SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

HR16DE (WITH EURO-OBD)

BASIC INSPECTION 22

DIAGNOSIS AND REPAIR WORKFLOW 22
Work Flow 22
Diagnostic Work Sheet 24

INSPECTION AND ADJUSTMENT 26

BASIC INSPECTION 26
BASIC INSPECTION : Special Repair Requirement 26

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT 29
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description 29
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement 29

IDLE SPEED 29
IDLE SPEED : Description 29
IDLE SPEED : Special Repair Requirement 30

IGNITION TIMING 30
IGNITION TIMING : Description 30
IGNITION TIMING : Special Repair Requirement 30

ACCELERATOR PEDAL RELEASED POSITION LEARNING 30
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description 30
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement 30

THROTTLE VALVE CLOSED POSITION LEARNING 31
THROTTLE VALVE CLOSED POSITION LEARNING : Description 31
THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement 31

IDLE AIR VOLUME LEARNING 31
IDLE AIR VOLUME LEARNING : Description 31
IDLE AIR VOLUME LEARNING : Special Repair Requirement 31

MIXTURE RATIO SELF-LEARNING VALUE CLEAR 33
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description 33
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement 33

FUNCTION DIAGNOSIS 34

ENGINE CONTROL SYSTEM 34
System Diagram 34
System Description 34
Component Parts Location 35
Component Description 39

MULTIPORT FUEL INJECTION SYSTEM 40
System Diagram 40
System Description 40
Component Parts Location 42
Component Description 47

ELECTRIC IGNITION SYSTEM 48
System Diagram 48
System Description 48
Component Parts Location 49
Component Description 53

AIR CONDITIONING CUT CONTROL 54
System Diagram 54
System Description 54
Component Parts Location 55
Component Description 59

AUTOMATIC SPEED CONTROL DEVICE (ASCD) 60
System Diagram 60
System Description 60

cardiagn.com

Component Parts Location 61
Component Description 66

CAN COMMUNICATION 67
System Description 67

COOLING FAN CONTROL 68
System Diagram 68
System Description 68
Component Parts Location 69
Component Description 73

EVAPORATIVE EMISSION SYSTEM 74
System Diagram 74
System Description 75
Component Parts Location 75
Component Description 80

INTAKE VALVE TIMING CONTROL 81
System Diagram 81
System Description 81
Component Parts Location 81
Component Description 86

ON BOARD DIAGNOSTIC (OBD) SYSTEM 87
Diagnosis Description 87
CONSULT-III Function 100
Diagnosis Tool Function 107

COMPONENT DIAGNOSIS 109

TROUBLE DIAGNOSIS - SPECIFICATION VALUE 109
Description 109
Component Function Check 109
Diagnosis Procedure 109

POWER SUPPLY AND GROUND CIRCUIT .. 117
Diagnosis Procedure 117

U1001 CAN COMM CIRCUIT 121
Description 121
DTC Logic 121
Diagnosis Procedure 121

U1010 CONTROL UNIT (CAN) 122
Description 122
DTC Logic 122
Diagnosis Procedure 122

P0011 IVT CONTROL 123
DTC Logic 123
Diagnosis Procedure 124
Component Inspection 125

P0102, P0103 MAF SENSOR 127
Description 127
DTC Logic 127
Diagnosis Procedure 128
Component Inspection 129

P0112, P0113 IAT SENSOR 132
Description 132
DTC Logic 132
Diagnosis Procedure 133
Component Inspection 133

P0117, P0118 ECT SENSOR 135
Description 135
DTC Logic 135
Diagnosis Procedure 136
Component Inspection 136

P0122, P0123 TP SENSOR 138
Description 138
DTC Logic 138
Diagnosis Procedure 138
Component Inspection 139
Special Repair Requirement 140

P0132 HO2S1 141
Description 141
DTC Logic 141
Diagnosis Procedure 142
Component Inspection 143

P0133 HO2S1 145
Description 145
DTC Logic 145
Diagnosis Procedure 146
Component Inspection 148

P0134 HO2S1 151
Description 151
DTC Logic 151
Diagnosis Procedure 152
Component Inspection 153

P0135 HO2S1 HEATER 156
Description 156
DTC Logic 156
Diagnosis Procedure 156
Component Inspection 158

P0138 HO2S2 159
Description 159
DTC Logic 159
Diagnosis Procedure 160
Component Inspection 161

P0139 HO2S2 164
Description 164
DTC Logic 164
Component Function Check 166
Diagnosis Procedure 167
Component Inspection 168

P0141 HO2S2 HEATER 171
Description 171
DTC Logic 171
Diagnosis Procedure 172
Component Inspection 173

cardiagn.com

P0171 FUEL INJECTION SYSTEM FUNCTION 174
DTC Logic 174
Diagnosis Procedure 175

P0172 FUEL INJECTION SYSTEM FUNCTION 178
DTC Logic 178
Diagnosis Procedure 179

P0222, P0223 TP SENSOR 182
Description 182
DTC Logic 182
Diagnosis Procedure 182
Component Inspection 183
Special Repair Requirement 184

P0300, P0301, P0302, P0303, P0304 MISFIRE 185
DTC Logic 185
Diagnosis Procedure 186

P0327, P0328 KS 191
Description 191
DTC Logic 191
Diagnosis Procedure 191
Component Inspection 192

P0335 CKP SENSOR (POS) 193
Description 193
DTC Logic 193
Diagnosis Procedure 194
Component Inspection 196

P0340 CMP SENSOR (PHASE) 197
Description 197
DTC Logic 197
Diagnosis Procedure 198
Component Inspection 199

P0420 THREE WAY CATALYST FUNCTION.. 201
DTC Logic 201
Component Function Check 202
Diagnosis Procedure 203

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 206
Description 206
DTC Logic 206
Diagnosis Procedure 206
Component Inspection 207

P0500 VSS 209
Description 209
DTC Logic 209
Component Function Check 210
Diagnosis Procedure 210

P0605 ECM 211
Description 211
DTC Logic 211
Diagnosis Procedure 212

P1065 ECM 213
Description 213
DTC Logic 213
Diagnosis Procedure 213

P1111 IVT CONTROL SOLENOID VALVE 215
Description 215
DTC Logic 215
Diagnosis Procedure 215
Component Inspection 216

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 217
Description 217
DTC Logic 217
Diagnosis Procedure 217
Special Repair Requirement 218

P1122 ELECTRIC THROTTLE CONTROL FUNCTION 219
Description 219
DTC Logic 219
Diagnosis Procedure 219
Component Inspection 221
Special Repair Requirement 222

P1124, P1126 THROTTLE CONTROL MOTOR RELAY 223
Description 223
DTC Logic 223
Diagnosis Procedure 223

P1128 THROTTLE CONTROL MOTOR 226
Description 226
DTC Logic 226
Diagnosis Procedure 226
Component Inspection 227
Special Repair Requirement 227

P1143 HO2S1 228
Description 228
DTC Logic 228
Diagnosis Procedure 229
Component Inspection 230

P1144 HO2S1 233
Description 233
DTC Logic 233
Diagnosis Procedure 234
Component Inspection 235

P1146 HO2S2 238
Description 238
DTC Logic 238
Component Function Check 240
Diagnosis Procedure 241
Component Inspection 242

P1147 HO2S2 245

cardiagn.com

Description 245
DTC Logic 245
Component Function Check 247
Diagnosis Procedure 248
Component Inspection 249

P1212 TCS COMMUNICATION LINE 252
Description 252
DTC Logic 252
Diagnosis Procedure 252

P1217 ENGINE OVER TEMPERATURE 253
DTC Logic 253
Component Function Check 253
Diagnosis Procedure 254

P1225 TP SENSOR 257
Description 257
DTC Logic 257
Diagnosis Procedure 257
Special Repair Requirement 258

P1226 TP SENSOR 259
Description 259
DTC Logic 259
Diagnosis Procedure 259
Special Repair Requirement 260

P1229 SENSOR POWER SUPPLY 261
DTC Logic 261
Diagnosis Procedure 261

P1564 ASCD STEERING SWITCH 263
Description 263
DTC Logic 263
Diagnosis Procedure 263
Component Inspection 265

P1572 ASCD BRAKE SWITCH 266
Description 266
DTC Logic 266
Diagnosis Procedure 267
Component Inspection (ASCD Brake Switch) 270
Component Inspection (ASCD Clutch Switch) 270
Component Inspection (Stop Lamp Switch) 271

P1574 ASCD VEHICLE SPEED SENSOR 272
Description 272
DTC Logic 272
Diagnosis Procedure 272

P1706 PNP SWITCH 274
Description 274
DTC Logic 274
Component Function Check 275
Diagnosis Procedure 275

P1805 BRAKE SWITCH 277
Description 277
DTC Logic 277
Diagnosis Procedure 277
Component Inspection (Stop Lamp Switch) 278

P2122, P2123 APP SENSOR 280
Description 280
DTC Logic 280
Diagnosis Procedure 280
Component Inspection 282
Special Repair Requirement 282

P2127, P2128 APP SENSOR 283
Description 283
DTC Logic 283
Diagnosis Procedure 283
Component Inspection 285
Special Repair Requirement 286

P2135 TP SENSOR 287
Description 287
DTC Logic 287
Diagnosis Procedure 287
Component Inspection 289
Special Repair Requirement 289

P2138 APP SENSOR 290
Description 290
DTC Logic 290
Diagnosis Procedure 290
Component Inspection 292
Special Repair Requirement 293

ASCD BRAKE SWITCH 294
Description 294
Component Function Check 294
Diagnosis Procedure 294
Component Inspection (ASCD Brake Switch) 296
Component Inspection (ASCD Clutch Switch) 296

ASCD INDICATOR 298
Description 298
Component Function Check 298
Diagnosis Procedure 298

COOLING FAN 299
Description 299
Component Function Check 299
Diagnosis Procedure 299
Component Inspection (Cooling Fan Motor) 300

ELECTRICAL LOAD SIGNAL 301
Description 301
Component Function Check 301
Diagnosis Procedure 301

FUEL INJECTOR 303
Description 303
Component Function Check 303
Diagnosis Procedure 303
Component Inspection 304

FUEL PUMP 306
Description 306

cardiagn.com

Component Function Check 306
Diagnosis Procedure 306
Component Inspection (Fuel Pump) 308

IGNITION SIGNAL 309
Description 309
Component Function Check 309
Diagnosis Procedure 309
Component Inspection (Ignition Coil with Power Transistor) 312
Component Inspection (Condenser) 312

MALFUNCTION INDICATOR 314
Description 314
Component Function Check 314
Diagnosis Procedure 314

POSITIVE CRANKCASE VENTILATION 315
Description 315
Component Inspection 315

REFRIGERANT PRESSURE SENSOR 316
Description 316
Component Function Check 316
Diagnosis Procedure 316

ECU DIAGNOSIS 318

ECM 318
Reference Value 318
Wiring Diagram - ENGINE CONTROL SYSTEM - 329
Fail Safe 339
DTC Inspection Priority Chart 341
DTC Index 341
How to Set SRT Code 343
Test Value and Test Limit 345

SYMPTOM DIAGNOSIS 346

ENGINE CONTROL SYSTEM SYMPTOMS ... 346
Symptom Table 346

NORMAL OPERATING CONDITION 350
Description 350

PRECAUTION 351

PRECAUTIONS 351
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 351
Precaution for Procedure without Cowl Top Cover. 351
Precautions For Xenon Headlamp Service 351
On Board Diagnostic (OBD) System of Engine 351
General Precautions 352

PREPARATION 355

PREPARATION 355
Special Service Tools 355
Commercial Service Tools 355

ON-VEHICLE MAINTENANCE 357

FUEL PRESSURE 357
Inspection 357

EVAPORATIVE EMISSION SYSTEM 359
Inspection 359

SERVICE DATA AND SPECIFICATIONS (SDS) 360

SERVICE DATA AND SPECIFICATIONS (SDS) 360
Idle Speed 360
Ignition Timing 360
Calculated Load Value 360
Mass Air Flow Sensor 360

HR16DE (WITHOUT EURO-OBD)

BASIC INSPECTION 361

DIAGNOSIS AND REPAIR WORKFLOW 361
Work Flow 361
Diagnostic Work Sheet 363

INSPECTION AND ADJUSTMENT 365

BASIC INSPECTION 365
BASIC INSPECTION : Special Repair Requirement 365

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT 368
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description 368
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement ... 368

IDLE SPEED 368
IDLE SPEED : Description 368
IDLE SPEED : Special Repair Requirement 369

IGNITION TIMING 369
IGNITION TIMING : Description 369
IGNITION TIMING : Special Repair Requirement. 369

ACCELERATOR PEDAL RELEASED POSITION LEARNING 369
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description 369
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement 369

THROTTLE VALVE CLOSED POSITION LEARNING 370
THROTTLE VALVE CLOSED POSITION LEARNING : Description 370
THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement 370

IDLE AIR VOLUME LEARNING 370
IDLE AIR VOLUME LEARNING : Description 370

cardiagn.com

IDLE AIR VOLUME LEARNING : Special Repair Requirement 370

MIXTURE RATIO SELF-LEARNING VALUE CLEAR 372
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description 372
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement 372

FUNCTION DIAGNOSIS 373

ENGINE CONTROL SYSTEM 373
System Diagram 373
System Description 373
Component Parts Location 374
Component Description 378

MULTIPORT FUEL INJECTION SYSTEM 379
System Diagram 379
System Description 379
Component Parts Location 381
Component Description 386

ELECTRIC IGNITION SYSTEM 387
System Diagram 387
System Description 387
Component Parts Location 388
Component Description 392

AIR CONDITIONING CUT CONTROL 393
System Diagram 393
System Description 393
Component Parts Location 394
Component Description 398

AUTOMATIC SPEED CONTROL DEVICE (ASCD) 399
System Diagram 399
System Description 399
Component Parts Location 400
Component Description 405

CAN COMMUNICATION 406
System Description 406

COOLING FAN CONTROL 407
System Diagram 407
System Description 407
Component Parts Location 408
Component Description 412

EVAPORATIVE EMISSION SYSTEM 413
System Diagram 413
System Description 414
Component Parts Location 414
Component Description 419

INTAKE VALVE TIMING CONTROL 420
System Diagram 420
System Description 420
Component Parts Location 420
Component Description 425

ON BOARD DIAGNOSTIC (OBD) SYSTEM ...426
Diagnosis Description 426
CONSULT-III Function 430

COMPONENT DIAGNOSIS 438

TROUBLE DIAGNOSIS - SPECIFICATION VALUE 438
Description 438
Component Function Check 438
Diagnosis Procedure 438

POWER SUPPLY AND GROUND CIRCUIT ...446
Diagnosis Procedure 446

U1001 CAN COMM CIRCUIT 450
Description 450
DTC Logic 450
Diagnosis Procedure 450

U1010 CONTROL UNIT (CAN) 451
Description 451
DTC Logic 451
Diagnosis Procedure 451

P0011 IVT CONTROL 452
DTC Logic 452
Component Function Check 453
Diagnosis Procedure 453
Component Inspection 455

P0102, P0103 MAF SENSOR 456
Description 456
DTC Logic 456
Diagnosis Procedure 457
Component Inspection 458

P0117, P0118 ECT SENSOR 461
Description 461
DTC Logic 461
Diagnosis Procedure 462
Component Inspection 462

P0122, P0123 TP SENSOR 464
Description 464
DTC Logic 464
Diagnosis Procedure 464
Component Inspection 465
Special Repair Requirement 466

P0132 HO2S1 467
Description 467
DTC Logic 467
Diagnosis Procedure 468
Component Inspection 469

P0134 HO2S1 471
Description 471
DTC Logic 471

cardiagn.com

Diagnosis Procedure 472
Component Inspection 473

P0138 HO2S2 475
Description 475
DTC Logic 475
Diagnosis Procedure 476
Component Inspection 477

P0222, P0223 TP SENSOR 480
Description 480
DTC Logic 480
Diagnosis Procedure 480
Component Inspection 481
Special Repair Requirement 482

P0327, P0328 KS 483
Description 483
DTC Logic 483
Diagnosis Procedure 483
Component Inspection 484

P0335 CKP SENSOR (POS) 485
Description 485
DTC Logic 485
Diagnosis Procedure 486
Component Inspection 488

P0340 CMP SENSOR (PHASE) 489
Description 489
DTC Logic 489
Diagnosis Procedure 490
Component Inspection 491

P0605 ECM 493
Description 493
DTC Logic 493
Diagnosis Procedure 494

P1065 ECM 495
Description 495
DTC Logic 495
Diagnosis Procedure 495

P1111 IVT CONTROL SOLENOID VALVE 497
Description 497
DTC Logic 497
Diagnosis Procedure 497
Component Inspection 498

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 499
Description 499
DTC Logic 499
Diagnosis Procedure 499
Special Repair Requirement 500

P1122 ELECTRIC THROTTLE CONTROL FUNCTION 501
Description 501
DTC Logic 501
Diagnosis Procedure 501
Component Inspection 503
Special Repair Requirement 504

P1124, P1126 THROTTLE CONTROL MOTOR RELAY 505
Description 505
DTC Logic 505
Diagnosis Procedure 505

P1128 THROTTLE CONTROL MOTOR 508
Description 508
DTC Logic 508
Diagnosis Procedure 508
Component Inspection 509
Special Repair Requirement 509

P1212 TCS COMMUNICATION LINE 510
Description 510
DTC Logic 510
Diagnosis Procedure 510

P1217 ENGINE OVER TEMPERATURE 511
DTC Logic 511
Component Function Check 511
Diagnosis Procedure 512

P1225 TP SENSOR 515
Description 515
DTC Logic 515
Diagnosis Procedure 515
Special Repair Requirement 516

P1226 TP SENSOR 517
Description 517
DTC Logic 517
Diagnosis Procedure 517
Special Repair Requirement 518

P1229 SENSOR POWER SUPPLY 519
DTC Logic 519
Diagnosis Procedure 519

P1564 ASCD STEERING SWITCH 521
Description 521
DTC Logic 521
Diagnosis Procedure 521
Component Inspection 523

P1572 ASCD BRAKE SWITCH 524
Description 524
DTC Logic 524
Component Function Check 525
Diagnosis Procedure 526
Component Inspection (ASCD Brake Switch) 529
Component Inspection (ASCD Clutch Switch) 529
Component Inspection (Stop Lamp Switch) 530

P1574 ASCD VEHICLE SPEED SENSOR 531
Description 531
DTC Logic 531

cardiagn.com

Diagnosis Procedure 531

P1706 PNP SWITCH 533
Description 533
DTC Logic 533
Component Function Check 534
Diagnosis Procedure 534

P1805 BRAKE SWITCH 536
Description 536
DTC Logic 536
Diagnosis Procedure 536
Component Inspection (Stop Lamp Switch) 537

P2122, P2123 APP SENSOR 539
Description 539
DTC Logic 539
Diagnosis Procedure 539
Component Inspection 541
Special Repair Requirement 541

P2127, P2128 APP SENSOR 542
Description 542
DTC Logic 542
Diagnosis Procedure 542
Component Inspection 544
Special Repair Requirement 545

P2135 TP SENSOR 546
Description 546
DTC Logic 546
Diagnosis Procedure 546
Component Inspection 548
Special Repair Requirement 548

P2138 APP SENSOR 549
Description 549
DTC Logic 549
Diagnosis Procedure 549
Component Inspection 551
Special Repair Requirement 552

ASCD BRAKE SWITCH 553
Description 553
Component Function Check 553
Diagnosis Procedure 553
Component Inspection (ASCD Brake Switch) 555
Component Inspection (ASCD Clutch Switch) 555

ASCD INDICATOR 557
Description 557
Component Function Check 557
Diagnosis Procedure 557

COOLING FAN 558
Description 558
Component Function Check 558
Diagnosis Procedure 558
Component Inspection (Cooling Fan Motor) 559

ELECTRICAL LOAD SIGNAL 560
Description 560
Component Function Check 560
Diagnosis Procedure 560

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 562
Description 562
Component Function Check 562
Diagnosis Procedure 562
Component Inspection 564

FUEL INJECTOR 565
Description 565
Component Function Check 565
Diagnosis Procedure 565
Component Inspection 566

FUEL PUMP 568
Description 568
Component Function Check 568
Diagnosis Procedure 568
Component Inspection (Fuel Pump) 570

HO2S1 571
Description 571
Component Function Check 571
Diagnosis Procedure 572
Component Inspection 573

HO2S1 HEATER 576
Description 576
Component Function Check 576
Diagnosis Procedure 576
Component Inspection 578

HO2S2 579
Description 579
Component Function Check 579
Diagnosis Procedure 580
Component Inspection 581

HO2S2 HEATER 583
Description 583
Component Function Check 583
Diagnosis Procedure 583
Component Inspection 585

IAT SENSOR 586
Description 586
Component Function Check 586
Diagnosis Procedure 586
Component Inspection 587

IGNITION SIGNAL 588
Description 588
Component Function Check 588
Diagnosis Procedure 588
Component Inspection (Ignition Coil with Power Transistor) 591
Component Inspection (Condenser) 591

cardiagn.com

MALFUNCTION INDICATOR 593
Description 593
Component Function Check 593
Diagnosis Procedure 593

POSITIVE CRANKCASE VENTILATION 594
Description 594
Component Inspection 594

REFRIGERANT PRESSURE SENSOR 595
Description 595
Component Function Check 595
Diagnosis Procedure 595

VSS 597
Description 597
Diagnosis Procedure 597

ECU DIAGNOSIS 598

ECM 598
Reference Value 598
Wiring Diagram - ENGINE CONTROL SYSTEM ... 608
Fail Safe 618
DTC Inspection Priority Chart 620
DTC Index 620

SYMPTOM DIAGNOSIS 623

ENGINE CONTROL SYSTEM SYMPTOMS ... 623
Symptom Table 623

NORMAL OPERATING CONDITION 627
Description 627

PRECAUTION 628

PRECAUTIONS 628
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 628
Precaution for Procedure without Cowl Top Cover. 628
Precautions For Xenon Headlamp Service 628
On Board Diagnostic (OBD) System of Engine 628
General Precautions 629

PREPARATION 632

PREPARATION 632
Special Service Tools 632
Commercial Service Tools 632

ON-VEHICLE MAINTENANCE 634

FUEL PRESSURE 634
Inspection 634

EVAPORATIVE EMISSION SYSTEM 636
Inspection 636

SERVICE DATA AND SPECIFICATIONS (SDS) 637

SERVICE DATA AND SPECIFICATIONS (SDS) 637
Idle Speed 637
Ignition Timing 637

MR20DE (WITH EURO-OBD)

BASIC INSPECTION 638

DIAGNOSIS AND REPAIR WORKFLOW 638
Work Flow 638
Diagnostic Work Sheet 640

INSPECTION AND ADJUSTMENT 642

BASIC INSPECTION 642
BASIC INSPECTION : Special Repair Requirement 642

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT 645
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description 645
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement ... 645

IDLE SPEED 646
IDLE SPEED : Description 646
IDLE SPEED : Special Repair Requirement 646

IGNITION TIMING 646
IGNITION TIMING : Description 646
IGNITION TIMING : Special Repair Requirement. 646

VIN REGISTRATION 646
VIN REGISTRATION : Description 646
VIN REGISTRATION : Special Repair Requirement 646

ACCELERATOR PEDAL RELEASED POSITION LEARNING 647
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description 647
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement 647

THROTTLE VALVE CLOSED POSITION LEARNING 647
THROTTLE VALVE CLOSED POSITION LEARNING : Description 647
THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement 647

IDLE AIR VOLUME LEARNING 647
IDLE AIR VOLUME LEARNING : Description 647
IDLE AIR VOLUME LEARNING : Special Repair Requirement 647

MIXTURE RATIO SELF-LEARNING VALUE CLEAR 649
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description 649

cardiagn.com

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement 649

FUNCTION DIAGNOSIS 650

ENGINE CONTROL SYSTEM 650
System Diagram 650
System Description 650
Component Parts Location 651
Component Description 655

MULTIPORT FUEL INJECTION SYSTEM 657
System Diagram 657
System Description 657
Component Parts Location 659
Component Description 664

ELECTRIC IGNITION SYSTEM 665
System Diagram 665
System Description 665
Component Parts Location 666
Component Description 670

AIR CONDITIONING CUT CONTROL 671
System Diagram 671
System Description 671
Component Parts Location 672
Component Description 676

AUTOMATIC SPEED CONTROL DEVICE (ASCD) 677
System Diagram 677
System Description 677
Component Parts Location 678
Component Description 683

CAN COMMUNICATION 684
System Description 684

COOLING FAN CONTROL 685
System Diagram 685
System Description 685
Component Parts Location 686
Component Description 691

EVAPORATIVE EMISSION SYSTEM 692
System Diagram 692
System Description 693
Component Parts Location 694
Component Description 699

INTAKE VALVE TIMING CONTROL 700
System Diagram 700
System Description 700
Component Parts Location 700
Component Description 705

ON BOARD DIAGNOSTIC (OBD) SYSTEM .. 706
Diagnosis Description 706
CONSULT-III Function 719
Diagnosis Tool Function 726

COMPONENT DIAGNOSIS 728

TROUBLE DIAGNOSIS - SPECIFICATION VALUE 728
Description 728
Component Function Check 728
Diagnosis Procedure 728

POWER SUPPLY AND GROUND CIRCUIT ...736
Diagnosis Procedure 736

U1001 CAN COMM CIRCUIT 740
Description 740
DTC Logic 740
Diagnosis Procedure 740

U1010 CONTROL UNIT (CAN) 741
Description 741
DTC Logic 741
Diagnosis Procedure 741

P0011 IVT CONTROL 742
DTC Logic 742
Diagnosis Procedure 743
Component Inspection 744

P0102, P0103 MAF SENSOR 746
Description 746
DTC Logic 746
Diagnosis Procedure 747
Component Inspection 748

P0112, P0113 IAT SENSOR 751
Description 751
DTC Logic 751
Diagnosis Procedure 752
Component Inspection 752

P0117, P0118 ECT SENSOR 754
Description 754
DTC Logic 754
Diagnosis Procedure 755
Component Inspection 755

P0122, P0123 TP SENSOR 757
Description 757
DTC Logic 757
Diagnosis Procedure 757
Component Inspection 758
Special Repair Requirement 759

P0132 HO2S1 760
Description 760
DTC Logic 760
Diagnosis Procedure 761
Component Inspection 762

P0133 HO2S1 764
Description 764
DTC Logic 764
Diagnosis Procedure 765

cardiagn.com

Component Inspection 767

P0134 HO2S1 770
Description 770
DTC Logic 770
Diagnosis Procedure 771
Component Inspection 772

P0135 HO2S1 HEATER 775
Description 775
DTC Logic 775
Diagnosis Procedure 775
Component Inspection 776

P0138 HO2S2 778
Description 778
DTC Logic 778
Diagnosis Procedure 779
Component Inspection 780

P0139 HO2S2 782
Description 782
DTC Logic 782
Component Function Check 784
Diagnosis Procedure 785
Component Inspection 786

P0141 HO2S2 HEATER 788
Description 788
DTC Logic 788
Diagnosis Procedure 788
Component Inspection 790

P0171 FUEL INJECTION SYSTEM FUNCTION 791
DTC Logic 791
Diagnosis Procedure 792

P0172 FUEL INJECTION SYSTEM FUNCTION 795
DTC Logic 795
Diagnosis Procedure 796

P0222, P0223 TP SENSOR 799
Description 799
DTC Logic 799
Diagnosis Procedure 799
Component Inspection 800
Special Repair Requirement 801

P0300, P0301, P0302, P0303, P0304 MISFIRE 802
DTC Logic 802
Diagnosis Procedure 803

P0327, P0328 KS 807
Description 807
DTC Logic 807
Diagnosis Procedure 807
Component Inspection 808

P0335 CKP SENSOR (POS) 809
Description 809
DTC Logic 809
Diagnosis Procedure 810
Component Inspection 812

P0340 CMP SENSOR (PHASE) 813
Description 813
DTC Logic 813
Diagnosis Procedure 814
Component Inspection 815

P0420 THREE WAY CATALYST FUNCTION . 817
DTC Logic 817
Component Function Check 818
Diagnosis Procedure 819

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 822
Description 822
DTC Logic 822
Diagnosis Procedure 822
Component Inspection 823

P0500 VSS 825
Description 825
DTC Logic 825
Component Function Check 826
Diagnosis Procedure 826

P0605 ECM 827
Description 827
DTC Logic 827
Diagnosis Procedure 828

P1111 IVT CONTROL SOLENOID VALVE 829
Description 829
DTC Logic 829
Diagnosis Procedure 829
Component Inspection 830

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 832
Description 832
DTC Logic 832
Diagnosis Procedure 832
Special Repair Requirement 833

P1122 ELECTRIC THROTTLE CONTROL FUNCTION 834
Description 834
DTC Logic 834
Diagnosis Procedure 834
Component Inspection 837
Special Repair Requirement 837

P1124, P1126 THROTTLE CONTROL MOTOR RELAY 838
Description 838
DTC Logic 838
Diagnosis Procedure 838

cardiagn.com

P1128 THROTTLE CONTROL MOTOR 841
Description 841
DTC Logic 841
Diagnosis Procedure 841
Component Inspection 842
Special Repair Requirement 842

P1143 HO2S1 844
Description 844
DTC Logic 844
Diagnosis Procedure 845
Component Inspection 846

P1144 HO2S1 849
Description 849
DTC Logic 849
Diagnosis Procedure 850
Component Inspection 851

P1146 HO2S2 854
Description 854
DTC Logic 854
Component Function Check 856
Diagnosis Procedure 857
Component Inspection 858

P1147 HO2S2 861
Description 861
DTC Logic 861
Component Function Check 863
Diagnosis Procedure 864
Component Inspection 865

P1211 TCS CONTROL UNIT 868
Description 868
DTC Logic 868
Diagnosis Procedure 868

P1212 TCS COMMUNICATION LINE 869
Description 869
DTC Logic 869
Diagnosis Procedure 869

P1217 ENGINE OVER TEMPERATURE 870
DTC Logic 870
Component Function Check 870
Diagnosis Procedure 871

P1225 TP SENSOR 874
Description 874
DTC Logic 874
Diagnosis Procedure 874
Special Repair Requirement 875

P1226 TP SENSOR 876
Description 876
DTC Logic 876
Diagnosis Procedure 876
Special Repair Requirement 877

P1229 SENSOR POWER SUPPLY 878
DTC Logic 878
Diagnosis Procedure 878

P1564 ASCD STEERING SWITCH 880
Description 880
DTC Logic 880
Diagnosis Procedure 880
Component Inspection 882

P1572 ASCD BRAKE SWITCH 883
Description 883
DTC Logic 883
Diagnosis Procedure 884
Component Inspection (ASCD Brake Switch) 888
Component Inspection (ASCD Clutch Switch) 888
Component Inspection (Stop Lamp Switch) 889

P1574 ASCD VEHICLE SPEED SENSOR 890
Description 890
DTC Logic 890
Diagnosis Procedure 890

P1706 PNP SWITCH 892
Description 892
DTC Logic 892
Component Function Check 893
Diagnosis Procedure 893

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR) 895
Description 895
DTC Logic 895
Diagnosis Procedure 895

P1805 BRAKE SWITCH 896
Description 896
DTC Logic 896
Diagnosis Procedure 896
Component Inspection (Stop Lamp Switch) 897

P2122, P2123 APP SENSOR 899
Description 899
DTC Logic 899
Diagnosis Procedure 899
Component Inspection 901
Special Repair Requirement 901

P2127, P2128 APP SENSOR 902
Description 902
DTC Logic 902
Diagnosis Procedure 902
Component Inspection 904
Special Repair Requirement 905

P2135 TP SENSOR 906
Description 906
DTC Logic 906
Diagnosis Procedure 906
Component Inspection 908
Special Repair Requirement 908

cardiagn.com

P2138 APP SENSOR 909
Description 909
DTC Logic 909
Diagnosis Procedure 909
Component Inspection 911
Special Repair Requirement 912

ASCD BRAKE SWITCH 913
Description 913
Component Function Check 913
Diagnosis Procedure 913
Component Inspection (ASCD Brake Switch) 915
Component Inspection (ASCD Clutch Switch) 916

ASCD INDICATOR 917
Description 917
Component Function Check 917
Diagnosis Procedure 917

COOLING FAN 918
Description 918
Component Function Check 918
Diagnosis Procedure 918
Component Inspection (Cooling Fan Motor) 920
Component Inspection (Cooling Fan Relay) 920

ELECTRICAL LOAD SIGNAL 921
Description 921
Component Function Check 921
Diagnosis Procedure 921

FUEL INJECTOR 923
Description 923
Component Function Check 923
Diagnosis Procedure 923
Component Inspection 924

FUEL PUMP 926
Description 926
Component Function Check 926
Diagnosis Procedure 926
Component Inspection (Fuel Pump) 928

IGNITION SIGNAL 929
Description 929
Component Function Check 929
Diagnosis Procedure 929
Component Inspection (Ignition Coil with Power Transistor) 932
Component Inspection (Condenser) 932

MALFUNCTION INDICATOR 934
Description 934
Component Function Check 934
Diagnosis Procedure 934

POSITIVE CRANKCASE VENTILATION 935
Description 935
Component Inspection 935

REFRIGERANT PRESSURE SENSOR 936
Description 936
Component Function Check 936
Diagnosis Procedure 936

ECU DIAGNOSIS 938

ECM 938
Reference Value 938
Wiring Diagram - ENGINE CONTROL SYSTEM - 949
Fail Safe 959
DTC Inspection Priority Chart 961
DTC Index 962
How to Set SRT Code 964
Test Value and Test Limit 966

SYMPTOM DIAGNOSIS 967

ENGINE CONTROL SYSTEM 967
Symptom Table 967

NORMAL OPERATING CONDITION 971
Description 971

PRECAUTION 972

PRECAUTIONS 972
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 972
Precaution for Procedure without Cowl Top Cover 972
On Board Diagnostic (OBD) System of Engine and CVT 972
General Precautions 972

PREPARATION 976

PREPARATION 976
Special Service Tools 976
Commercial Service Tools 976

ON-VEHICLE REPAIR 978

FUEL PRESSURE 978
Inspection 978

EVAPORATIVE EMISSION SYSTEM 980
Inspection 980

SERVICE DATA AND SPECIFICATIONS (SDS) 981

SERVICE DATA AND SPECIFICATIONS (SDS) 981
Idle Speed 981
Ignition Timing 981
Calculated Load Value 981
Mass Air Flow Sensor 981

MR20DE (WITHOUT EURO-OBD)

BASIC INSPECTION 982

DIAGNOSIS AND REPAIR WORKFLOW 982

cardiagn.com

Work Flow 982
Diagnostic Work Sheet 984

INSPECTION AND ADJUSTMENT 986

BASIC INSPECTION 986
BASIC INSPECTION : Special Repair Requirement 986

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT 989
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description 989
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement ...989

IDLE SPEED 990
IDLE SPEED : Description 990
IDLE SPEED : Special Repair Requirement 990

IGNITION TIMING 990
IGNITION TIMING : Description 990
IGNITION TIMING : Special Repair Requirement..990

VIN REGISTRATION 990
VIN REGISTRATION : Description 990
VIN REGISTRATION : Special Repair Requirement 990

ACCELERATOR PEDAL RELEASED POSITION LEARNING 991
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description 991
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement 991

THROTTLE VALVE CLOSED POSITION LEARNING 991
THROTTLE VALVE CLOSED POSITION LEARNING : Description 991
THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement 991

IDLE AIR VOLUME LEARNING 991
IDLE AIR VOLUME LEARNING : Description 991
IDLE AIR VOLUME LEARNING : Special Repair Requirement 991

MIXTURE RATIO SELF-LEARNING VALUE CLEAR 993
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description 993
MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement 993

FUNCTION DIAGNOSIS 994

ENGINE CONTROL SYSTEM 994
System Diagram 994
System Description 994
Component Parts Location 995
Component Description 999

MULTIPORT FUEL INJECTION SYSTEM 1001
System Diagram 1001
System Description 1001
Component Parts Location 1003
Component Description 1008

ELECTRIC IGNITION SYSTEM 1009
System Diagram 1009
System Description 1009
Component Parts Location 1010
Component Description 1014

AIR CONDITIONING CUT CONTROL 1015
System Diagram 1015
System Description 1015
Component Parts Location 1016
Component Description 1020

AUTOMATIC SPEED CONTROL DEVICE (ASCD) 1021
System Diagram 1021
System Description 1021
Component Parts Location 1022
Component Description 1027

CAN COMMUNICATION 1028
System Description 1028

COOLING FAN CONTROL 1029
System Diagram 1029
System Description 1029
Component Parts Location 1030
Component Description 1035

EVAPORATIVE EMISSION SYSTEM 1036
System Diagram 1036
System Description 1037
Component Parts Location 1038
Component Description 1043

INTAKE VALVE TIMING CONTROL 1044
System Diagram 1044
System Description 1044
Component Parts Location 1044
Component Description 1049

ON BOARD DIAGNOSTIC (OBD) SYSTEM ..1050
Diagnosis Description 1050
CONSULT-III Function 1054

COMPONENT DIAGNOSIS 1061

TROUBLE DIAGNOSIS - SPECIFICATION VALUE 1061
Description 1061
Component Function Check 1061
Diagnosis Procedure 1061

POWER SUPPLY AND GROUND CIRCUIT ..1069
Diagnosis Procedure 1069

cardiagn.com

U1001 CAN COMM CIRCUIT 1073
Description 1073
DTC Logic 1073
Diagnosis Procedure 1073

U1010 CONTROL UNIT (CAN) 1074
Description 1074
DTC Logic 1074
Diagnosis Procedure 1074

P0011 IVT CONTROL 1075
DTC Logic 1075
Diagnosis Procedure 1076
Component Inspection 1077

P0102, P0103 MAF SENSOR 1079
Description 1079
DTC Logic 1079
Diagnosis Procedure 1080
Component Inspection 1081

P0117, P0118 ECT SENSOR 1084
Description 1084
DTC Logic 1084
Diagnosis Procedure 1085
Component Inspection 1085

P0122, P0123 TP SENSOR 1087
Description 1087
DTC Logic 1087
Diagnosis Procedure 1087
Component Inspection 1088
Special Repair Requirement 1089

P0132 HO2S1 1090
Description 1090
DTC Logic 1090
Diagnosis Procedure 1091
Component Inspection 1092

P0134 HO2S1 1094
Description 1094
DTC Logic 1094
Diagnosis Procedure 1095
Component Inspection 1096

P0222, P0223 TP SENSOR 1098
Description 1098
DTC Logic 1098
Diagnosis Procedure 1098
Component Inspection 1099
Special Repair Requirement 1100

P0327, P0328 KS 1101
Description 1101
DTC Logic 1101
Diagnosis Procedure 1101
Component Inspection 1102

P0335 CKP SENSOR (POS) 1103
Description 1103
DTC Logic 1103
Diagnosis Procedure 1104
Component Inspection 1106

P0340 CMP SENSOR (PHASE) 1107
Description 1107
DTC Logic 1107
Diagnosis Procedure 1108
Component Inspection 1109

P0605 ECM 1111
Description 1111
DTC Logic 1111
Diagnosis Procedure 1112

P1111 IVT CONTROL SOLENOID VALVE ...1113
Description 1113
DTC Logic 1113
Diagnosis Procedure 1113
Component Inspection 1114

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR 1116
Description 1116
DTC Logic 1116
Diagnosis Procedure 1116
Special Repair Requirement 1117

P1122 ELECTRIC THROTTLE CONTROL FUNCTION 1118
Description 1118
DTC Logic 1118
Diagnosis Procedure 1118
Component Inspection 1121
Special Repair Requirement 1121

P1124, P1126 THROTTLE CONTROL MOTOR RELAY 1122
Description 1122
DTC Logic 1122
Diagnosis Procedure 1122

P1128 THROTTLE CONTROL MOTOR 1125
Description 1125
DTC Logic 1125
Diagnosis Procedure 1125
Component Inspection 1126
Special Repair Requirement 1126

P1212 TCS COMMUNICATION LINE 1128
Description 1128
DTC Logic 1128
Diagnosis Procedure 1128

P1217 ENGINE OVER TEMPERATURE 1129
DTC Logic 1129
Component Function Check 1129
Diagnosis Procedure 1130

P1225 TP SENSOR 1133
Description 1133

cardiagn.com

DTC Logic 1133
Diagnosis Procedure 1133
Special Repair Requirement 1134

P1226 TP SENSOR 1135
Description 1135
DTC Logic 1135
Diagnosis Procedure 1135
Special Repair Requirement 1136

P1229 SENSOR POWER SUPPLY 1137
DTC Logic 1137
Diagnosis Procedure 1137

P1564 ASCD STEERING SWITCH 1139
Description 1139
DTC Logic 1139
Diagnosis Procedure 1139
Component Inspection 1141

P1572 ASCD BRAKE SWITCH 1142
Description 1142
DTC Logic 1142
Component Function Check 1143
Diagnosis Procedure 1144
Component Inspection (ASCD Brake Switch) 1148
Component Inspection (ASCD Clutch Switch) 1148
Component Inspection (Stop Lamp Switch) 1149

P1574 ASCD VEHICLE SPEED SENSOR 1150
Description 1150
DTC Logic 1150
Diagnosis Procedure 1150

P1706 PNP SWITCH 1152
Description 1152
DTC Logic 1152
Component Function Check 1153
Diagnosis Procedure 1153

P1805 BRAKE SWITCH 1155
Description 1155
DTC Logic 1155
Diagnosis Procedure 1155
Component Inspection (Stop Lamp Switch) 1156

P2122, P2123 APP SENSOR 1158
Description 1158
DTC Logic 1158
Diagnosis Procedure 1158
Component Inspection 1160
Special Repair Requirement 1160

P2127, P2128 APP SENSOR 1161
Description 1161
DTC Logic 1161
Diagnosis Procedure 1161
Component Inspection 1163
Special Repair Requirement 1164

P2135 TP SENSOR 1165
Description 1165
DTC Logic 1165
Diagnosis Procedure 1165
Component Inspection 1167
Special Repair Requirement 1167

P2138 APP SENSOR 1168
Description 1168
DTC Logic 1168
Diagnosis Procedure 1168
Component Inspection 1170
Special Repair Requirement 1171

ASCD BRAKE SWITCH 1172
Description 1172
Component Function Check 1172
Diagnosis Procedure 1172
Component Inspection (ASCD Brake Switch) 1174
Component Inspection (ASCD Clutch Switch) 1175

ASCD INDICATOR 1176
Description 1176
Component Function Check 1176
Diagnosis Procedure 1176

COOLING FAN 1177
Description 1177
Component Function Check 1177
Diagnosis Procedure 1177
Component Inspection (Cooling Fan Motor) 1179
Component Inspection (Cooling Fan Relay) 1179

ELECTRICAL LOAD SIGNAL 1180
Description 1180
Component Function Check 1180
Diagnosis Procedure 1180

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE 1182
Description 1182
Component Function Check 1182
Diagnosis Procedure 1182
Component Inspection 1184

FUEL INJECTOR 1185
Description 1185
Component Function Check 1185
Diagnosis Procedure 1185
Component Inspection 1186

FUEL PUMP 1188
Description 1188
Component Function Check 1188
Diagnosis Procedure 1188
Component Inspection (Fuel Pump) 1190

HO2S1 1191
Description 1191
Component Function Check 1191
Diagnosis Procedure 1192
Component Inspection 1193

cardiagn.com

HO2S1 HEATER 1196
Description 1196
Component Function Check 1196
Diagnosis Procedure 1196
Component Inspection 1198

HO2S2 1199
Description 1199
Component Function Check 1199
Diagnosis Procedure 1200
Component Inspection 1201

HO2S2 HEATER 1203
Description 1203
Component Function Check 1203
Diagnosis Procedure 1203
Component Inspection 1205

IAT SENSOR 1206
Description 1206
Component Function Check 1206
Diagnosis Procedure 1206
Component Inspection 1207

IGNITION SIGNAL 1208
Description 1208
Component Function Check 1208
Diagnosis Procedure 1208
Component Inspection (Ignition Coil with Power Transistor) 1211
Component Inspection (Condenser) 1211

MALFUNCTION INDICATOR 1213
Description 1213
Component Function Check 1213
Diagnosis Procedure 1213

POSITIVE CRANKCASE VENTILATION 1214
Description 1214
Component Inspection 1214

REFRIGERANT PRESSURE SENSOR 1215
Description 1215
Component Function Check 1215
Diagnosis Procedure 1215

VSS 1217
Description 1217
Diagnosis Procedure 1217

ECU DIAGNOSIS 1218

ECM 1218
Reference Value 1218
Wiring Diagram - ENGINE CONTROL SYSTEM -1229
Fail Safe 1239
DTC Inspection Priority Chart 1241
DTC Index 1241

SYMPTOM DIAGNOSIS 1243

ENGINE CONTROL SYSTEM 1243
Symptom Table 1243

NORMAL OPERATING CONDITION 1247
Description 1247

PRECAUTION 1248

PRECAUTIONS 1248
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 1248
Precaution for Procedure without Cowl Top Cover1248
On Board Diagnostic (OBD) System of Engine and CVT 1248
General Precautions 1248

PREPARATION 1252

PREPARATION 1252
Special Service Tools 1252
Commercial Service Tools 1252

ON-VEHICLE REPAIR 1254

FUEL PRESSURE 1254
Inspection 1254

EVAPORATIVE EMISSION SYSTEM 1256
Inspection 1256

SERVICE DATA AND SPECIFICATIONS (SDS) 1257

SERVICE DATA AND SPECIFICATIONS (SDS) 1257
Idle Speed 1257
Ignition Timing 1257
Mass Air Flow Sensor 1257

K9K

BASIC INSPECTION 1258

DIAGNOSIS AND REPAIR WORKFLOW 1258
Work Flow 1258
Diagnostic Work Sheet 1260

INSPECTION AND ADJUSTMENT 1262

BASIC INSPECTION 1262
BASIC INSPECTION : Description 1262
BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check) 1262
BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check) 1263
BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check] 1263

cardiagn.com

BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check] 1264
BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check) 1267
BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open) 1271
BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity) 1272

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT 1273
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description 1273
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement .1273

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING 1274
EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Description 1274
EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement 1274

FUNCTION DIAGNOSIS 1276

ENGINE CONTROL SYSTEM 1276
System Diagram 1276
System Description 1277
Component Parts Location 1277
Component Description 1280

FUEL INJECTION CONTROL 1281
System Description 1281
Component Parts Location 1282

TURBOCHARGER BOOST CONTROL 1287
Vacuum Hose Drawing 1287
System Description 1287
Component Parts Location 1287

EGR SYSTEM 1292
System Description 1292
Component Parts Location 1292

IDLE SPEED CONTROL 1296
System Diagram 1296
System Description 1296
Component Parts Location 1296

ENGINE TORQUE CONTROL 1301
System Description 1301
Component Parts Location 1301

GLOW CONTROL 1305
System Description 1305
Component Parts Location 1305

COOLING FAN CONTROL 1309
System Description 1309
Component Parts Location 1309

CAN COMMUNICATION 1314
System Description 1314

ON BOARD DIAGNOSTIC (OBD) SYSTEM ..1315
Diagnosis Description 1315

COMPONENT DIAGNOSIS 1317

POWER SUPPLY AND GROUND CIRCUIT ..1317
Diagnosis Procedure 1317

P0001 FUEL PUMP 1320
DTC Logic 1320
Diagnosis Procedure 1320
Component Inspection 1321

P0002 FUEL PUMP 1322
DTC Logic 1322
Diagnosis Procedure 1322
Component Inspection 1323

P0016 CKP - CMP CORRELATION 1324
DTC Logic 1324
Diagnosis Procedure 1324
Component Inspection 1325

P0045 TC BOOST CONTROL SOLENOID VALVE 1327
DTC Logic 1327
Diagnosis Procedure 1327
Component Inspection 1328

P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION 1329
DTC Logic 1329
Diagnosis Procedure 1329
Component Inspection 1330

P0087 FUEL PUMP 1331
DTC Logic 1331
Diagnosis Procedure 1331

P0090 FUEL PUMP 1333
DTC Logic 1333
Diagnosis Procedure 1333
Component Inspection 1334

P0100 MAF SENSOR 1335
Description 1335
DTC Logic 1335
Diagnosis Procedure 1335
Component Inspection 1337

P0101 MAF SENSOR 1338
Description 1338
DTC Logic 1338
Diagnosis Procedure 1338
Component Inspection 1340

cardiagn.com

P0110 IAT SENSOR 1341
Description 1341
DTC Logic 1341
Diagnosis Procedure 1341
Component Inspection 1342

P0115 ECT SENSOR 1343
Description 1343
DTC Logic 1343
Diagnosis Procedure 1343
Component Inspection 1344

P0120 ELECTRIC THROTTLE CONTROL ACTUATOR 1345
Description 1345
DTC Logic 1345
Diagnosis Procedure 1345

P0180 FPT SENSOR 1347
Description 1347
DTC Logic 1347
Diagnosis Procedure 1347
Component Inspection 1348

P0190 FRP SENSOR 1349
Description 1349
DTC Logic 1349
Diagnosis Procedure 1349
Component Inspection 1350

P0200 FUEL INJECTOR 1351
DTC Logic 1351
Diagnosis Procedure 1351
Component Inspection 1352

P0201, P0202, P0203, P0204 FUEL INJECTOR 1353
DTC Logic 1353
Diagnosis Procedure 1353
Component Inspection 1354

P0217 ENGINE OVER TEMPERATURE 1355
DTC Logic 1355
Diagnosis Procedure 1355

P0225 APP SENSOR 1358
Description 1358
DTC Logic 1358
Diagnosis Procedure 1358
Component Inspection 1359

P0235 TC BOOST SENSOR 1361
Description 1361
DTC Logic 1361
Diagnosis Procedure 1361
Component Inspection 1362

P0335 CKP SENSOR 1363
DTC Logic 1363
Diagnosis Procedure 1363
Component Inspection 1364

P0340 CMP SENSOR 1365
DTC Logic 1365
Diagnosis Procedure 1365
Component Inspection 1366

P0380 GLOW RELAY 1368
DTC Logic 1368
Diagnosis Procedure 1368

P0381 GLOW CONTROL SYSTEM 1370
DTC Logic 1370
Diagnosis Procedure 1370
Component Inspection 1371

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR 1372
DTC Logic 1372
Diagnosis Procedure 1372

P0487 EGR VOLUME CONTROL VALVE 1374
DTC Logic 1374
Diagnosis Procedure 1374
Component Inspection 1375

P0488 EGR SYSTEM 1376
DTC Logic 1376
Diagnosis Procedure 1376
Component Inspection 1378

P0500 VSS 1379
Description 1379
DTC Logic 1379
Diagnosis Procedure 1379

P0530 REFRIGERANT PRESSURE SENSOR 1380
Description 1380
DTC Logic 1380
Diagnosis Procedure 1380

P0560 BATTERY VOLTAGE 1382
DTC Logic 1382
Diagnosis Procedure 1382

P0571 ASCD BRAKE SWITCH 1385
DTC Logic 1385
Diagnosis Procedure 1385
Component Inspection 1386

P0575 ASCD STEERING SWITCH 1388
Description 1388
DTC Logic 1388
Diagnosis Procedure 1388
Component Inspection 1389

P0606 ECM 1391
Description 1391
DTC Logic 1391
Diagnosis Procedure 1391

P0641 SENSOR POWER SUPPLY 1393

cardiagn.com

DTC Logic 1393
Diagnosis Procedure 1393

P0651 SENSOR POWER SUPPLY 1395
DTC Logic 1395
Diagnosis Procedure 1395

P0685 ECM RELAY 1397
DTC Logic 1397
Diagnosis Procedure 1397

P0812 PNP SWITCH 1399
DTC Logic 1399
Diagnosis Procedure 1399

P0830 ASCD CLUTCH SWITCH 1400
Description 1400
DTC Logic 1400
Diagnosis Procedure 1400
Component Inspection 1401

P1089 FUEL PUMP 1402
DTC Logic 1402
Diagnosis Procedure 1402

P2101 ELECTRIC THROTTLE CONTROL FUNCTION 1404
Description 1404
DTC Logic 1404
Diagnosis Procedure 1404
Component Inspection 1405

P2120 APP SENSOR 1407
Description 1407
DTC Logic 1407
Diagnosis Procedure 1407
Component Inspection 1408

P2226 BARO SENSOR 1409
Description 1409
DTC Logic 1409
Diagnosis Procedure 1409

P2263 TC SYSTEM 1410
DTC Logic 1410
Diagnosis Procedure 1410

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY 1412
DTC Logic 1412
Diagnosis Procedure 1412

P2413 EGR SYSTEM 1415
DTC Logic 1415
Diagnosis Procedure 1415

P2502 BATTERY VOLTAGE 1418
DTC Logic 1418
Diagnosis Procedure 1418

P2610 ENGINE SAFETY STOP 1419
DTC Logic 1419
Diagnosis Procedure 1419

ASCD INDICATOR 1421
Description 1421
Component Function Check 1421
Diagnosis Procedure 1421

COOLING FAN 1422
Description 1422
Component Function Check 1422
Diagnosis Procedure 1422
Component Inspection (Cooling Fan Motor) 1424
Component Inspection (Cooling Fan Relay) 1424

STOP LAMP SWITCH 1425
Description 1425
Component Function Check 1425
Diagnosis Procedure 1425
Component Inspection 1426

ECU DIAGNOSIS 1427

ECM 1427
Wiring Diagram - ENGINE CONTROL SYSTEM -1427
DTC Index 1437

SYMPTOM DIAGNOSIS 1440

ENGINE CONTROL SYSTEM SYMPTOMS ..1440
Symptom Table 1440

NOT COMMUNICATION WITH THE ECM 1441
Description 1441
Diagnosis Procedure 1441

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY 1442
Description 1442
Diagnosis Procedure 1442

STARTING DIFFICULT WITH COLD ENGINE1444
Description 1444
Diagnosis Procedure 1444

IMPOSSIBLE TO SHUT OFF ENGINE 1446
Description 1446
Diagnosis Procedure 1446

ENGINE IDLE SPEED TOO HIGH 1447
Description 1447
Diagnosis Procedure 1447

ENGINE IDLE SPEED TOO LOW OR UNSTABLE 1448
Description 1448
Diagnosis Procedure 1448

ENGINE STALLING 1450
Description 1450
Diagnosis Procedure 1450

cardiagn.com

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED 1452
Description 1452
Diagnosis Procedure 1452

ENGINE BUCKING 1455
Description 1455
Diagnosis Procedure 1455

ERRATIC ACCELERATION 1457
Description 1457
Diagnosis Procedure 1457

NO ENGINE BRAKING 1459
Description 1459
Diagnosis Procedure 1459

LOSS OF POWER 1460
Description 1460
Diagnosis Procedure 1460

TOO MUCH POWER 1463
Description 1463
Diagnosis Procedure 1463

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE 1465
Description 1465
Diagnosis Procedure 1465

EXCESSIVE CONSUMPTION 1466
Description 1466
Diagnosis Procedure 1466

ENGINE KNOCK 1468
Description 1468
Diagnosis Procedure 1468

ENGINE OVERHEATING 1470
Description 1470
Diagnosis Procedure 1470

ENGINE SMOKES WHEN STARTED 1471
Description 1471
Diagnosis Procedure 1471

ENGINE EMITS BLUE SMOKE 1472
Description 1472
Diagnosis Procedure 1472

ENGINE SMOKES WHEN REVVED 1474
Description 1474
Diagnosis Procedure 1474

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING) 1475
Description 1475
Diagnosis Procedure 1475

EMISSION CONTROL NOT SATISFACTORY1476
Description 1476
Diagnosis Procedure 1476

PRECAUTION 1478

PRECAUTIONS 1478
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 1478
Precaution for Procedure without Cowl Top Cover1478
On Board Diagnostic (OBD) System of Engine ..1478
General Precautions 1478
Cleanliness 1481

SERVICE DATA AND SPECIFICATIONS (SDS) 1483

SERVICE DATA AND SPECIFICATIONS (SDS) 1483
Idle Speed 1483

cardiagn.com

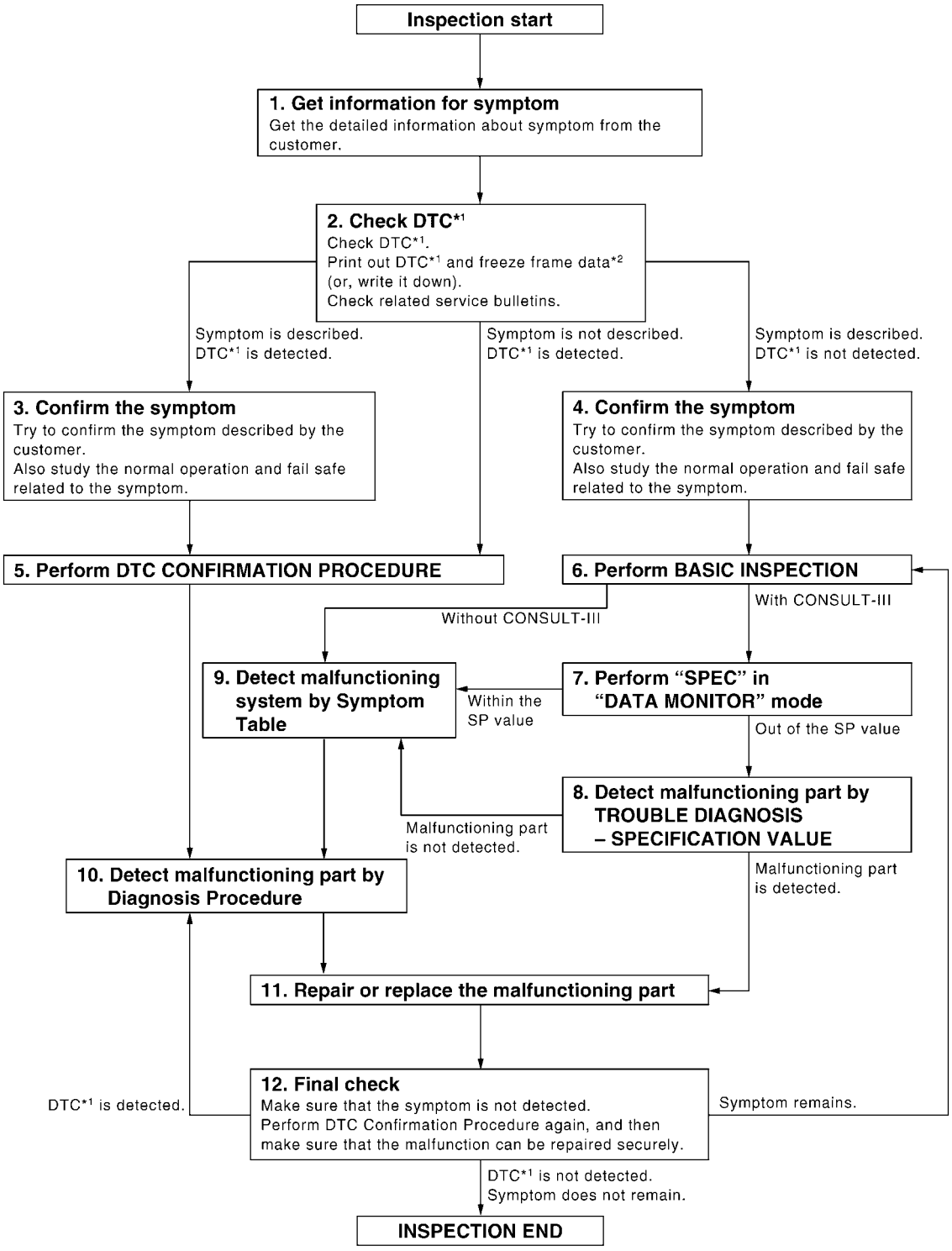
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001056110

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

JMBIA0078GB

DETAILED FLOW

cardiagn.com

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-24, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-87, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-346, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-350, "Description" and EC-339, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-350, "Description" and EC-339, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-341, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to EC-341, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-26, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 7.
NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to EC-109, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-109, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-346, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-318, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to EC-87, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to EC-87, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in EC-343, "How to Set SRT Code".

Diagnostic Work Sheet

INFOID:0000000001056111

DESCRIPTION

cardiagn.com

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:
Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms — ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms — ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms — ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather conditions — Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Weather conditions — Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

MTBL0017

cardiagn.com

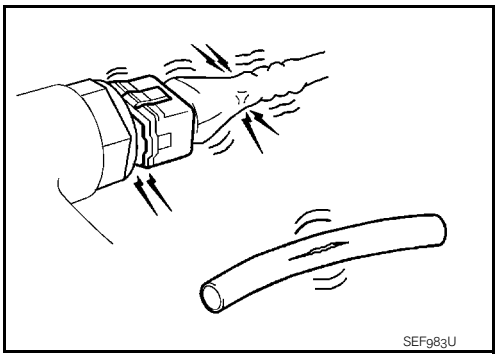
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

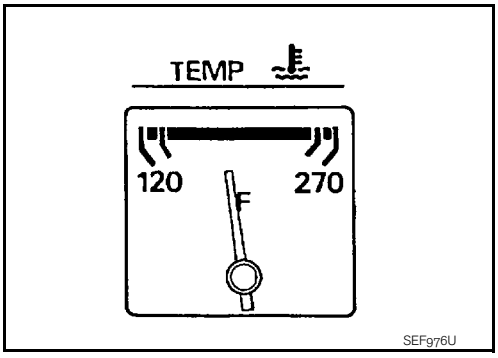
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001056112

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.


SEF983U

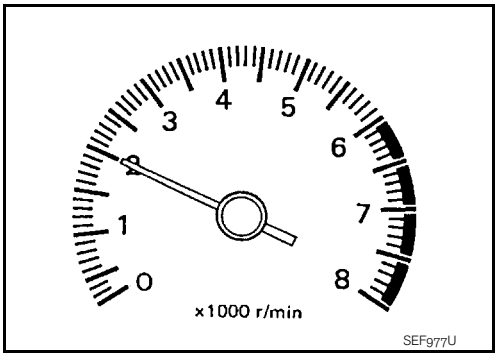


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

YES >> GO TO 2.
NO >> GO TO 3.



SEF977U

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

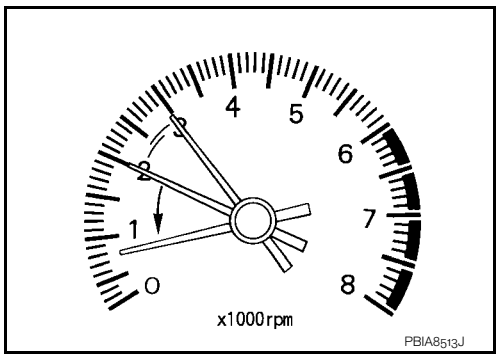
>> GO TO 3

3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

cardiagn.com

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-30, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-360, "Idle Speed".



Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-30, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-360, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-197, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-193, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

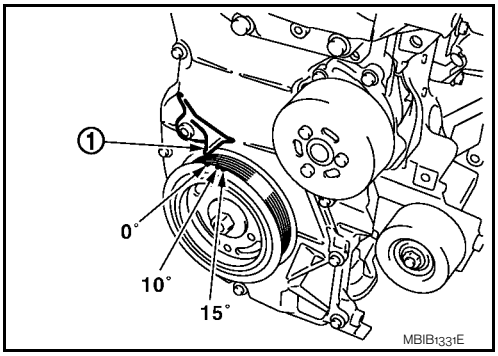
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

cardiagn.com

2. Check ignition timing with a timing light.
For procedure, refer to EC-30, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-360, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

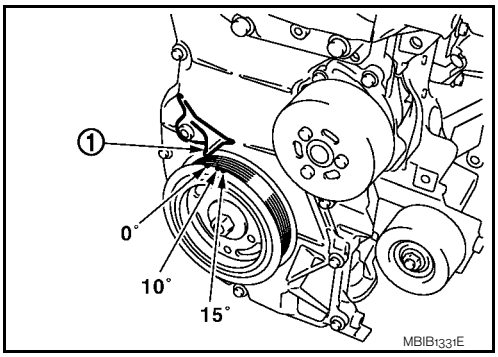
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-30, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-360, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-30, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-360, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-46, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

cardiagn.com

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-197, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-193, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001056113

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001056114

1. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 2.

2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001056115

This describes how to check the idle speed. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

cardiagn.com

IDLE SPEED : Special Repair Requirement

INFOID:0000000001056116

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.
With GST
Check idle speed with Service $01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001056117

This describes how to check the ignition timing. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

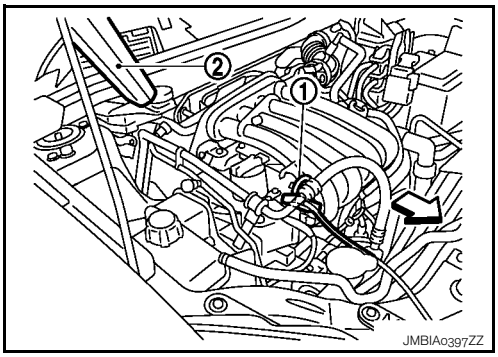
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001056118

1.CHECK IGNITION TIMING

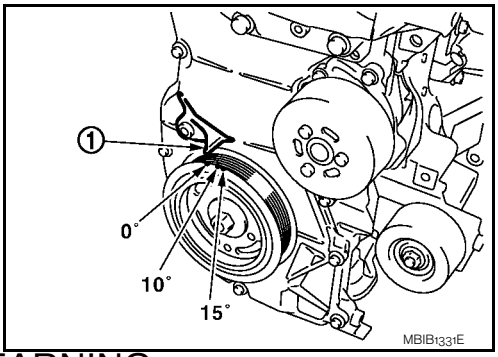
1. Attach timing light to No.1 ignition coil wire harness (1) as shown.

   2 : Timing light
   ⇦ : Vehicle front



2. Check ignition timing.

   1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001056121

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001056122

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001056123

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001056124

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001056125

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001056126

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/neutral position switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Drive vehicle for 10 minutes

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.IDLE AIR VOLUME LEARNING

With CONSULT-III
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.

cardiagn.com

5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

YES >> GO TO 4.
NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

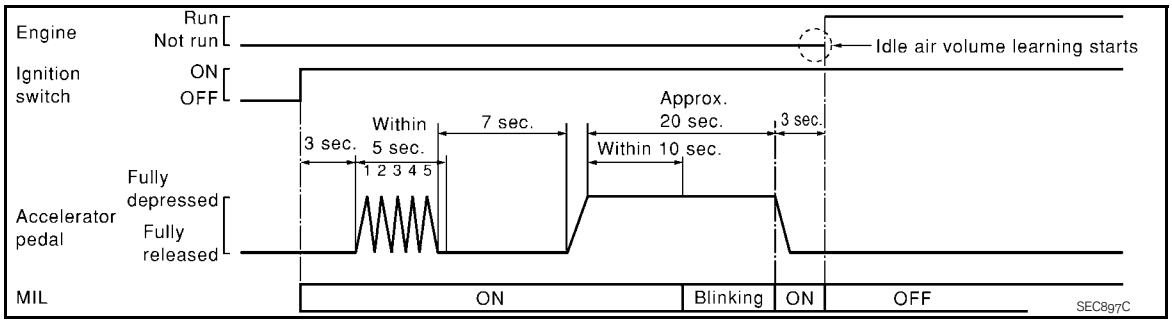
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

For specification, refer to EC-360, "Idle Speed" and EC-360, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

cardiagn.com

It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-109, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001056127

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:0000000001056128

1.START

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear mixture ratio self-learning value by touching “CLEAR”.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST to erase the DTC P0102.

>> END

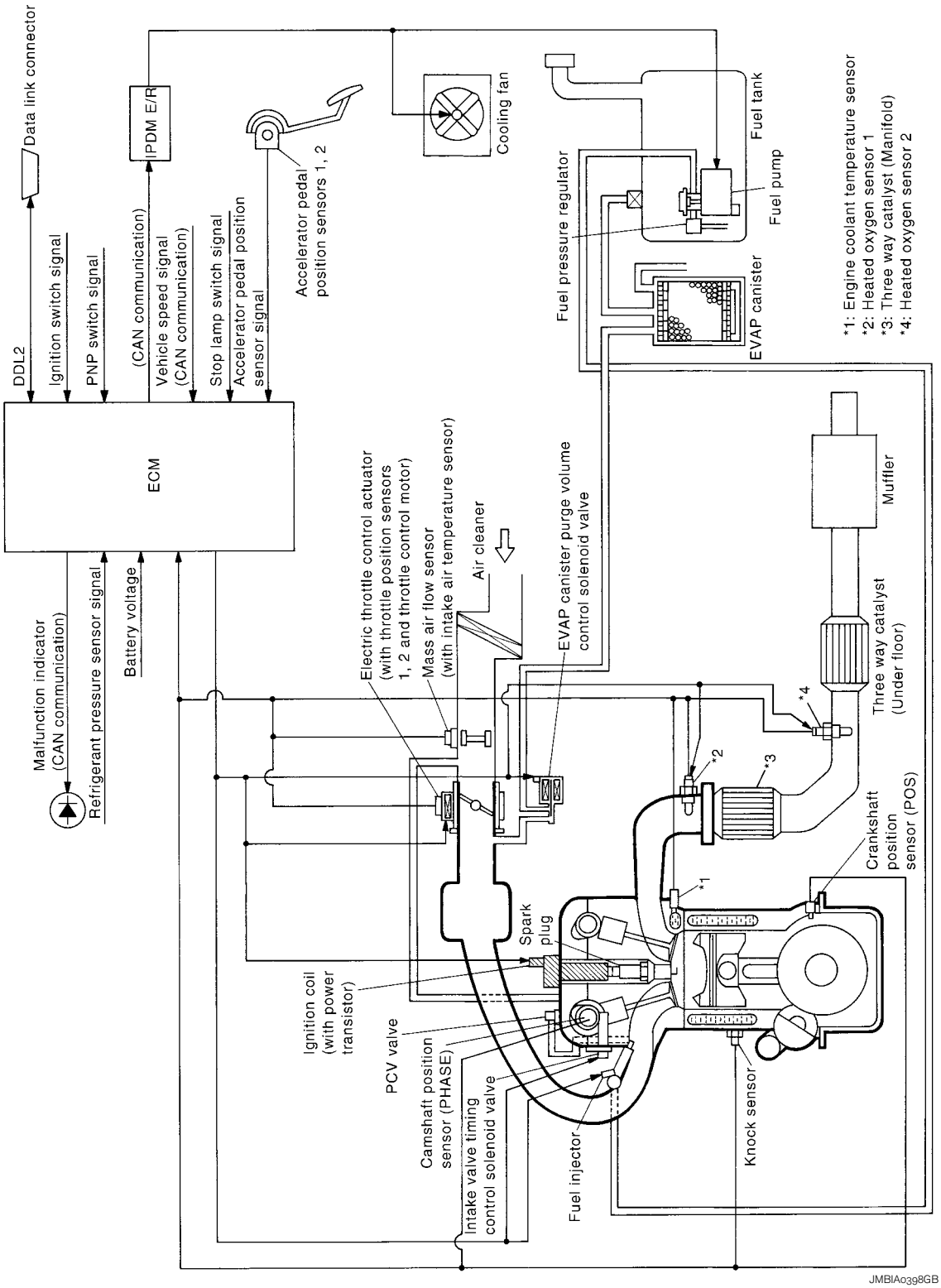
cardiagn.com

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001056129



System Description

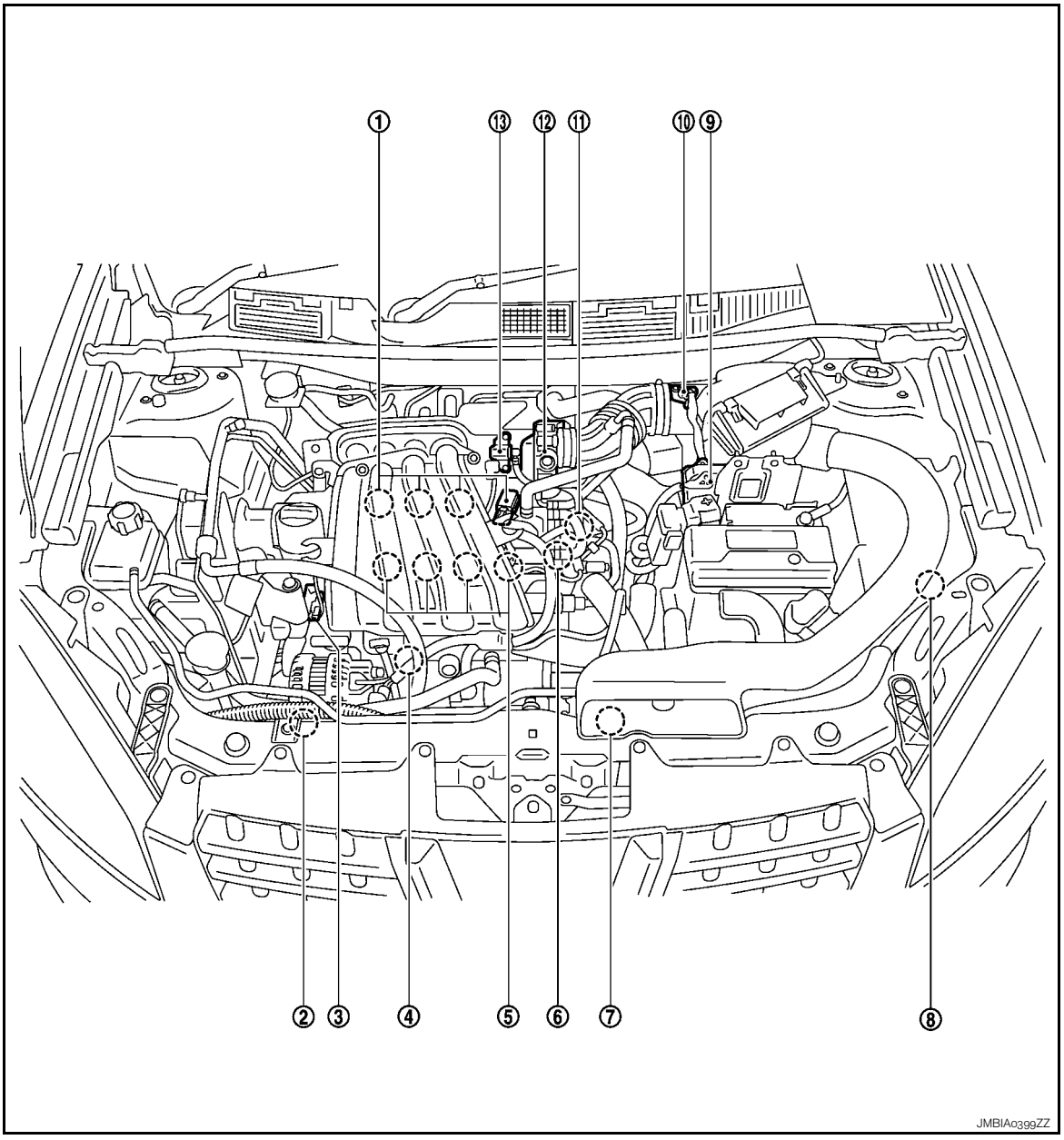
INFOID:0000000001056130

cardiagn.com

ECM performs various controls such as fuel injection control and ignition timing control.

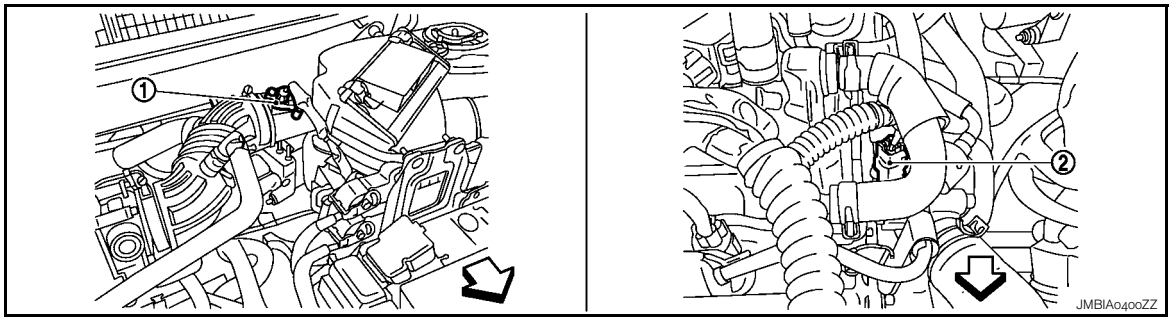
Component Parts Location

INFOID:0000000001056131



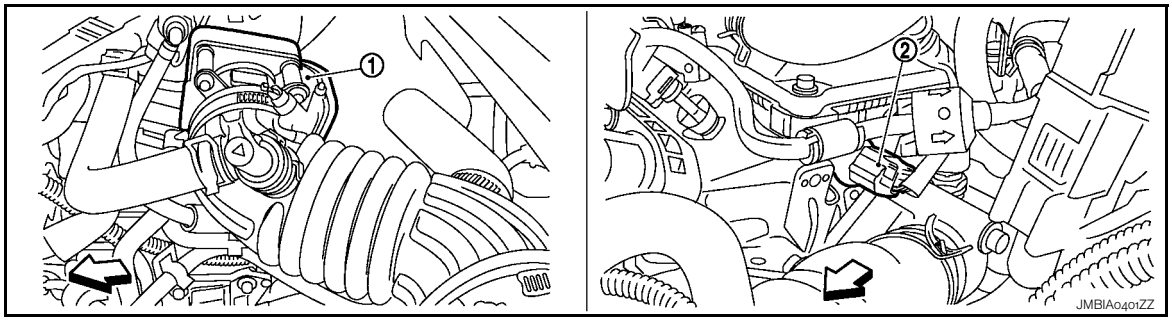
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



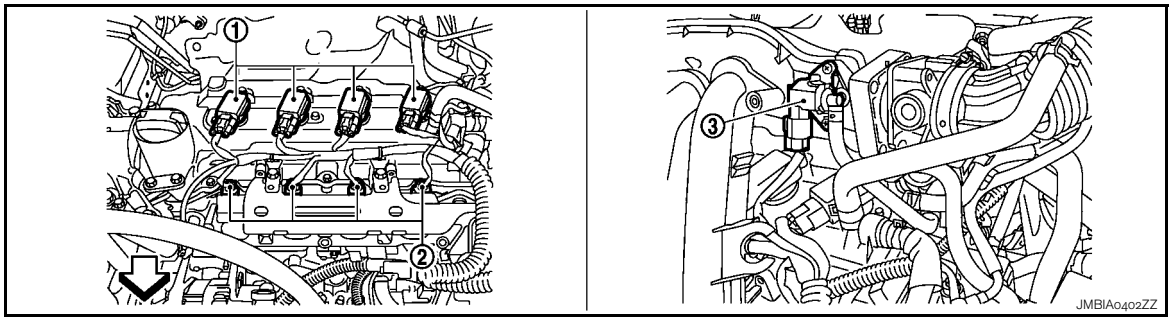
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



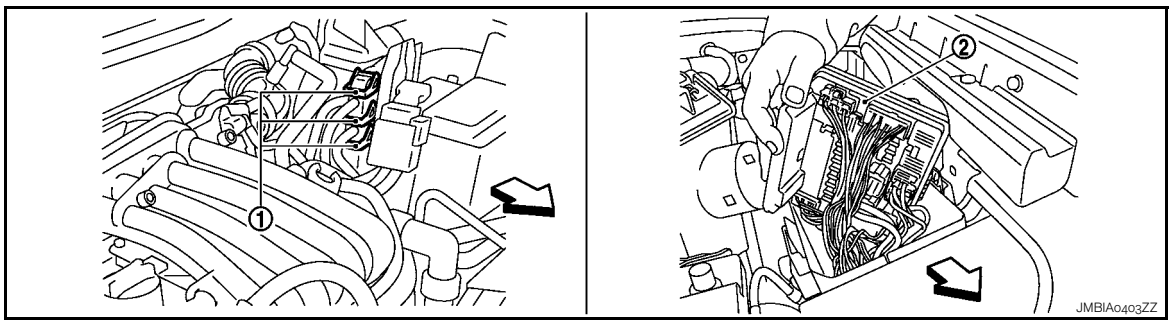
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

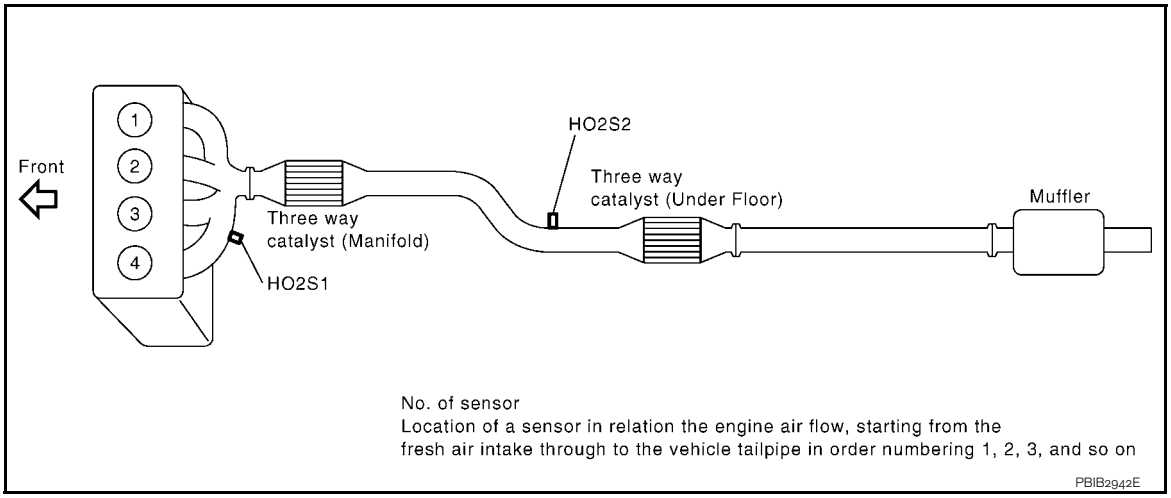
⇦ Vehicle front

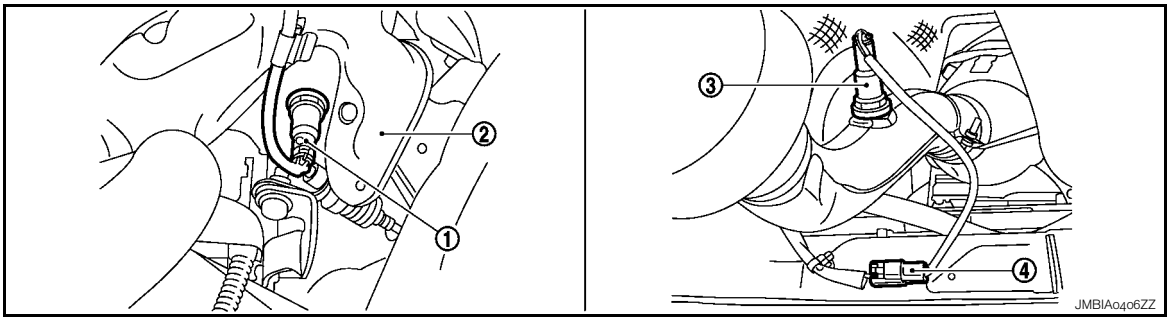


1. ECM harness connector
2. IPDM E/R

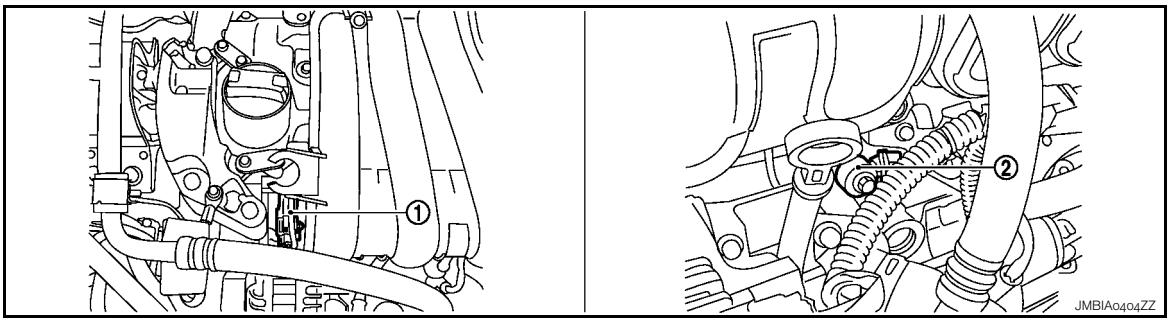
⇦ Vehicle front

cardiagn.com

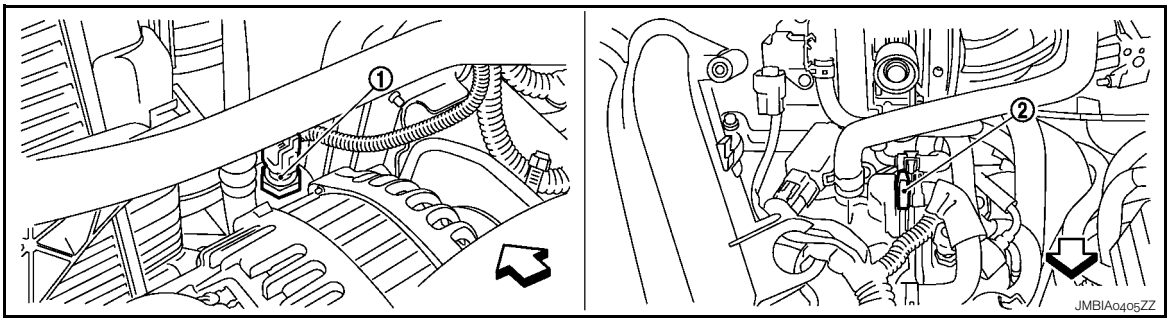




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



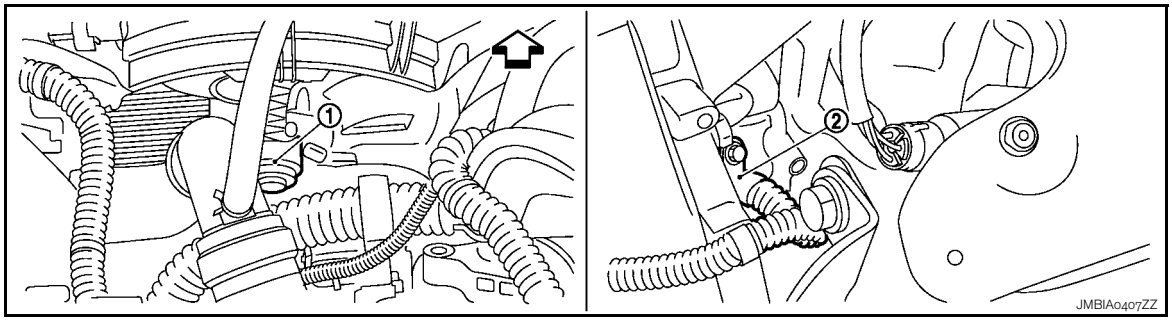
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

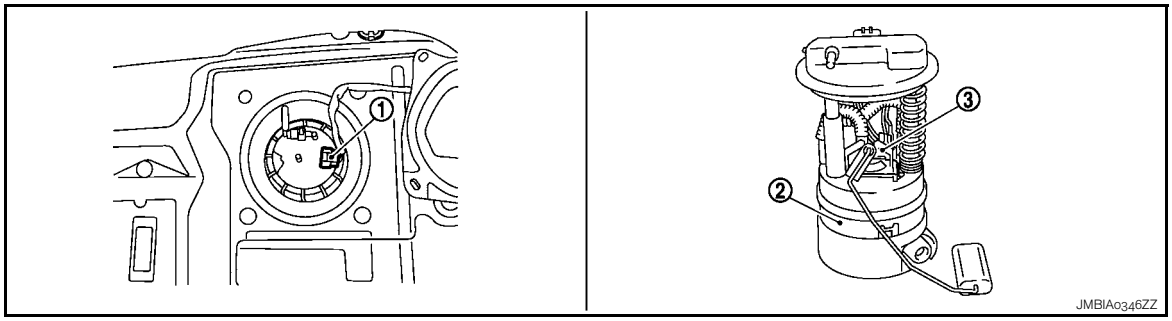
⇦ Vehicle front

cardiagn.com

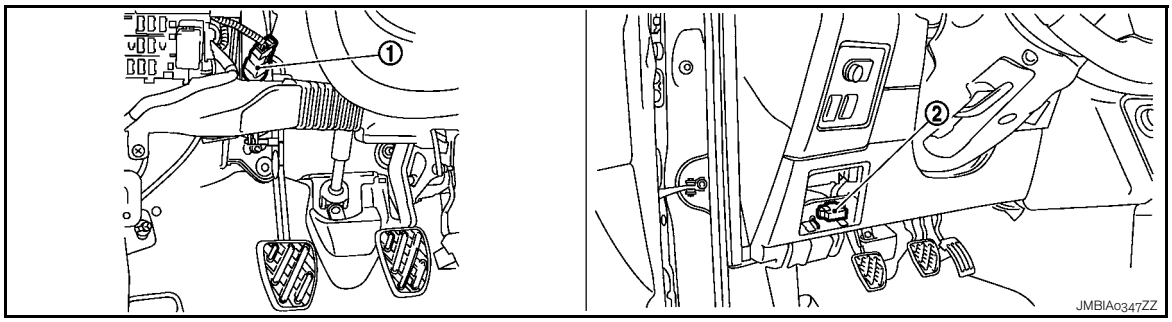


1. Cooling fan motor
2. Crankshaft position sensor (POS)

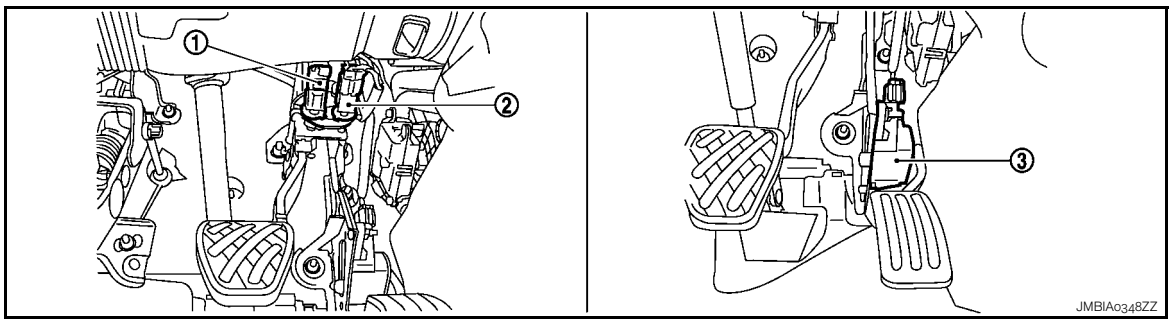
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

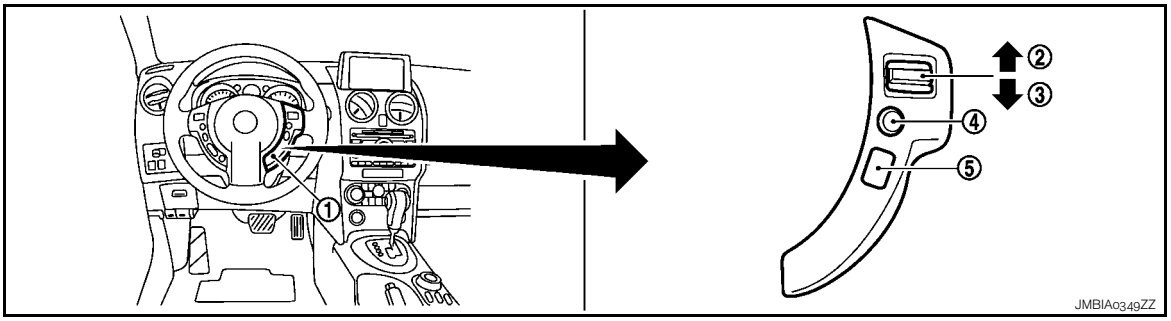


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056132

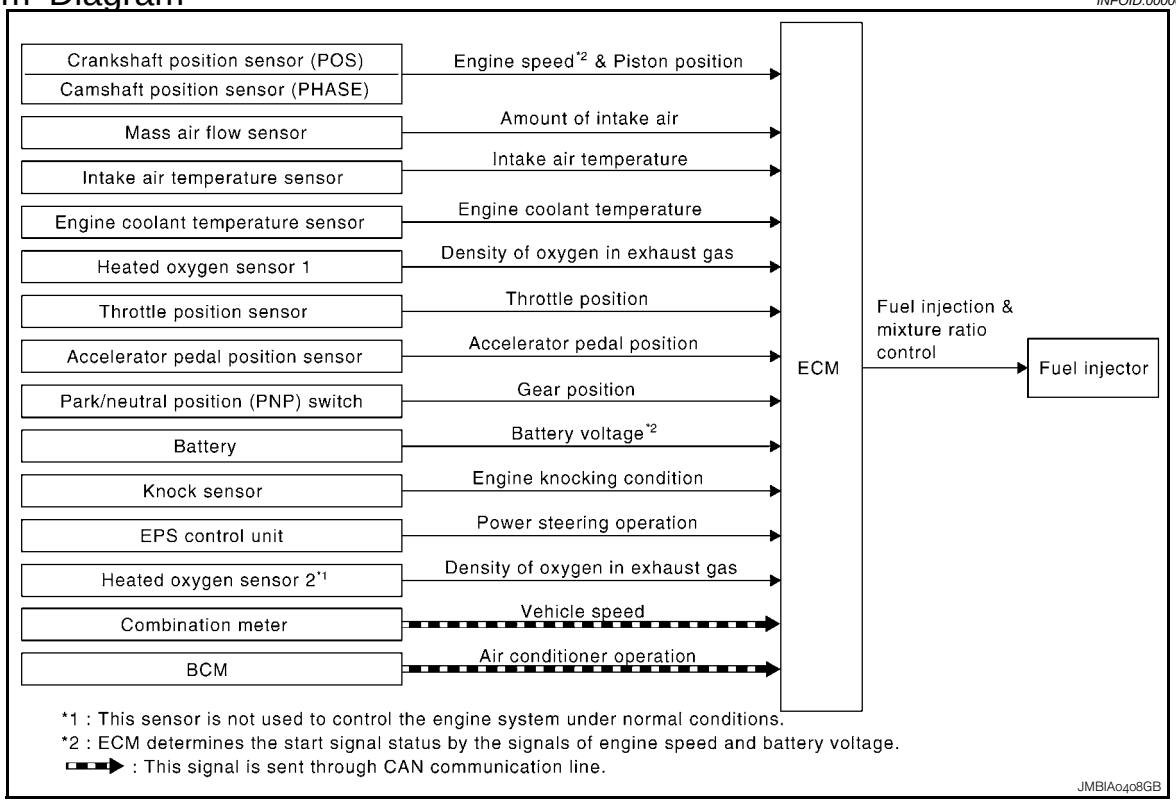
Component	Reference
Accelerator pedal position sensor	EC-280, "Description"
ASCD brake switch	EC-294, "Description"
ASCD steering switch	EC-263, "Description"
ASCD vehicle speed sensor	EC-272, "Description"
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Cooling fan motor	EC-299, "Description"
Electric throttle control actuator	EC-217, "Description"
Engine coolant temperature sensor	EC-135, "Description"
Fuel injector	EC-303, "Description"
Fuel pump	EC-306, "Description"
Heated oxygen sensor 1	EC-141, "Description"
Heated oxygen sensor 1 heater	EC-156, "Description"
Heated oxygen sensor 2	EC-159, "Description"
Heated oxygen sensor 2 heater	EC-171, "Description"
Ignition signal	EC-309, "Description"
Intake air temperature sensor	EC-132, "Description"
Intake valve timing control solenoid valve	EC-215, "Description"
Knock sensor	EC-191, "Description"
Mass air flow sensor	EC-127, "Description"
Park/neutral position switch	EC-274, "Description"
PCV valve	EC-315, "Description"
Refrigerant pressure sensor	EC-316, "Description"
Stop lamp switch	EC-277, "Description"
Throttle control motor	EC-226, "Description"
Throttle control motor relay	EC-223, "Description"
Throttle position sensor	EC-138, "Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001056133



System Description

INFOID:0000000001056134

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
BCM*2	Air conditioner operation		
Combination meter*2	Vehicle speed		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

cardiagn.com

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

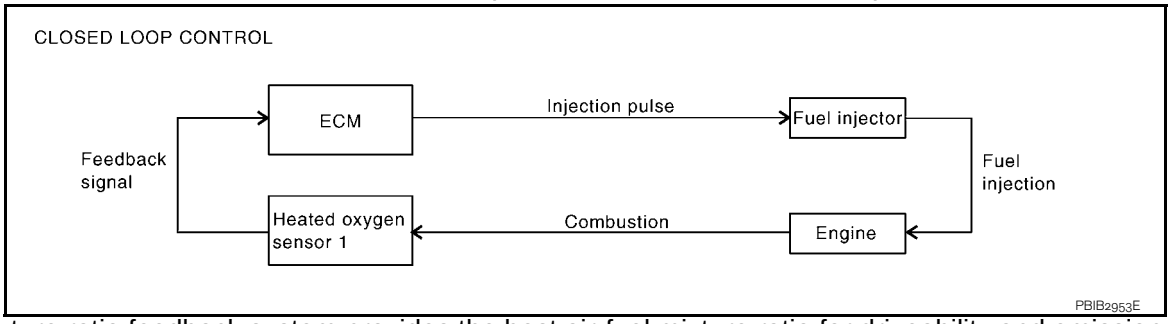
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-141, "DTC Logic". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

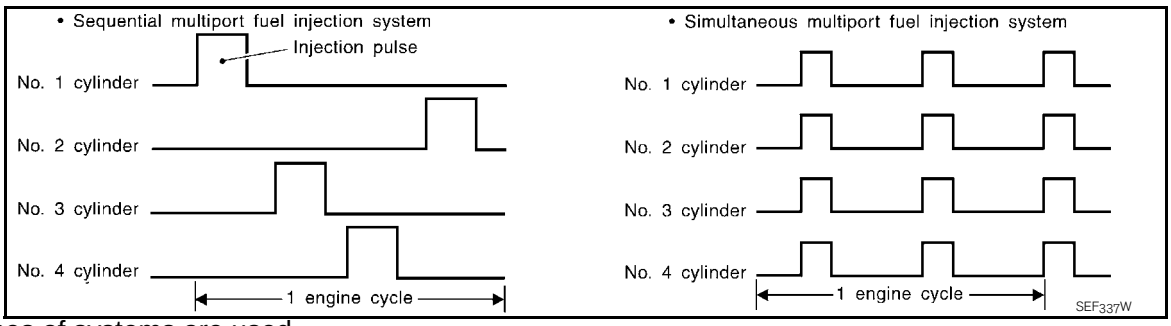
MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

cardiagn.com

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

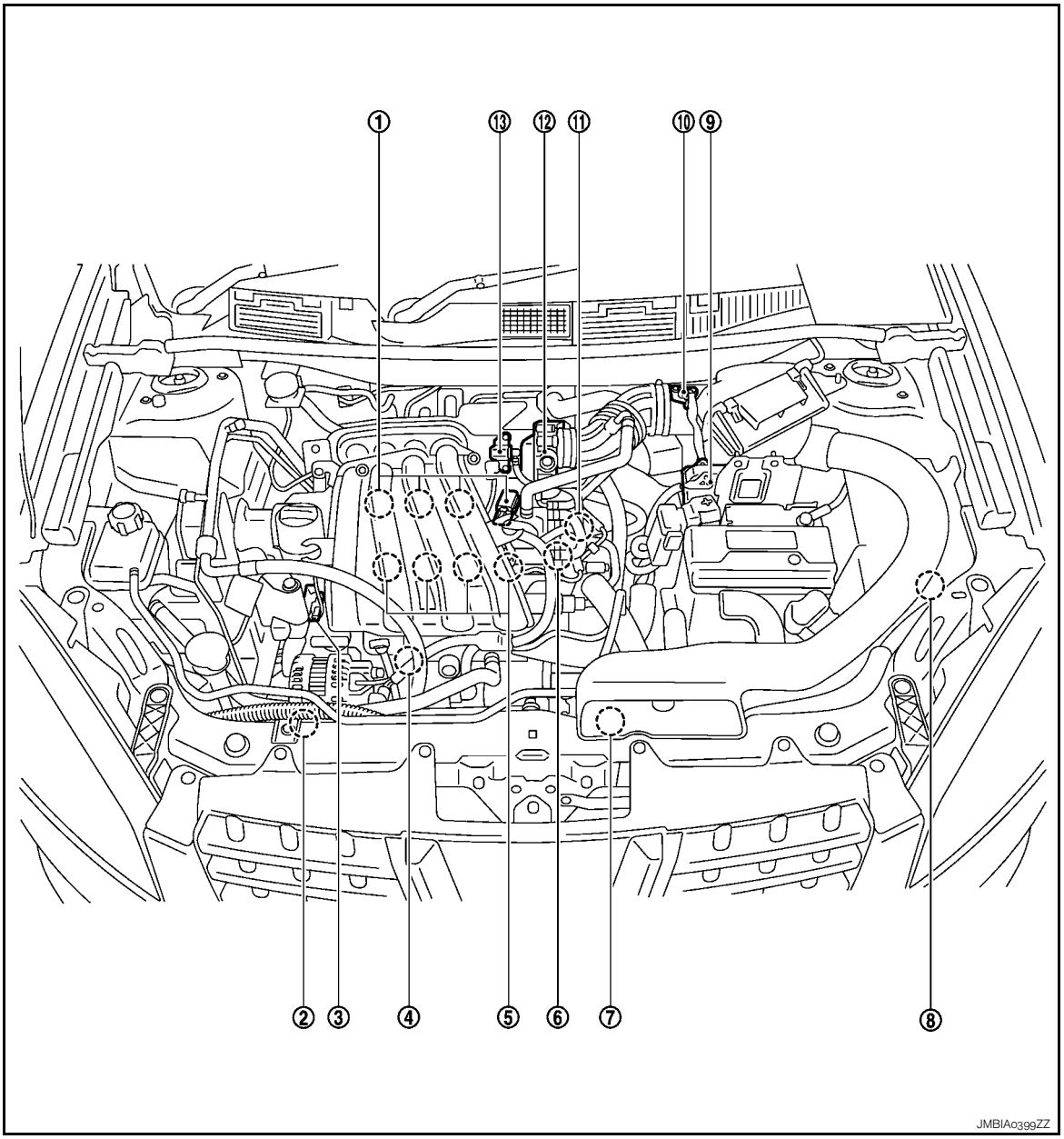
FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Component Parts Location

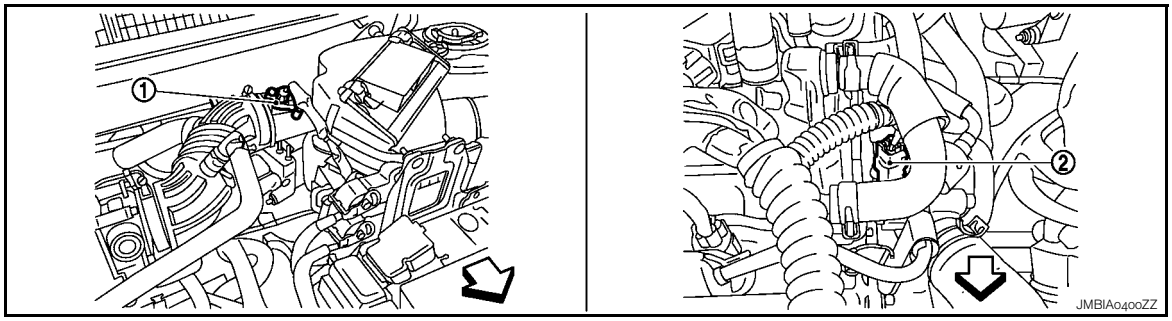
INFOID:0000000001060009

cardiagn.com



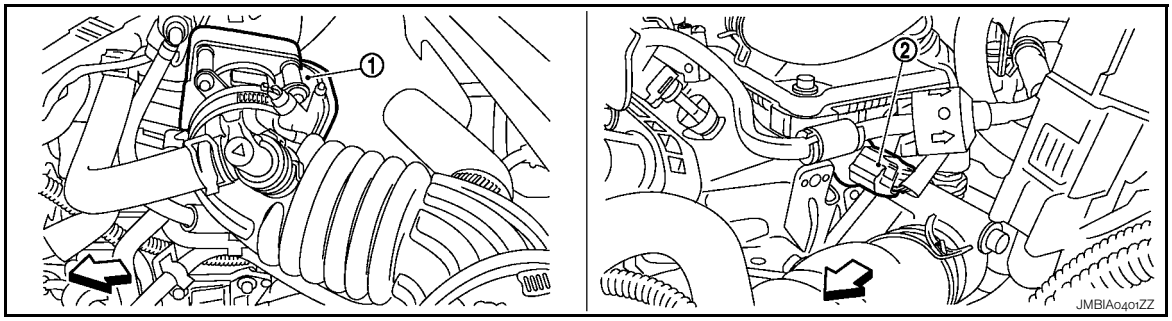
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



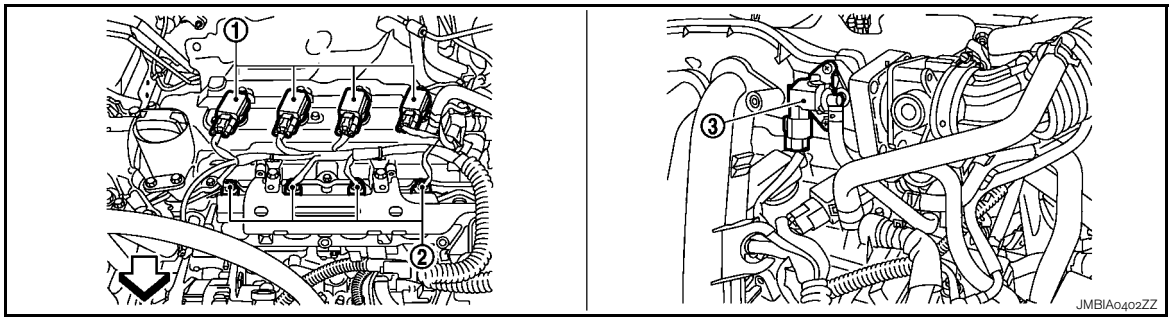
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



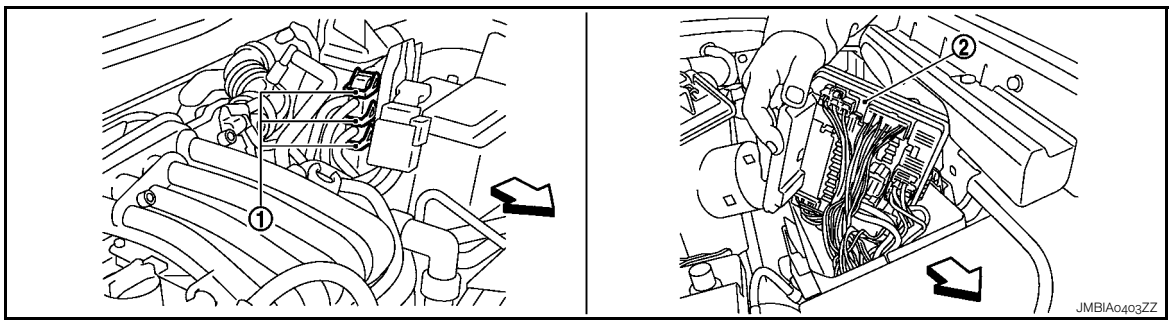
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

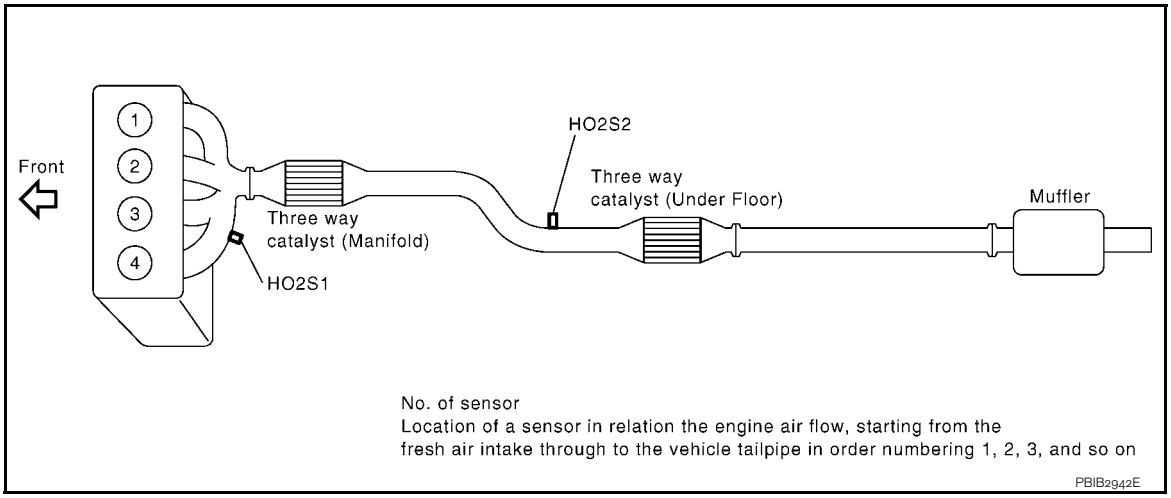
⇦ Vehicle front

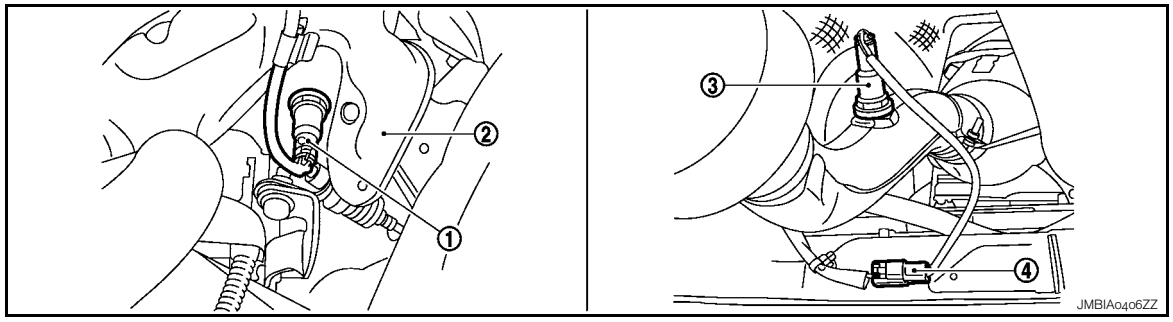


1. ECM harness connector
2. IPDM E/R

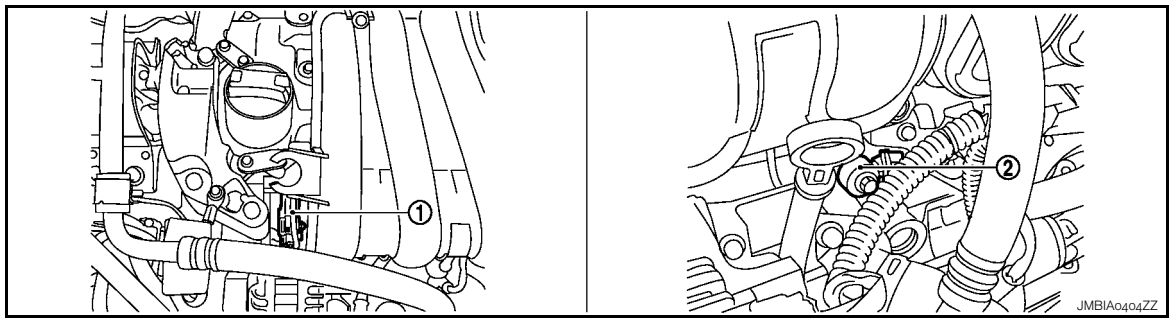
⇦ Vehicle front

cardiagn.com

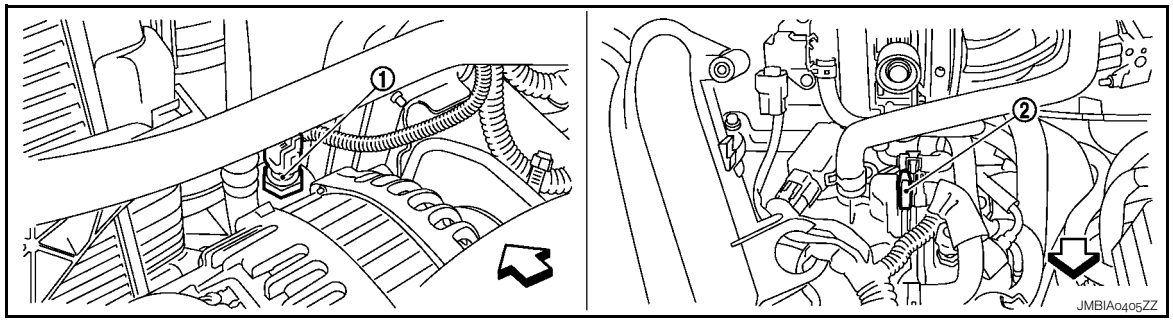




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



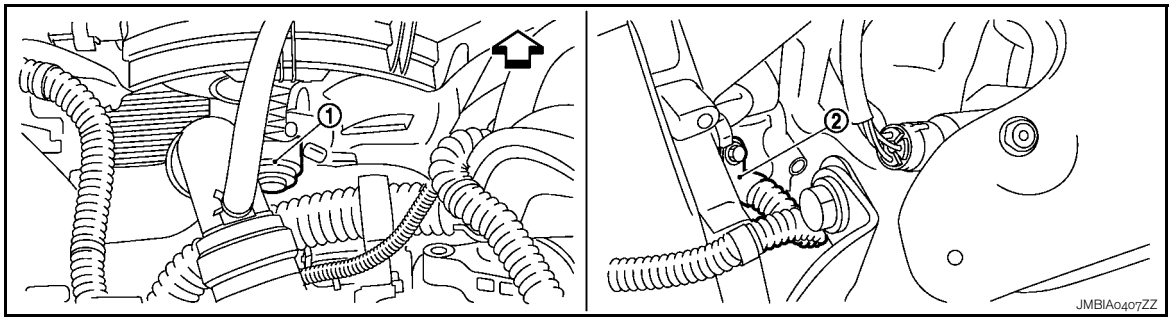
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

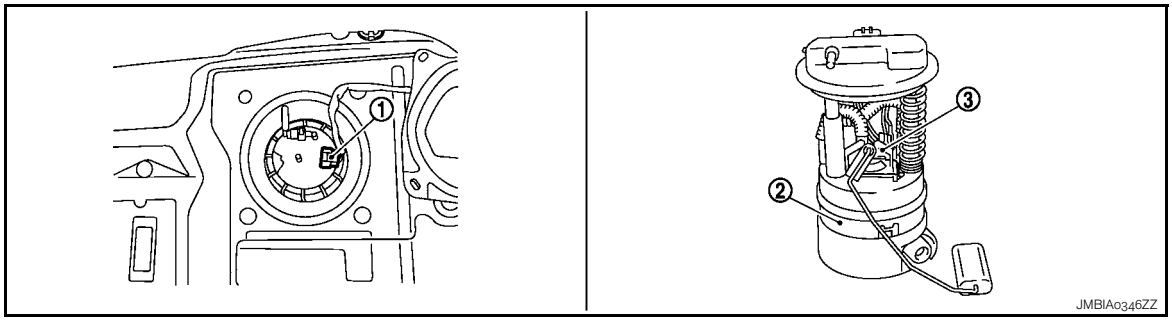
⇦ Vehicle front

cardiagn.com

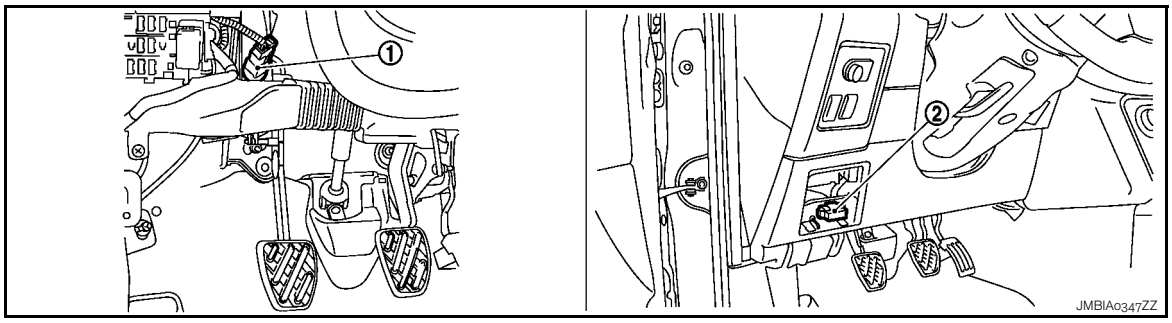


1. Cooling fan motor
2. Crankshaft position sensor (POS)

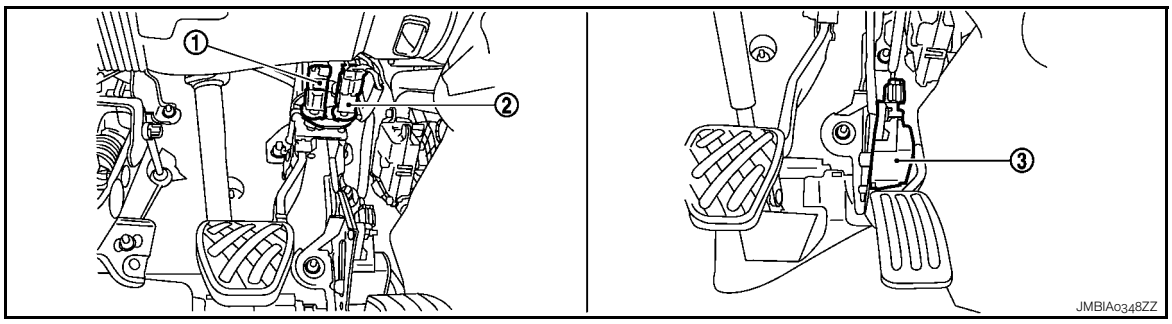
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

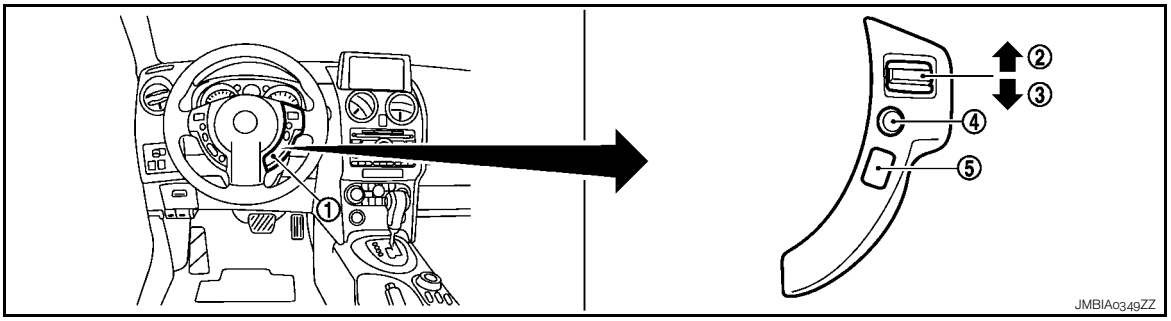


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056136

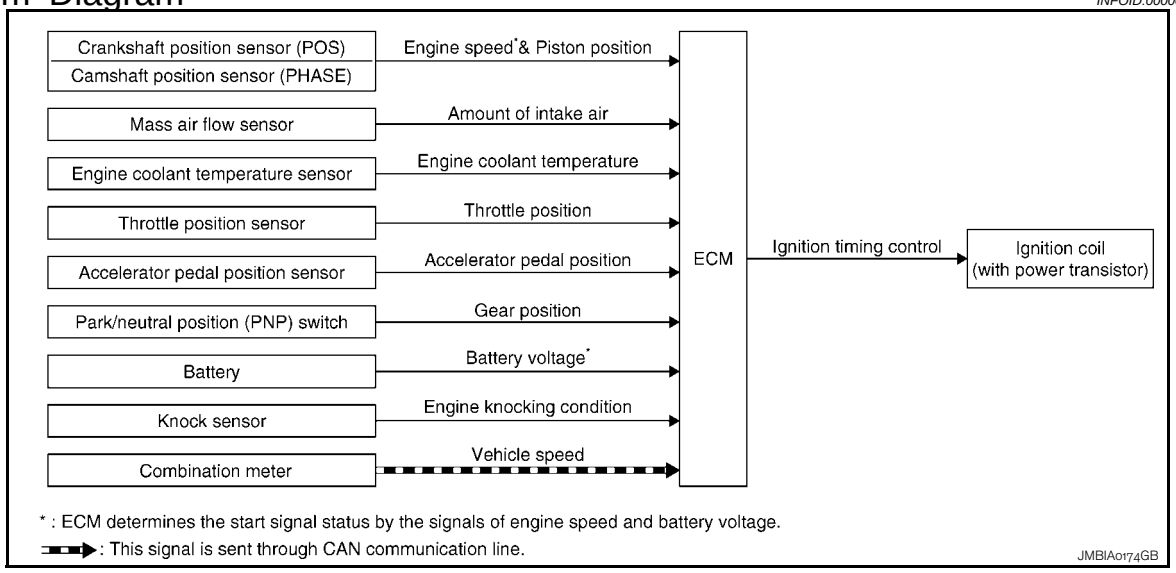
Component	Reference
Accelerator pedal position sensor	EC-280, "Description"
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Engine coolant temperature sensor	EC-135, "Description"
Fuel injector	EC-303, "Description"
Heated oxygen sensor 1	EC-141, "Description"
Heated oxygen sensor 2	EC-171, "Description"
Intake air temperature sensor	EC-132, "Description"
Knock sensor	EC-191, "Description"
Mass air flow sensor	EC-127, "Description"
Park/neutral position (PNP) switch	EC-274, "Description"
Throttle position sensor	EC-138, "Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001056137



System Description

INFOID:0000000001056138

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

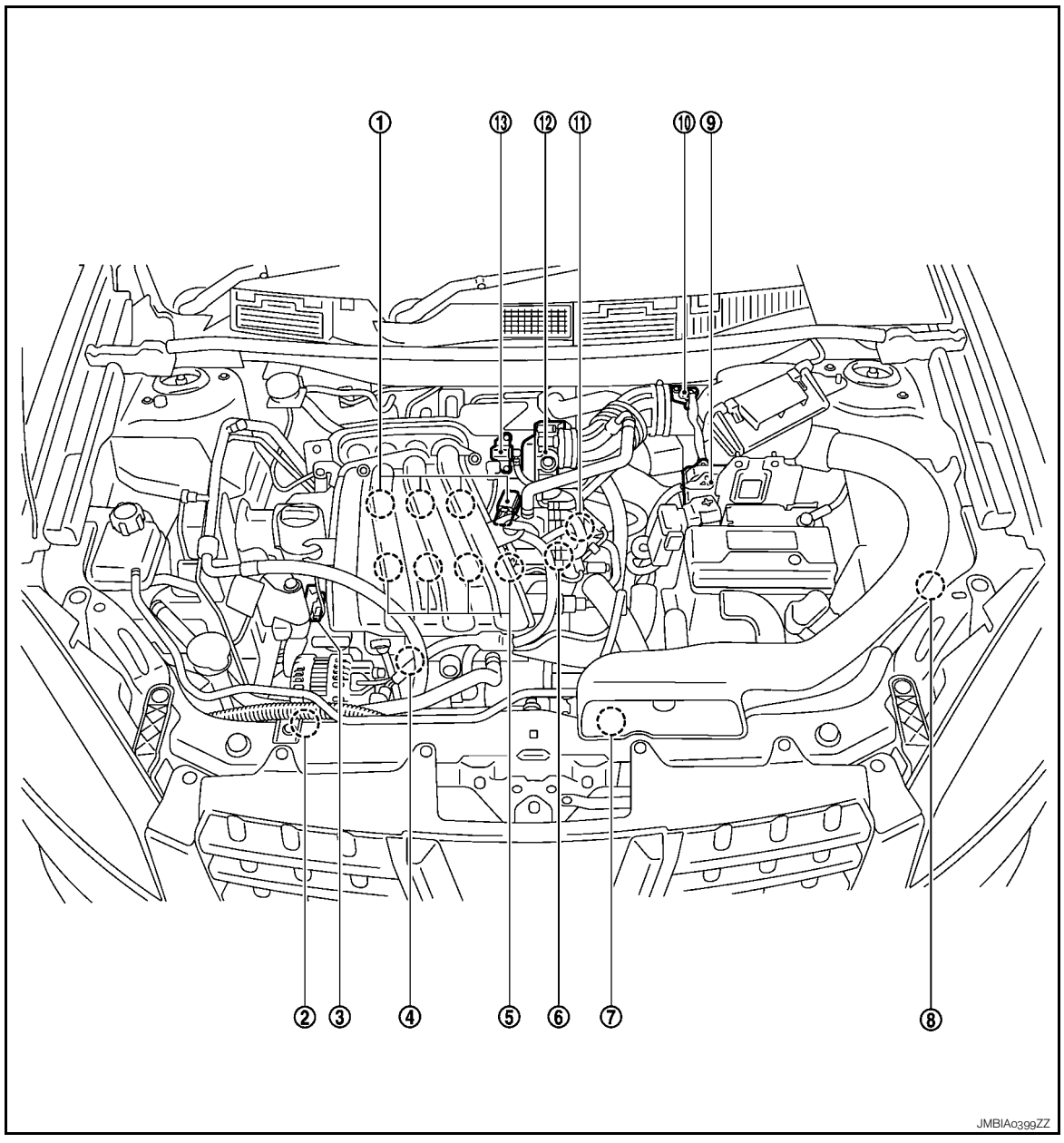
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

cardiagn.com

operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

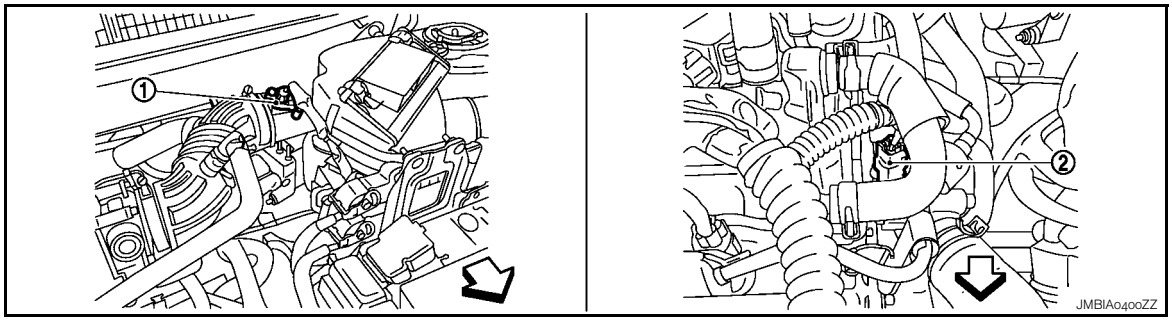
Component Parts Location

INFOID:0000000001060010



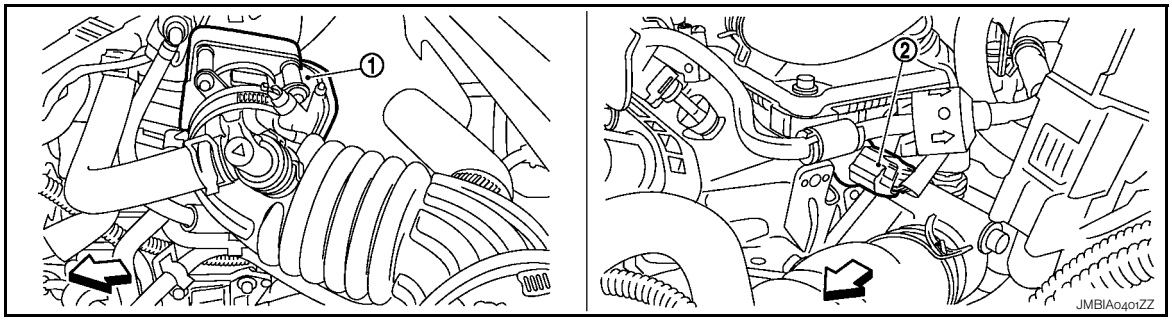
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



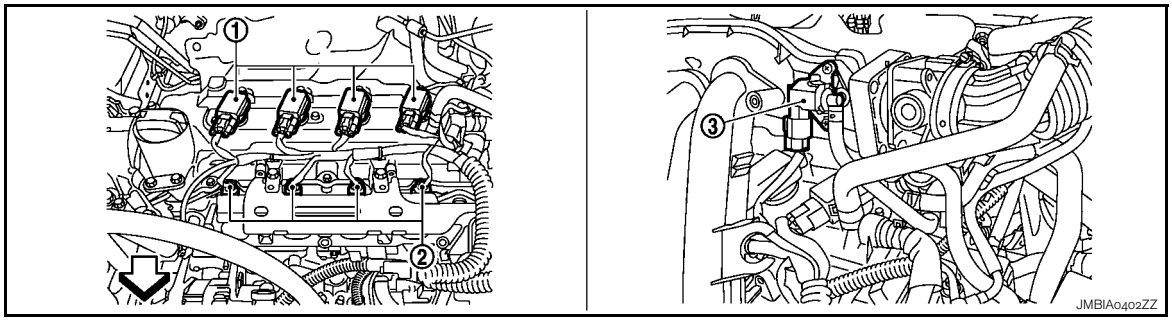
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



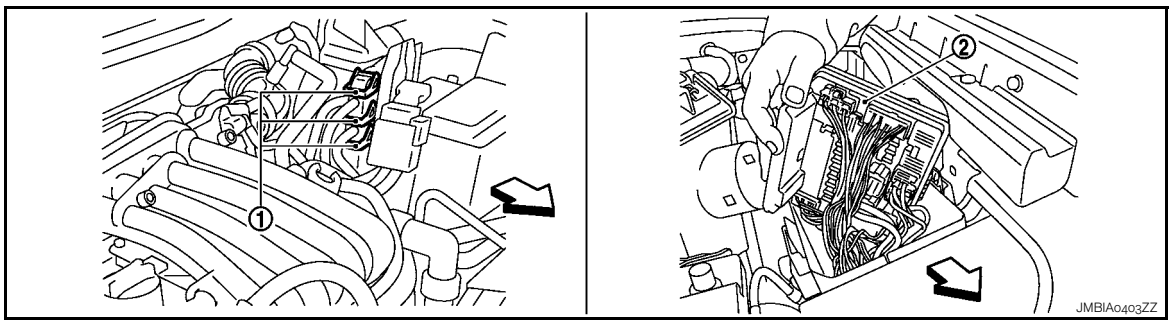
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

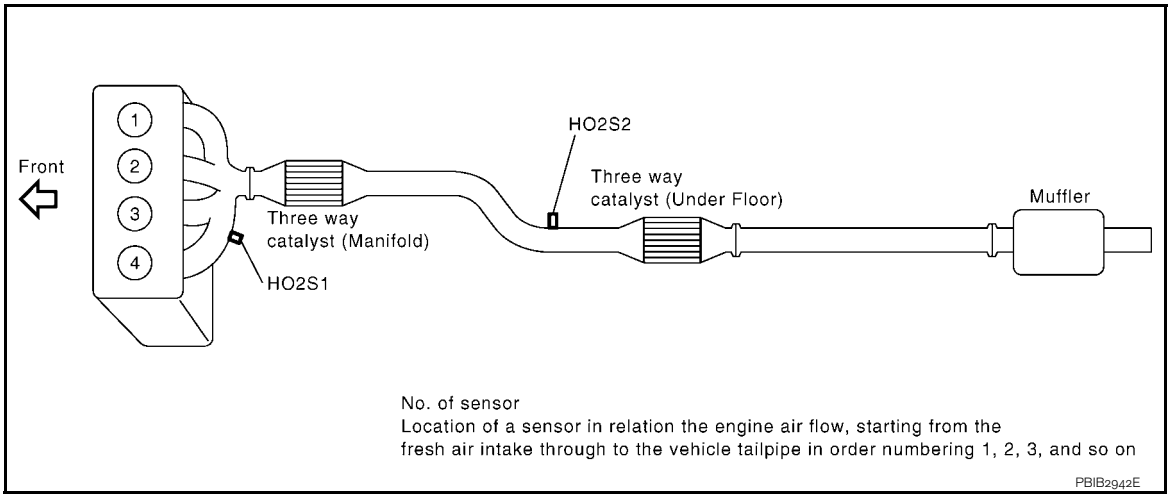
⇦ Vehicle front

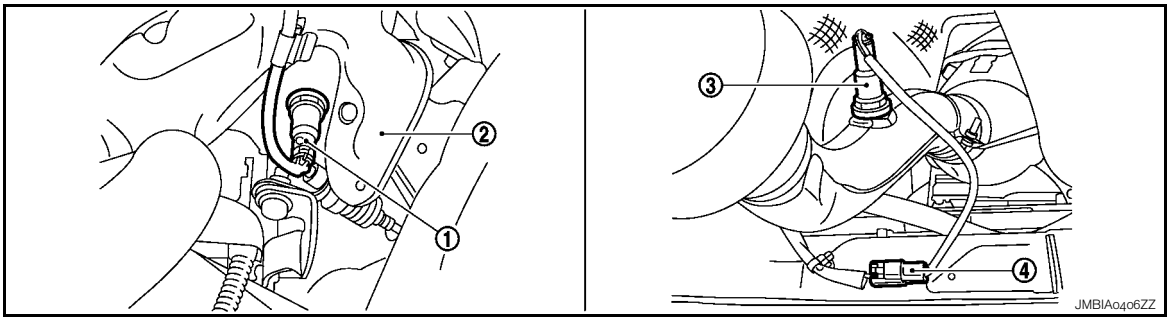


1. ECM harness connector
2. IPDM E/R

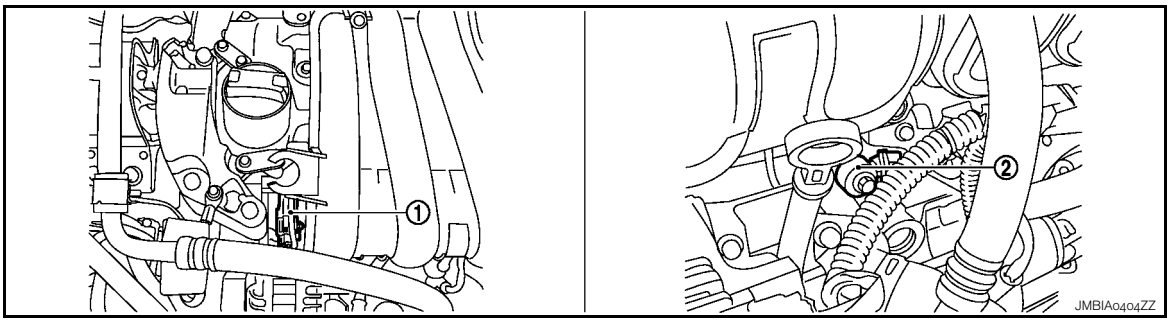
⇦ Vehicle front

cardiagn.com

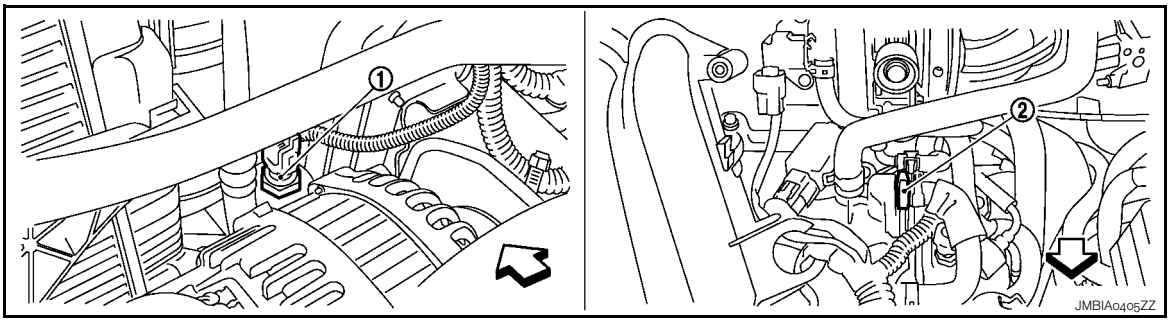




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



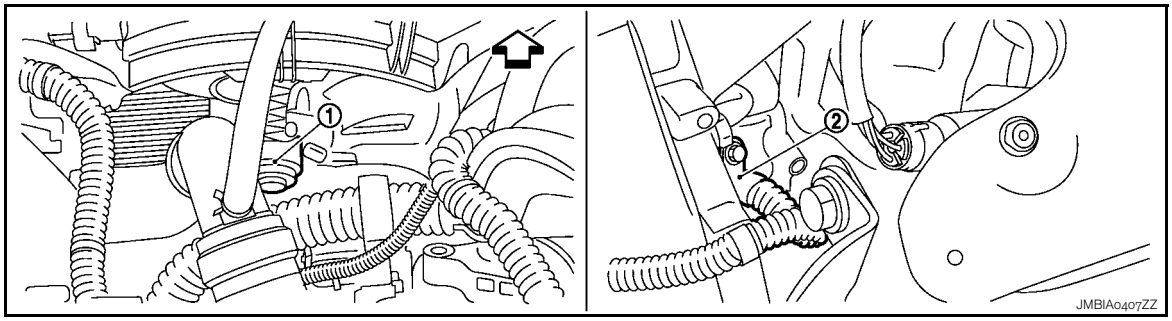
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

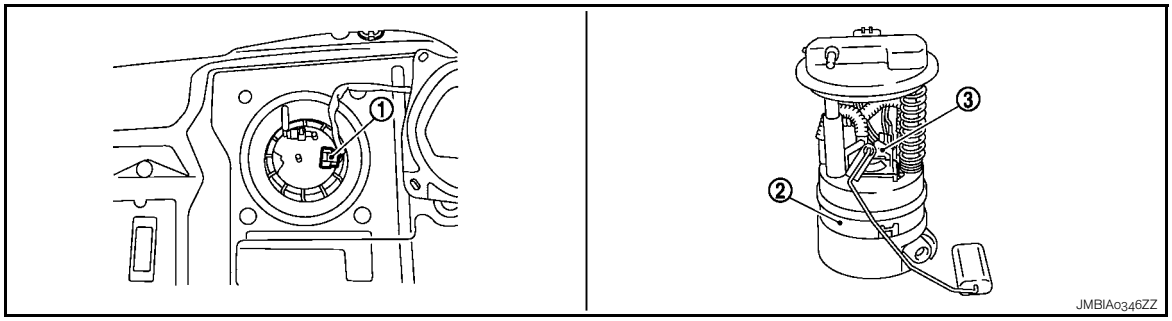
⇦ Vehicle front

cardiagn.com

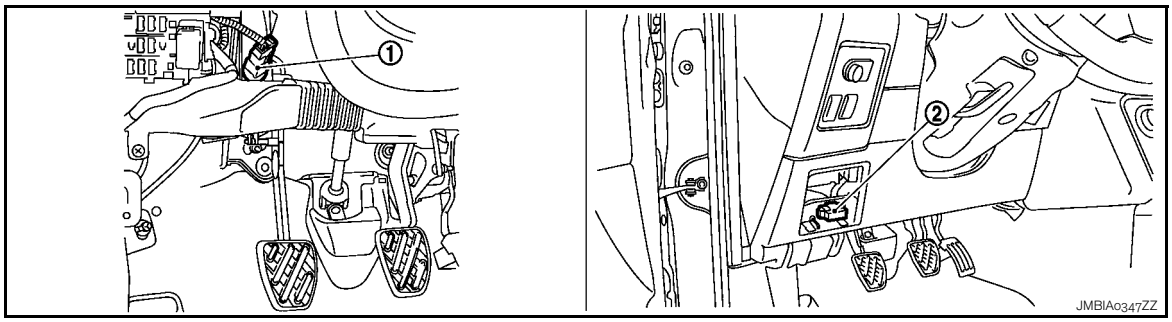


1. Cooling fan motor
2. Crankshaft position sensor (POS)

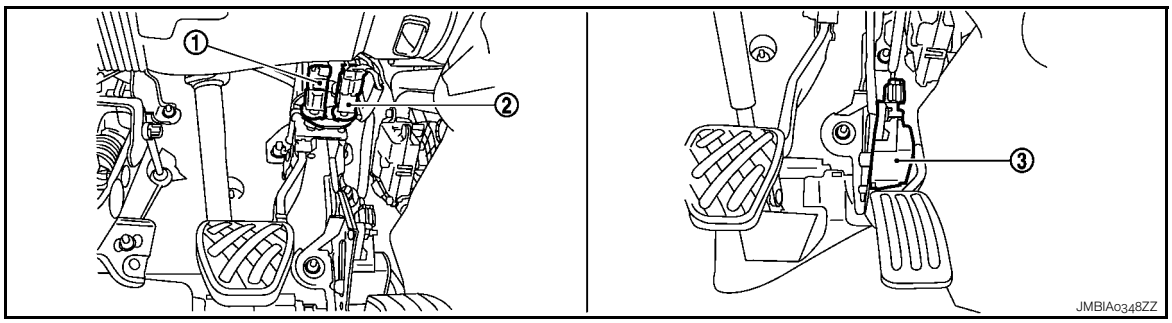
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

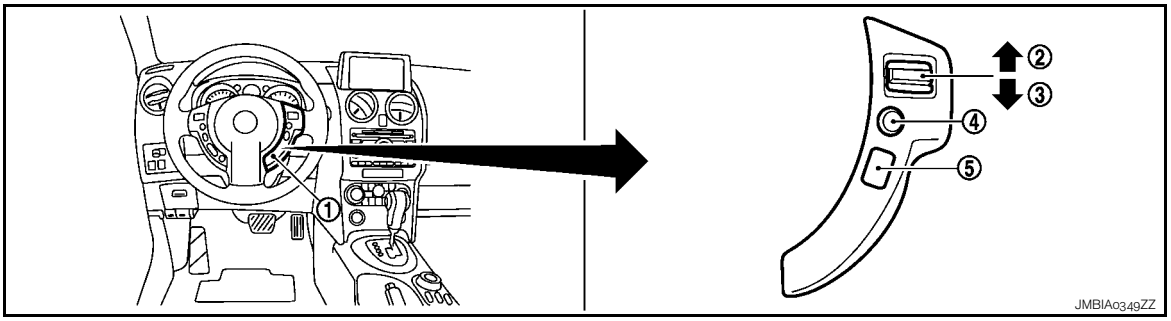


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056140

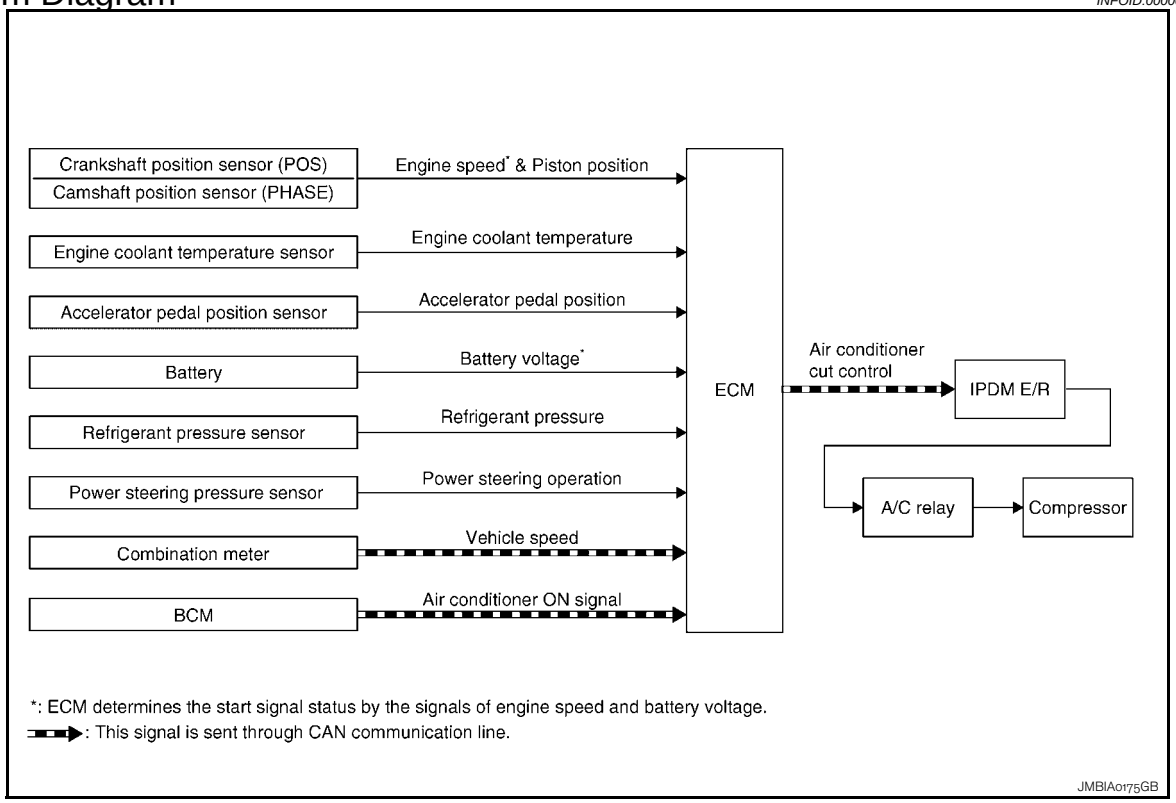
Component	Reference
Accelerator pedal position sensor	EC-280, "Description"
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Engine coolant temperature sensor	EC-135, "Description"
Ignition signal	EC-309, "Description"
Knock sensor	EC-191, "Description"
Mass air flow sensor	EC-127, "Description"
Park/neutral position (PNP) switch	EC-274, "Description"
Throttle position sensor	EC-138, "Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001056141



System Description

INFOID:0000000001056142

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
BCM*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

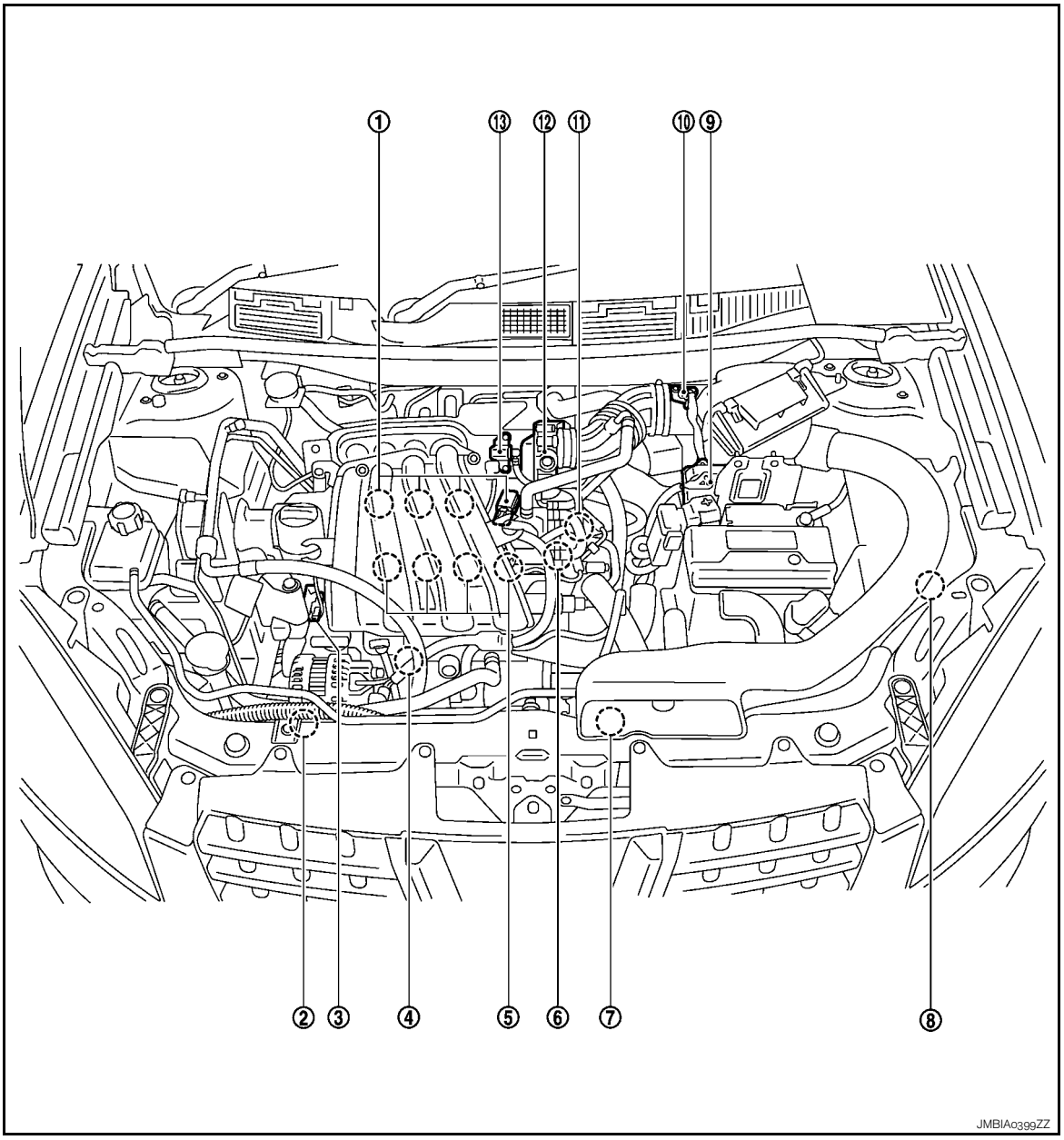
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

cardiagn.com

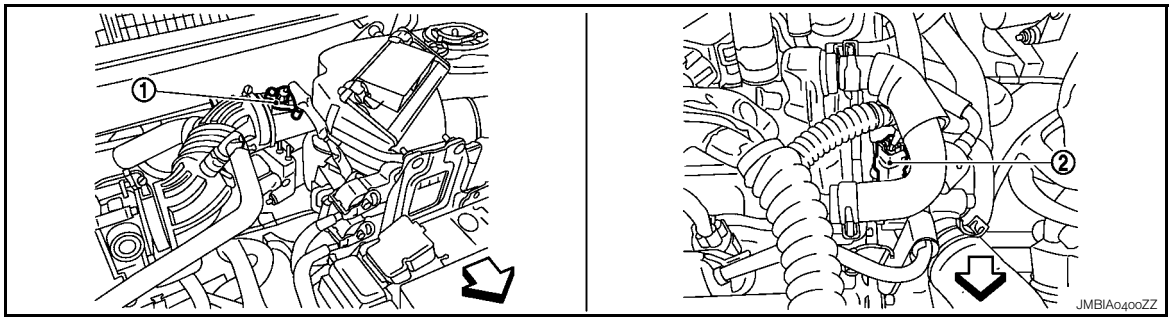
Component Parts Location

INFOID:0000000001060011



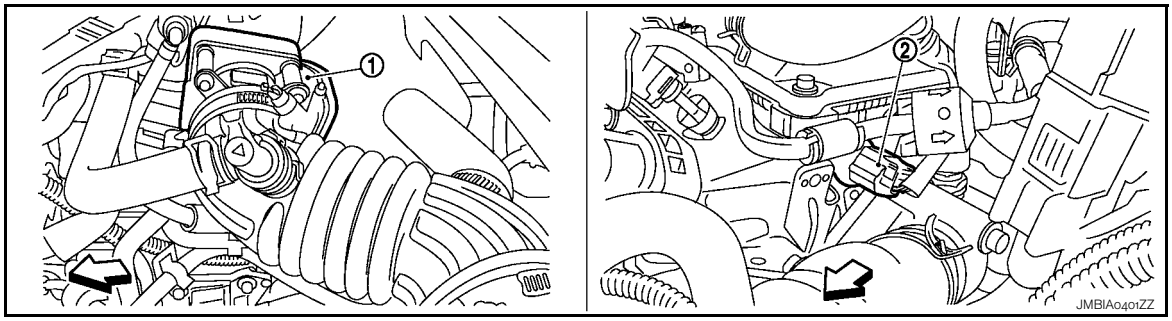
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



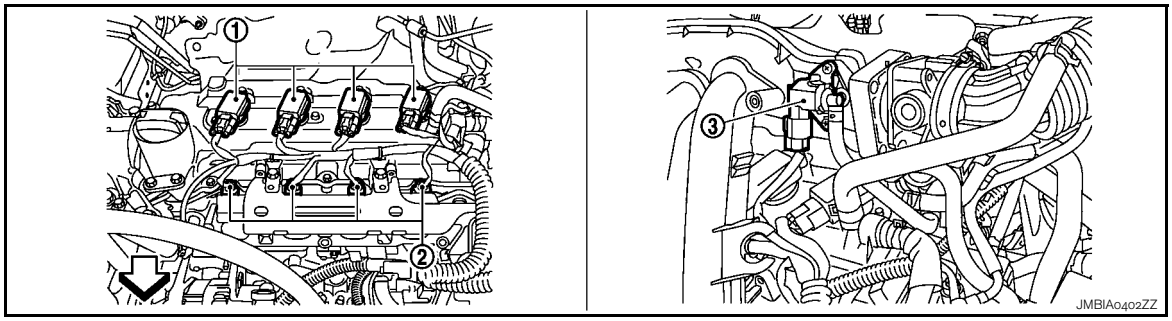
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



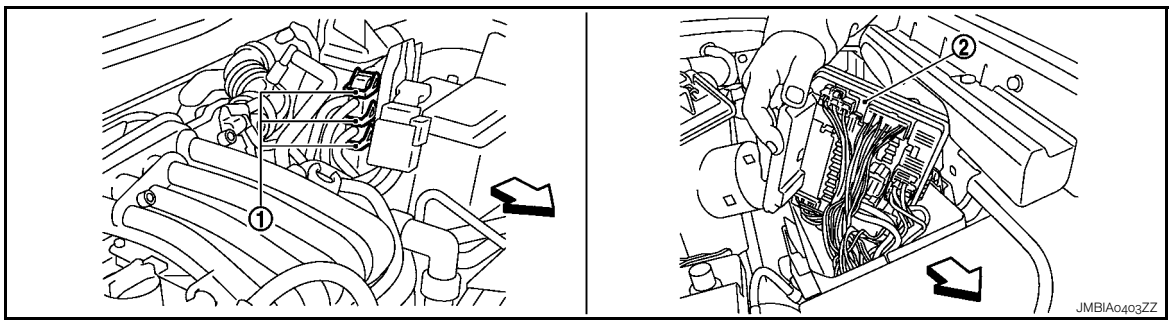
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

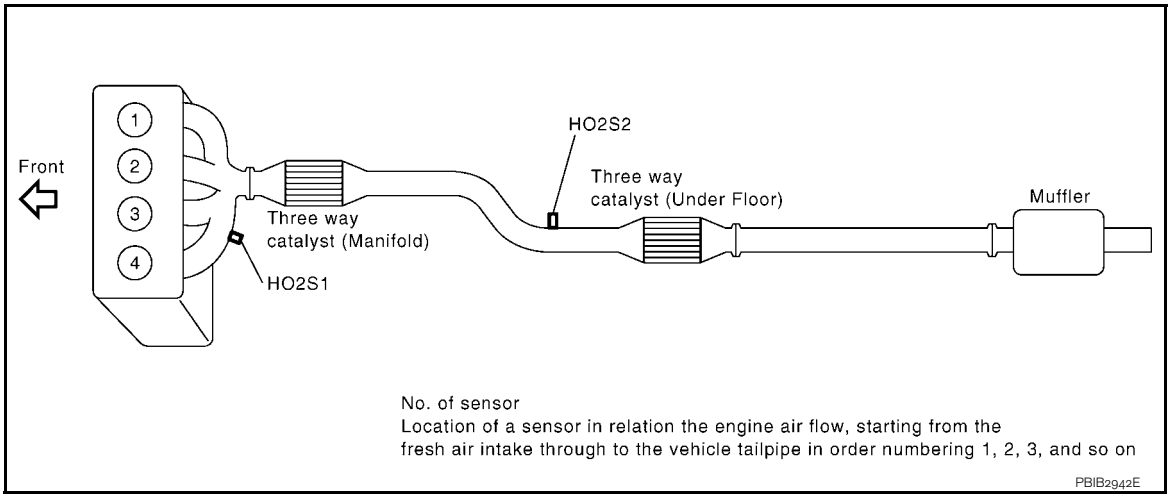
⇦ Vehicle front

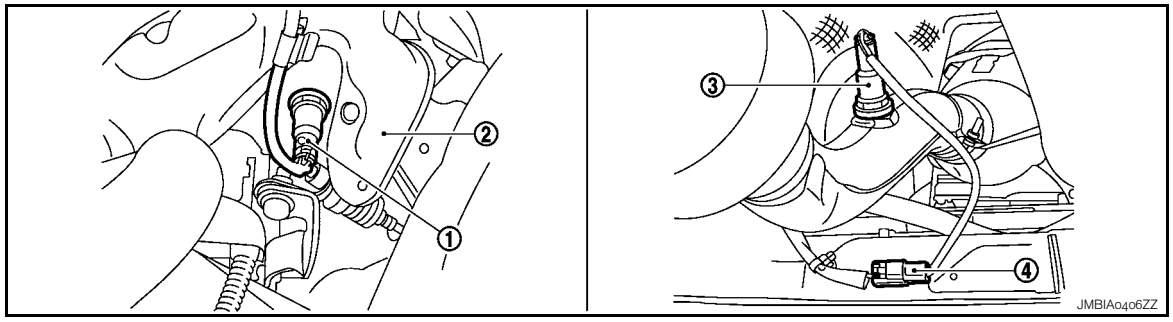


1. ECM harness connector
2. IPDM E/R

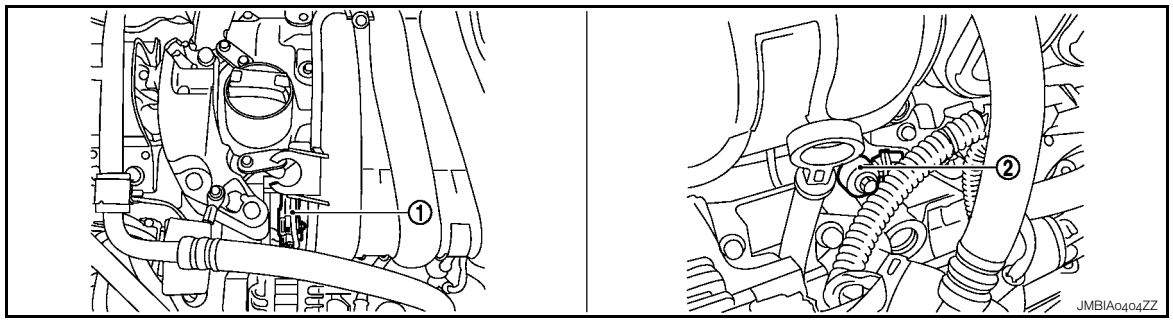
⇦ Vehicle front

cardiagn.com

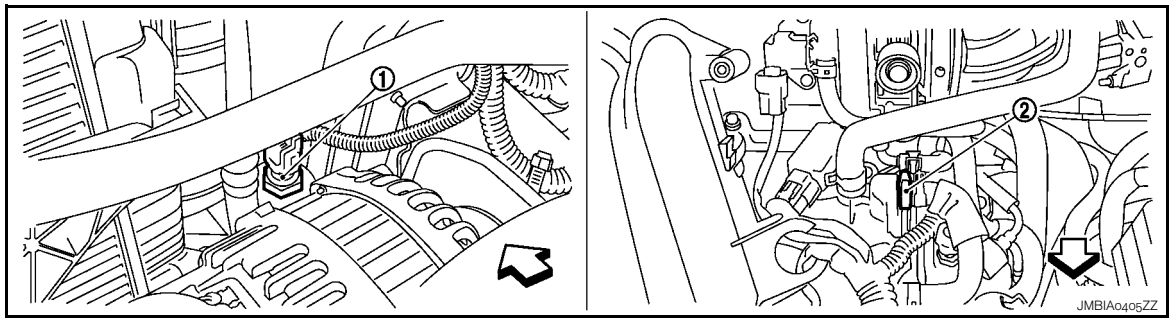




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



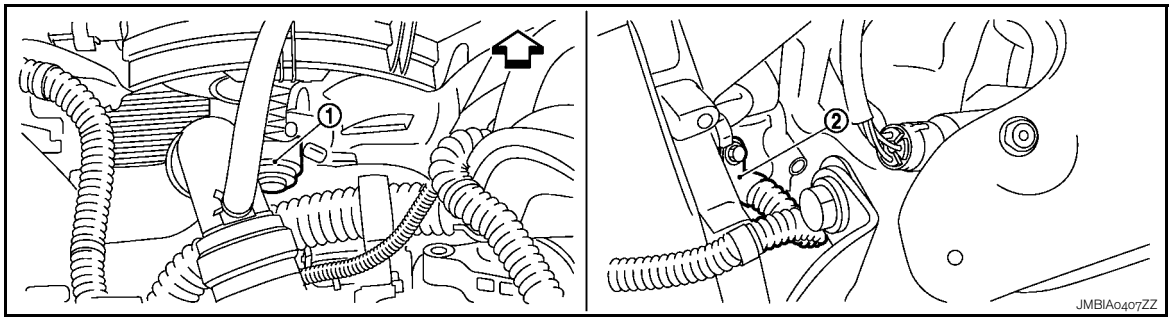
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

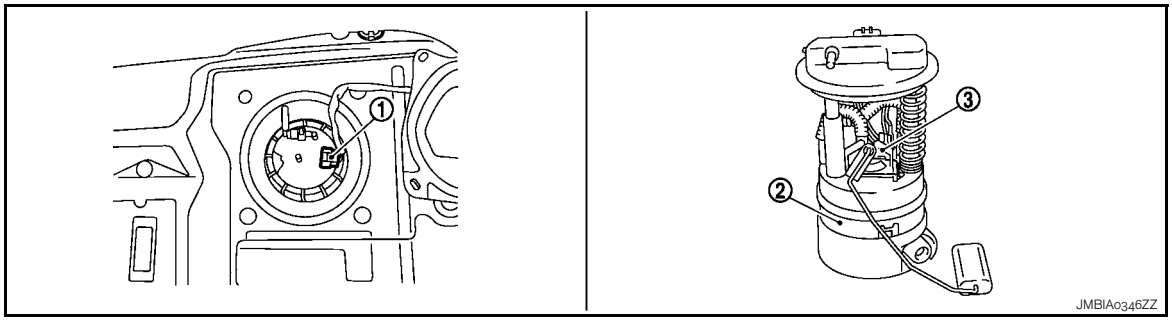
⇦ Vehicle front

cardiagn.com

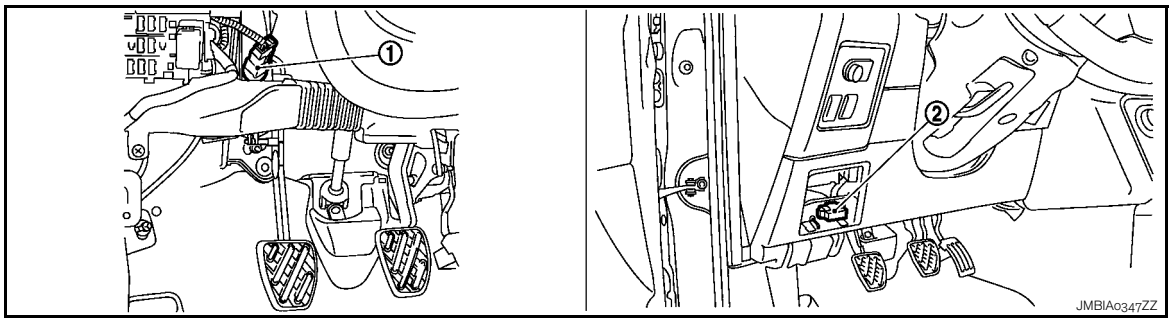


1. Cooling fan motor
2. Crankshaft position sensor (POS)

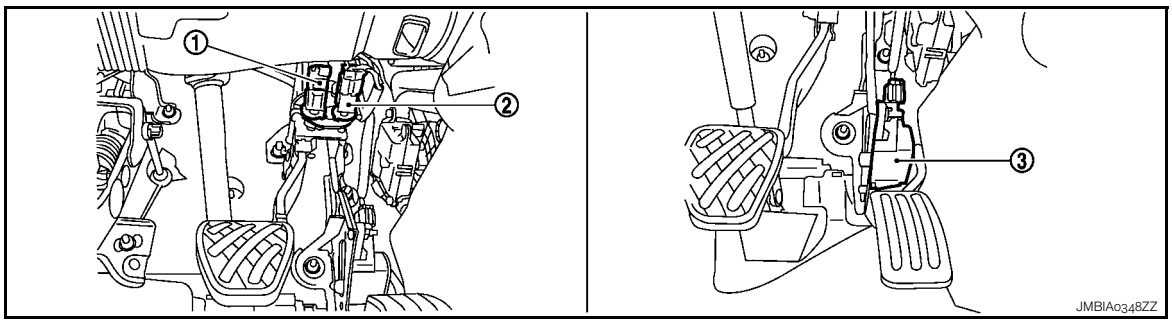
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

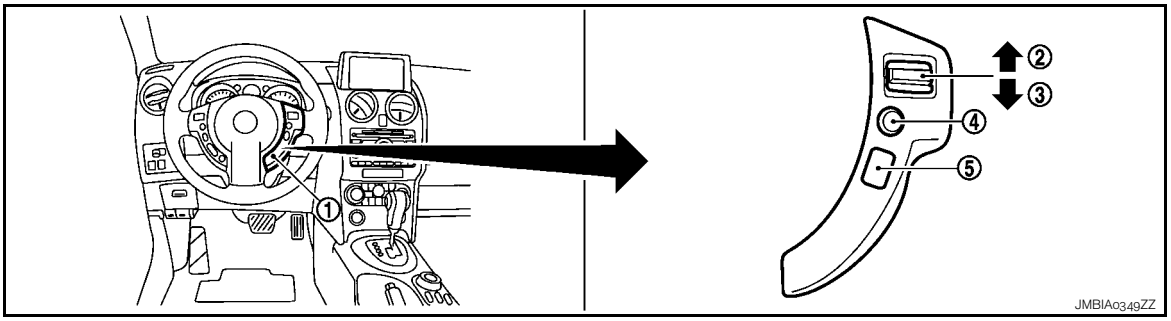


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056144

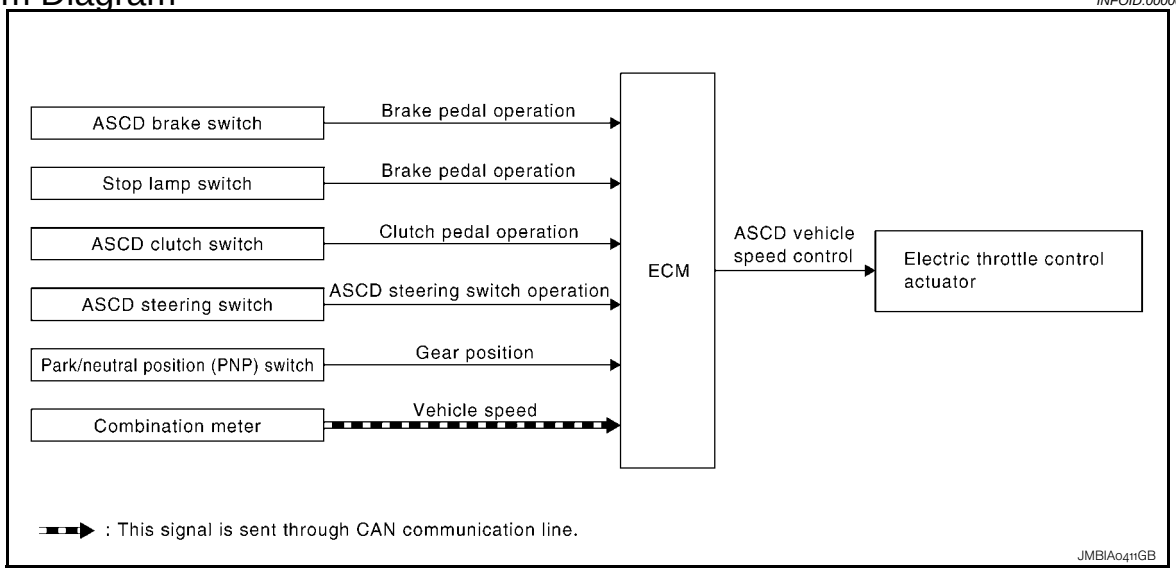
Component	Reference
Accelerator pedal position sensor	EC-280, "Description"
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Engine coolant temperature sensor	EC-135, "Description"
EPS contro unit	STC-4, "System Description"
Refrigerant pressure sensor	EC-316, "Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001056145



System Description

INFOID:0000000001056146

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch			
ASCD clutch switch	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position switch	Gear position		
Combination meter*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed

cardiagn.com

- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position.
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

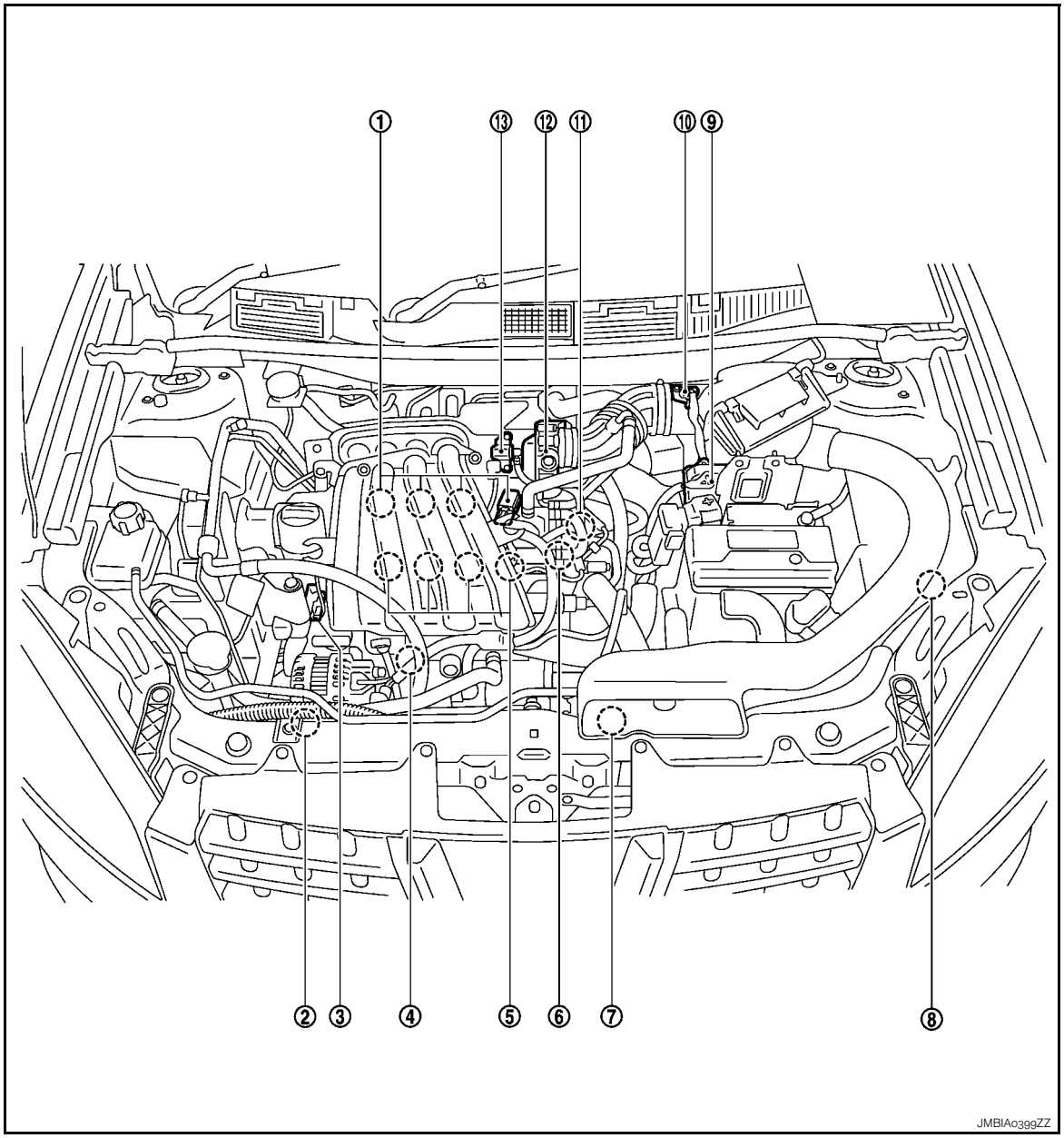
When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180km/h (112 MPH)

Component Parts Location

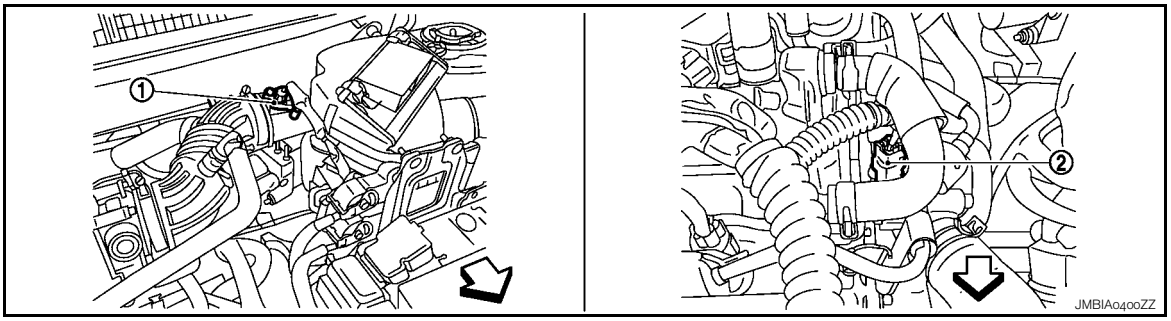
INFOID:0000000001060012

cardiagn.com



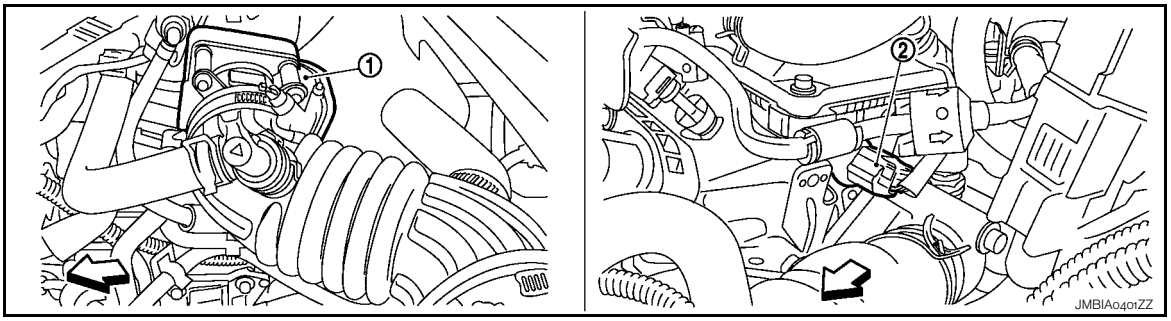
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



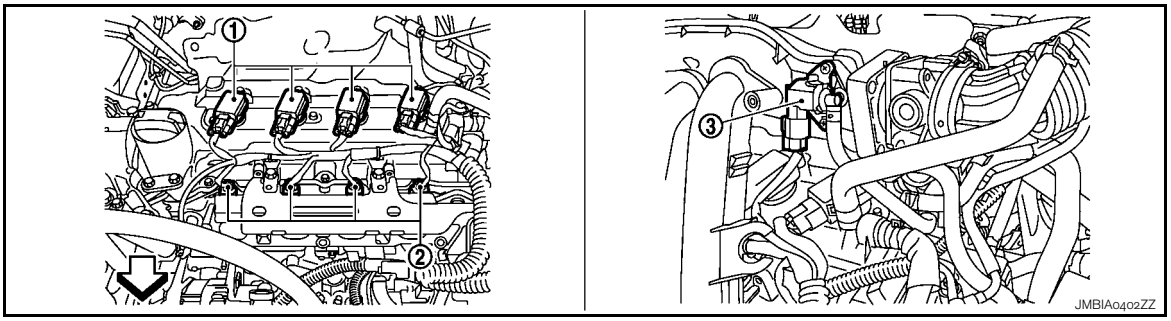
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



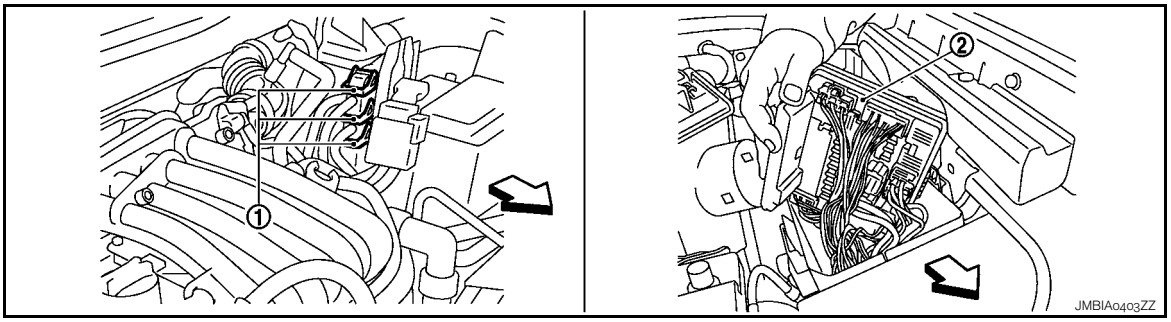
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

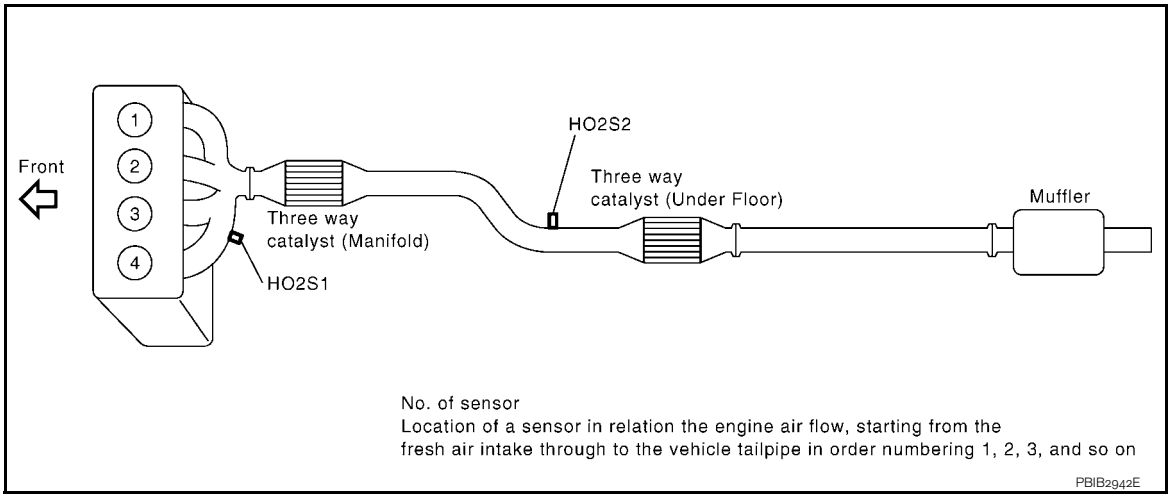
⇦ Vehicle front

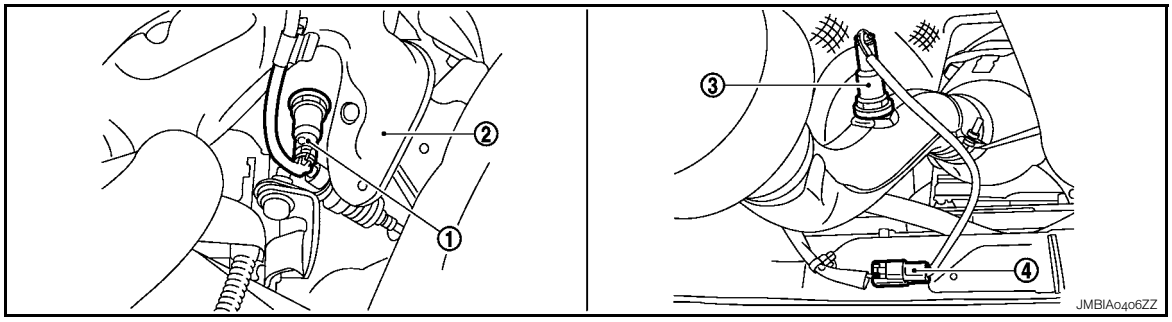


1. ECM harness connector
2. IPDM E/R

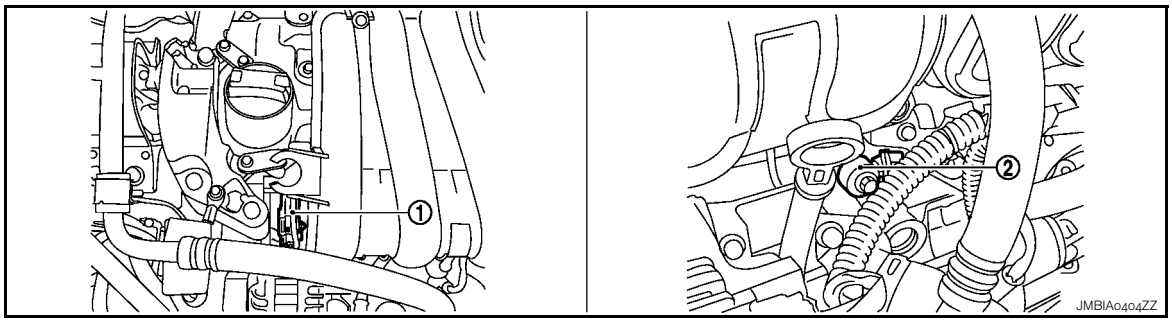
⇦ Vehicle front

cardiagn.com

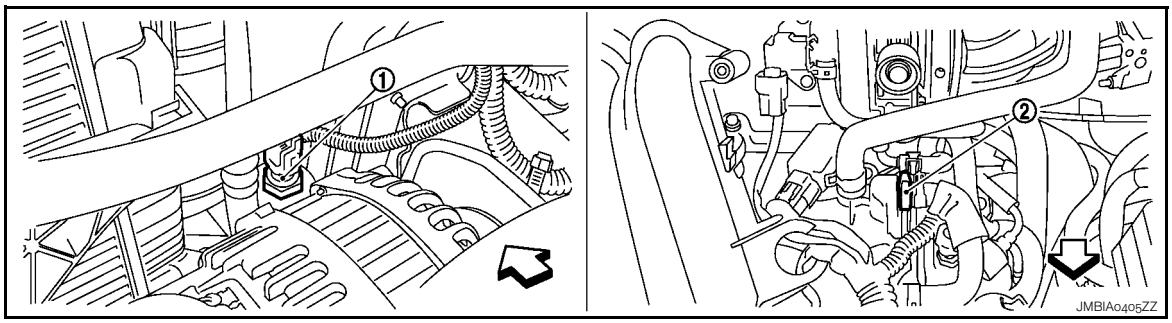




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



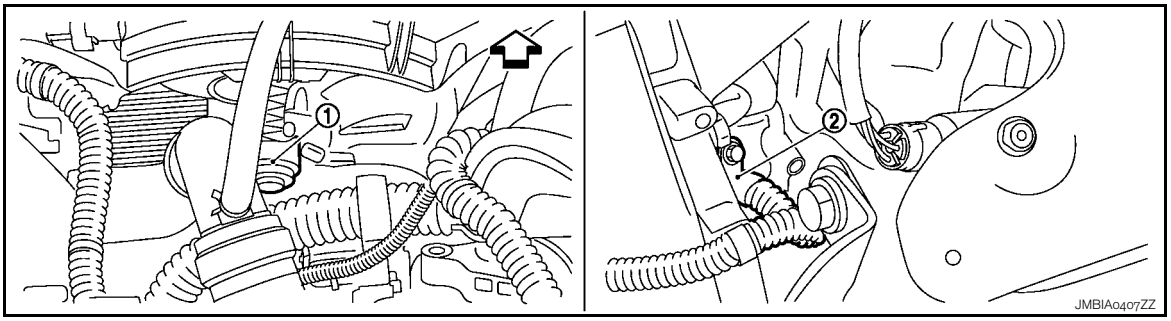
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

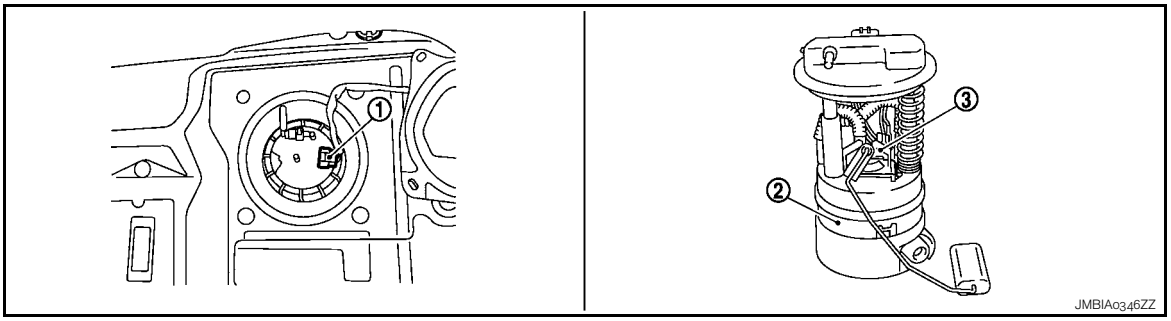
⇦ Vehicle front

cardiagn.com

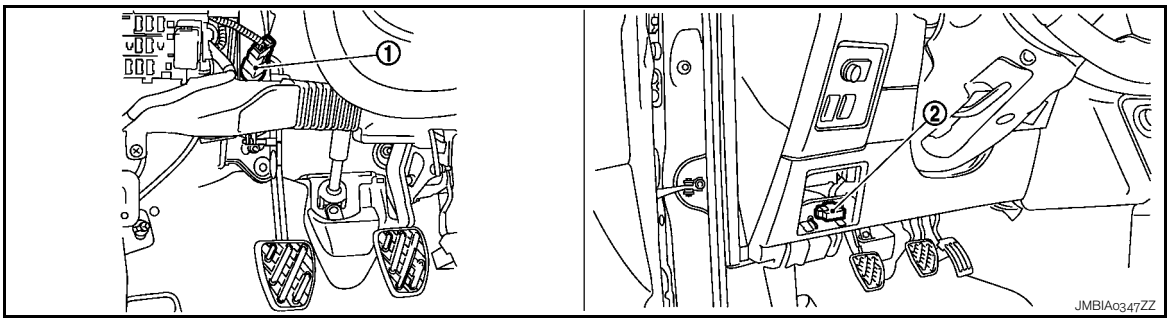


1. Cooling fan motor
2. Crankshaft position sensor (POS)

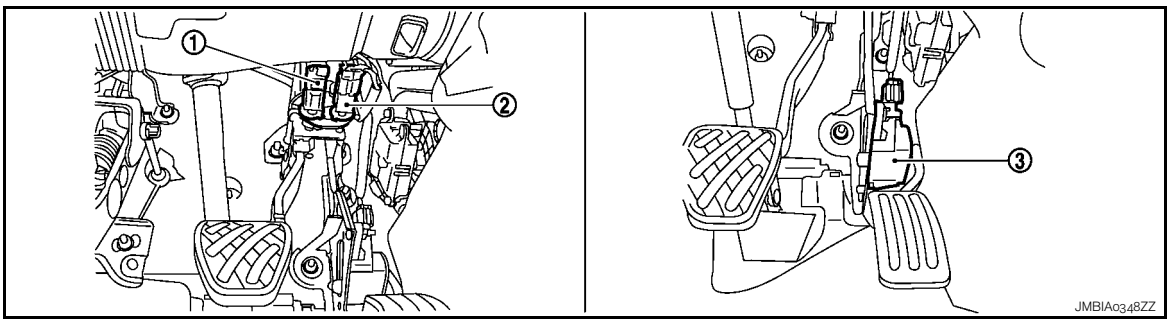
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

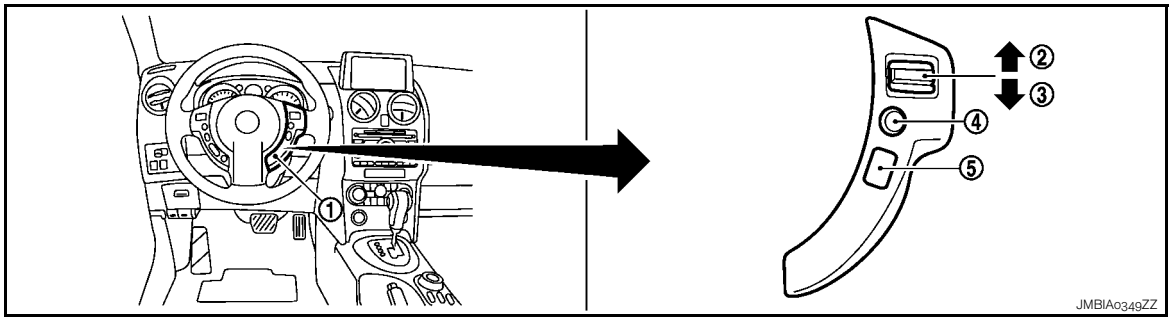


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056148

Component	Reference
ASCD steering switch	EC-263, "Description"
ASCD clutch switch	EC-294, "Description"
ASCD brake switch	EC-294, "Description"
ASCD indicator	EC-298, "Description"
Stop lamp switch	EC-277, "Description"
Electric throttle control actuator	EC-217, "Description"

cardiagn.com

CAN COMMUNICATION

System Description

INFOID:0000000001056149

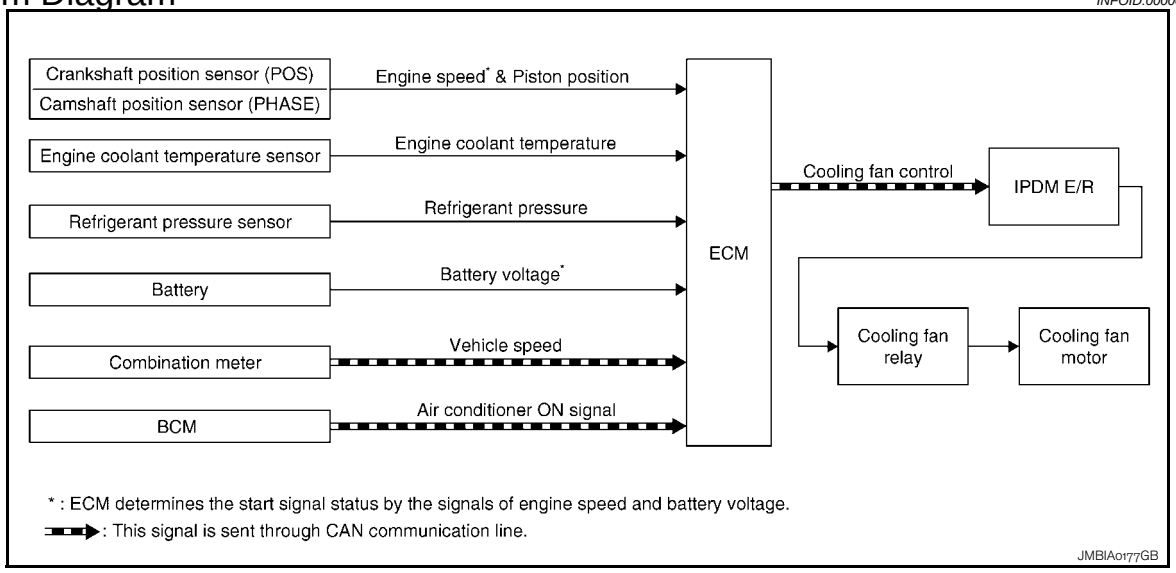
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-59, "CAN Communication Signal Chart", about CAN communication for detail.

cardiagn.com

COOLING FAN CONTROL

System Diagram

INFOID:0000000001056150



System Description

INFOID:0000000001056151

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

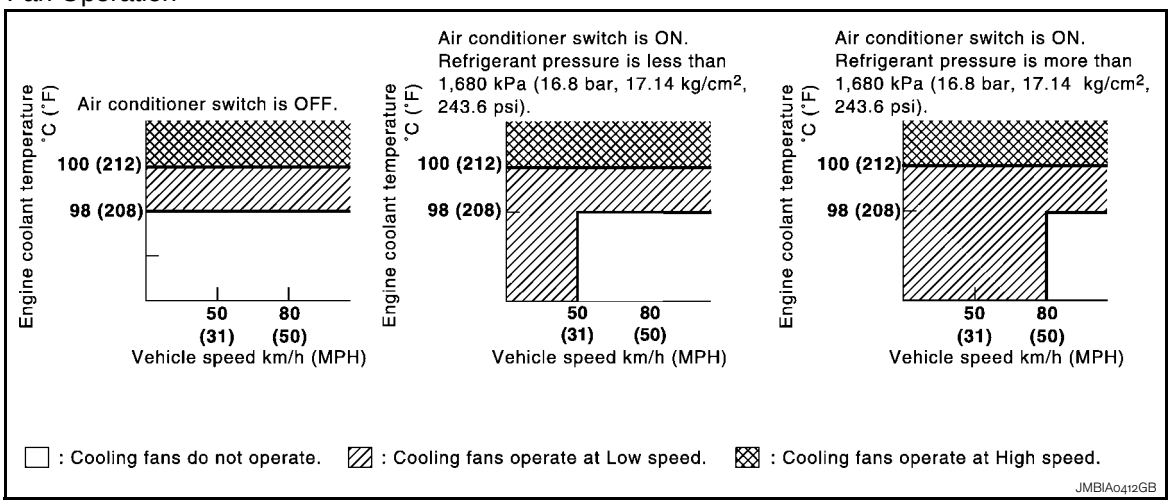
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



cardiagn.com

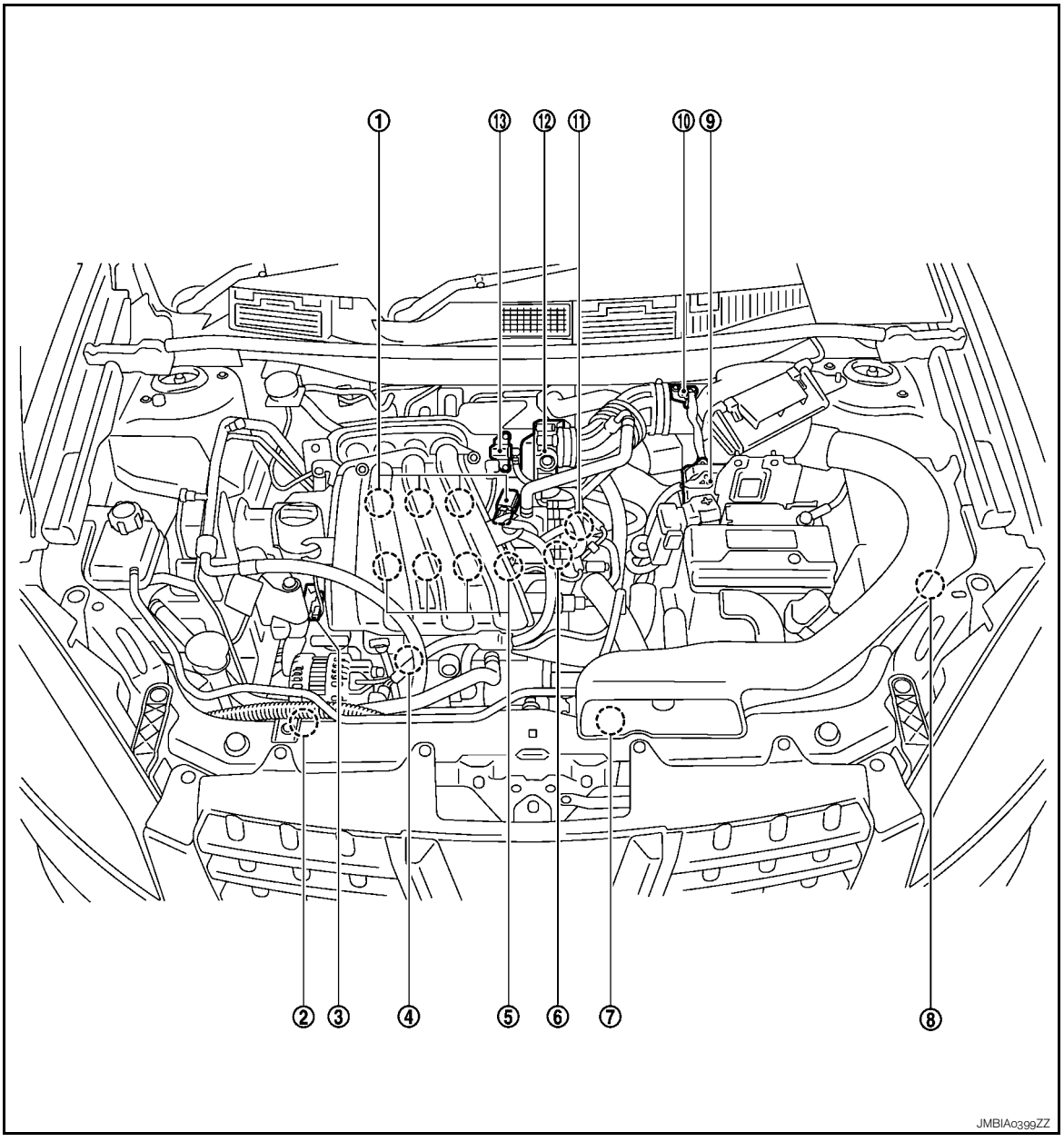
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	3
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

Component Parts Location

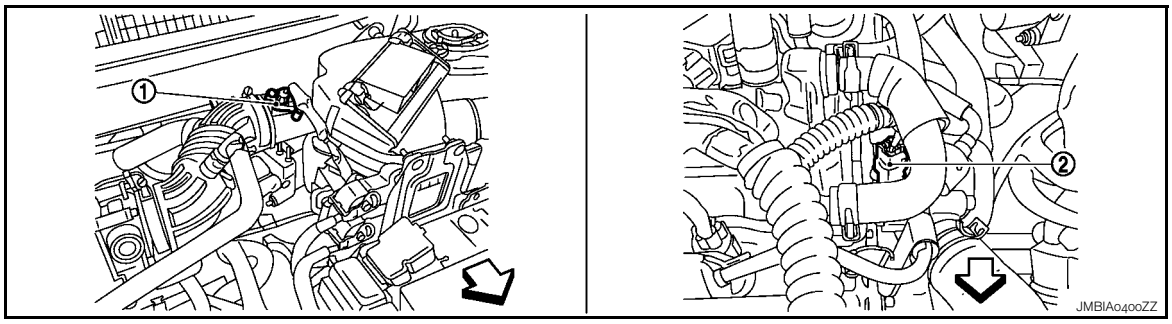
INFOID:0000000001060013



1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM

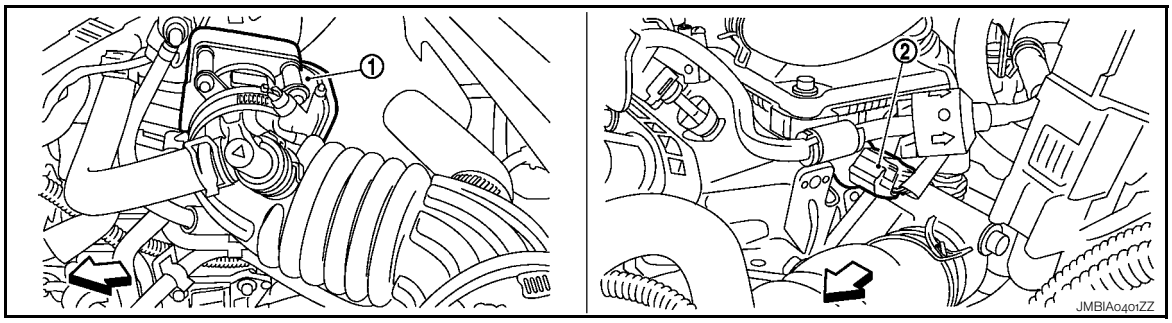
cardiagn.com

10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve



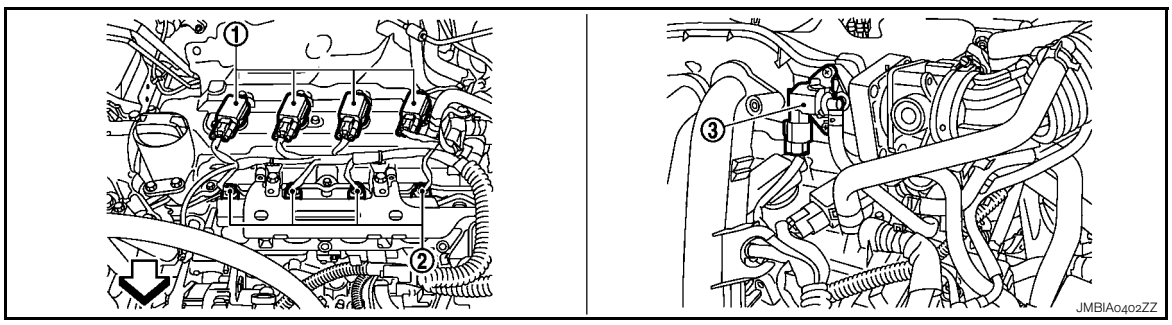
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

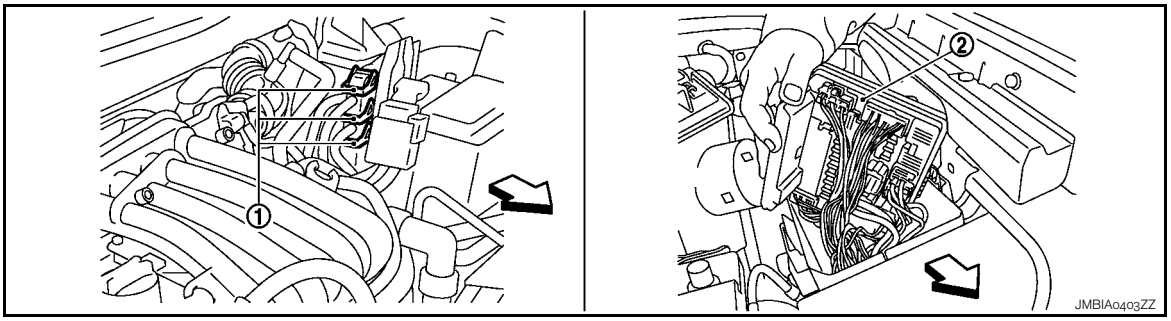
⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

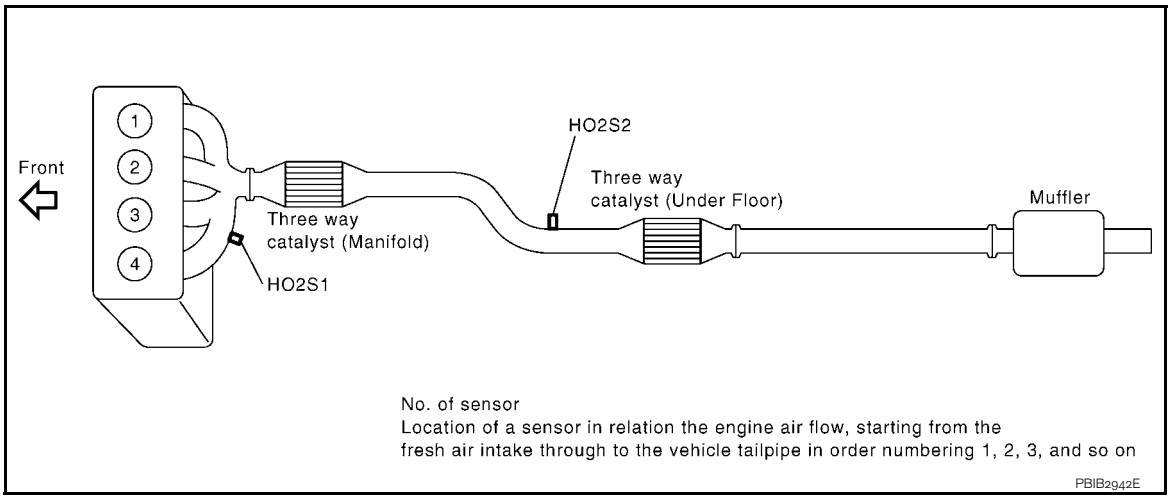
⇦ Vehicle front

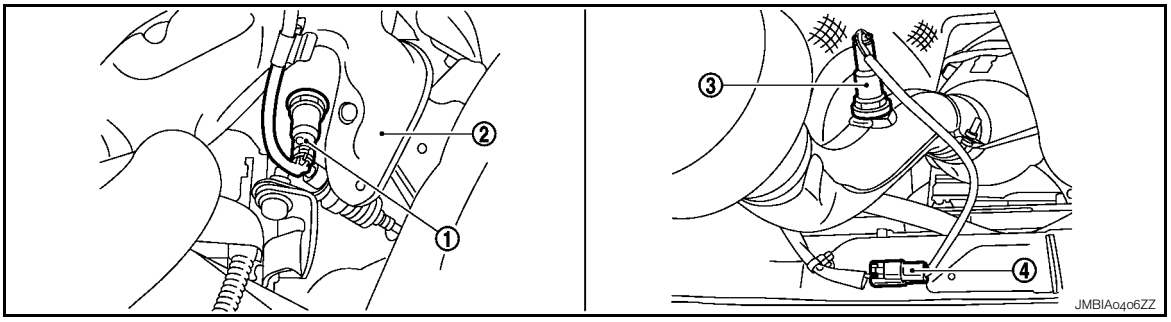
cardiagn.com



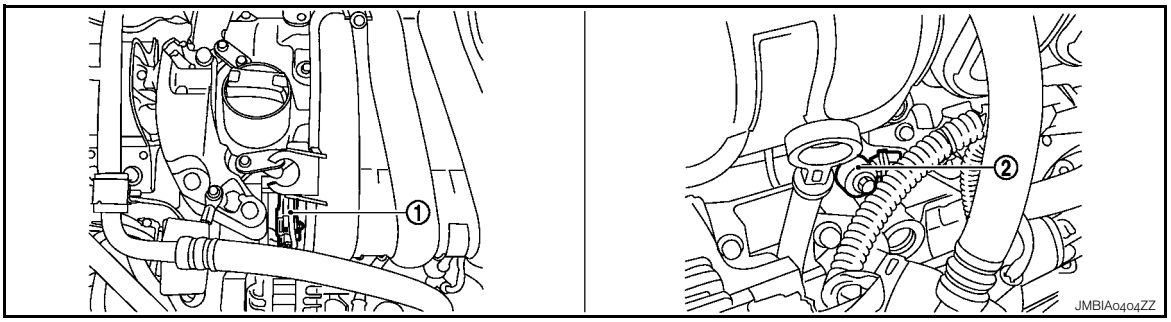
1. ECM harness connector
2. IPDM E/R

⇦ Vehicle front



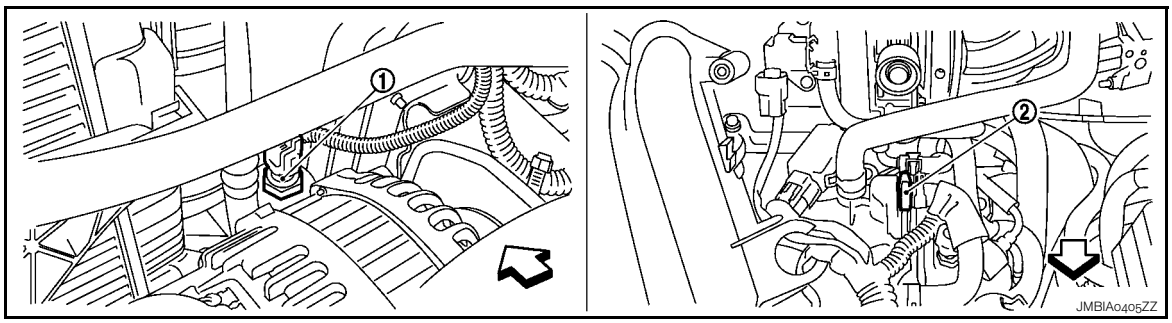


1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



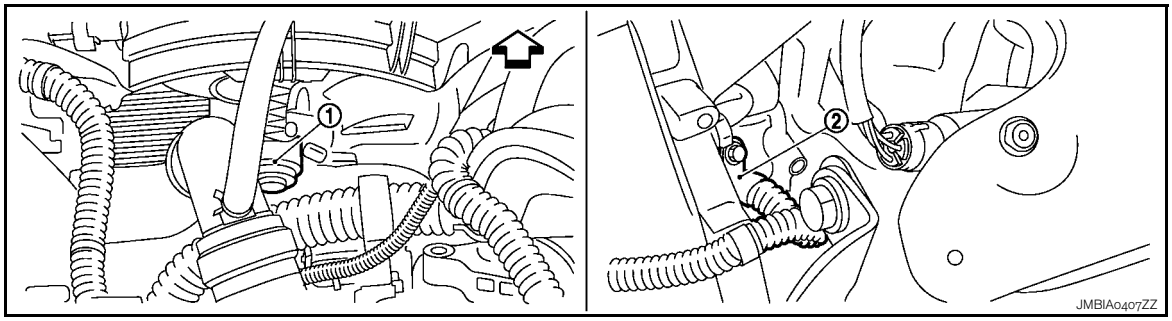
1. Intake valve timing control solenoid valve
2. Knock sensor

cardiagn.com



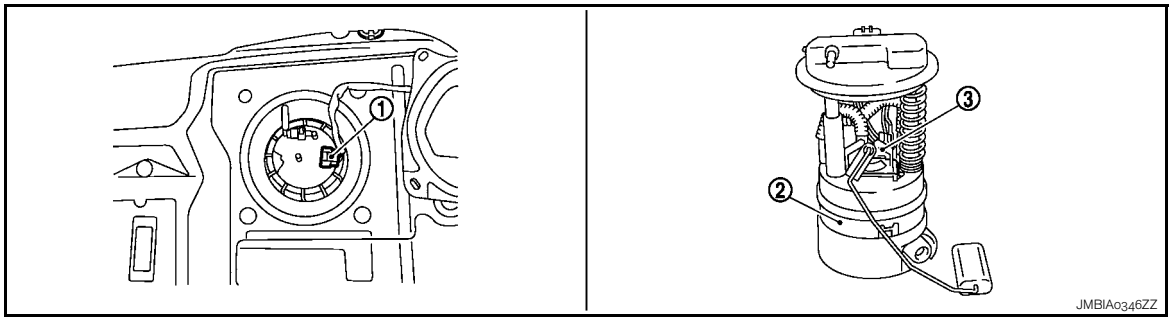
1. Refrigerant pressure sensor
2. PCV valve

⇦ Vehicle front

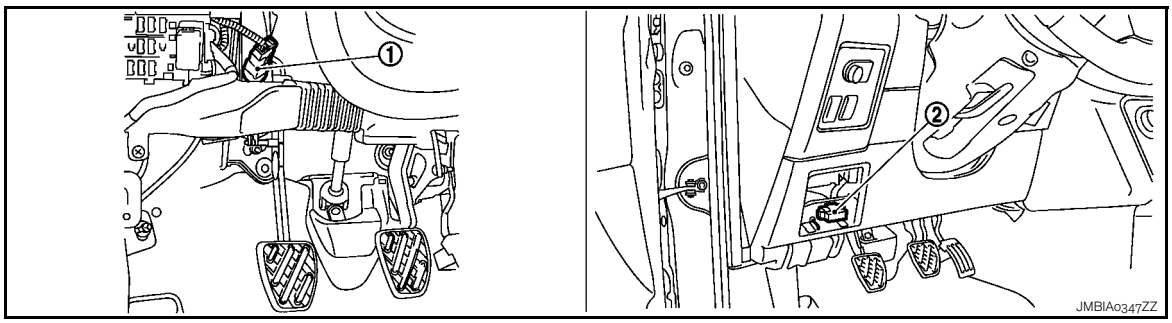


1. Cooling fan motor
2. Crankshaft position sensor (POS)

⇦ Vehicle front

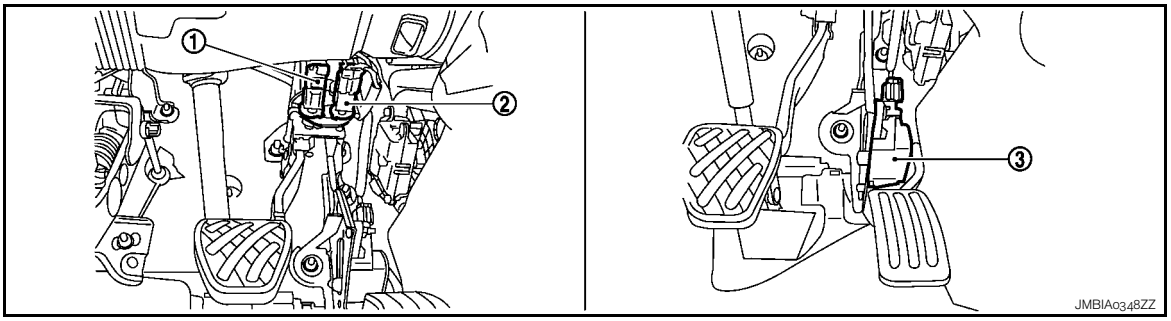


1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

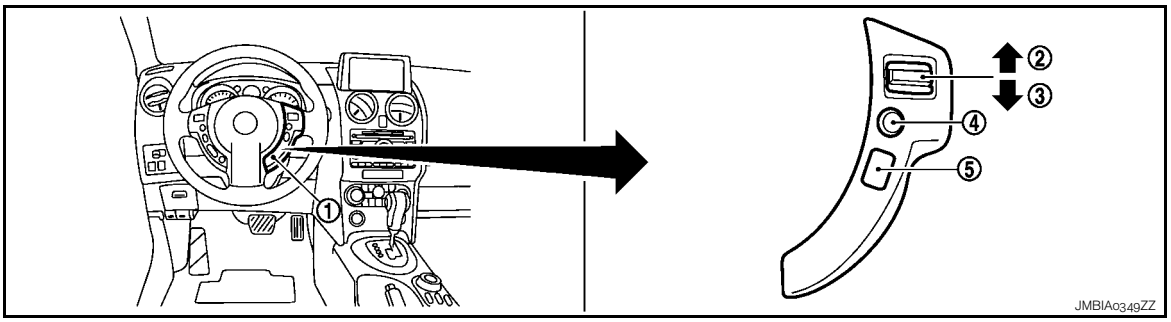


1. ASCD clutch switch
2. Data link connector

cardiagn.com



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056153

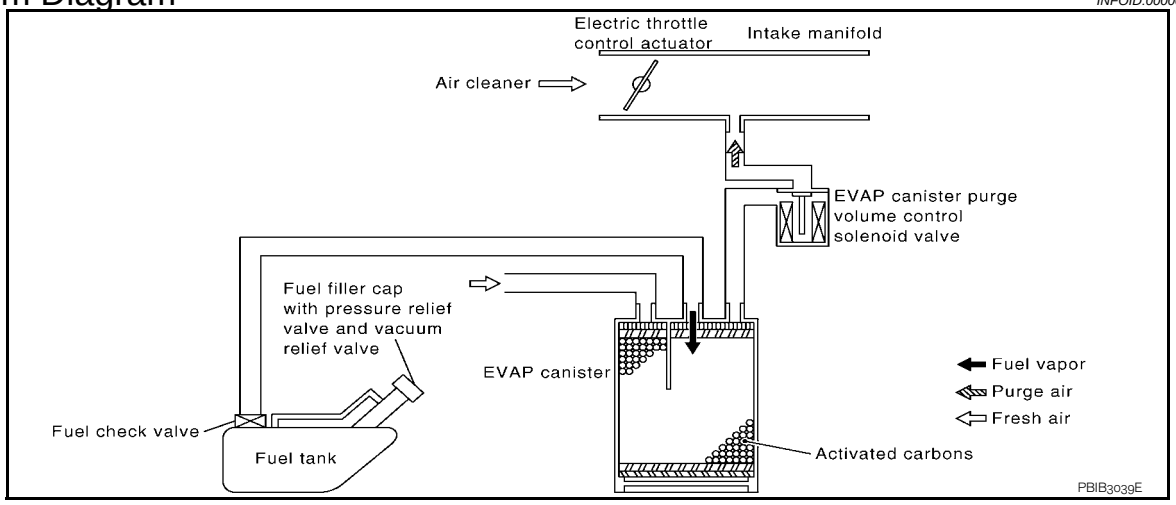
Component	Reference
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Cooling fan motor	EC-68, "System Description"
Engine coolant temperature sensor	EC-135, "Description"
Refrigerant pressure sensor	EC-316, "Description"

cardiagn.com

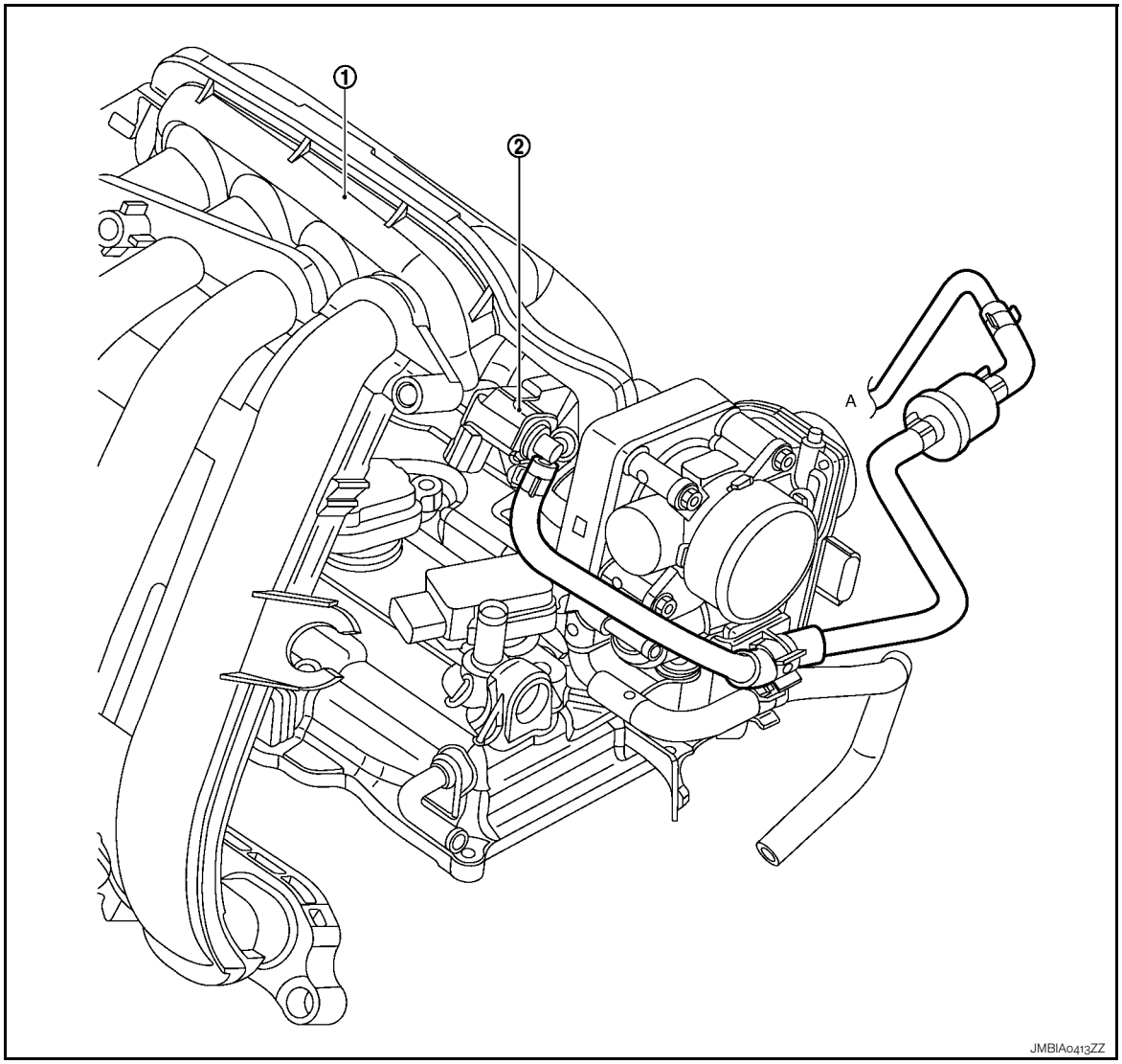
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001056154



EVAPORATIVE EMISSION LINE DRAWING



cardiagn.com

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve

A. To EVAP canister

NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

System Description

INFOID:0000000001056155

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter*2	Vehicle speed		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

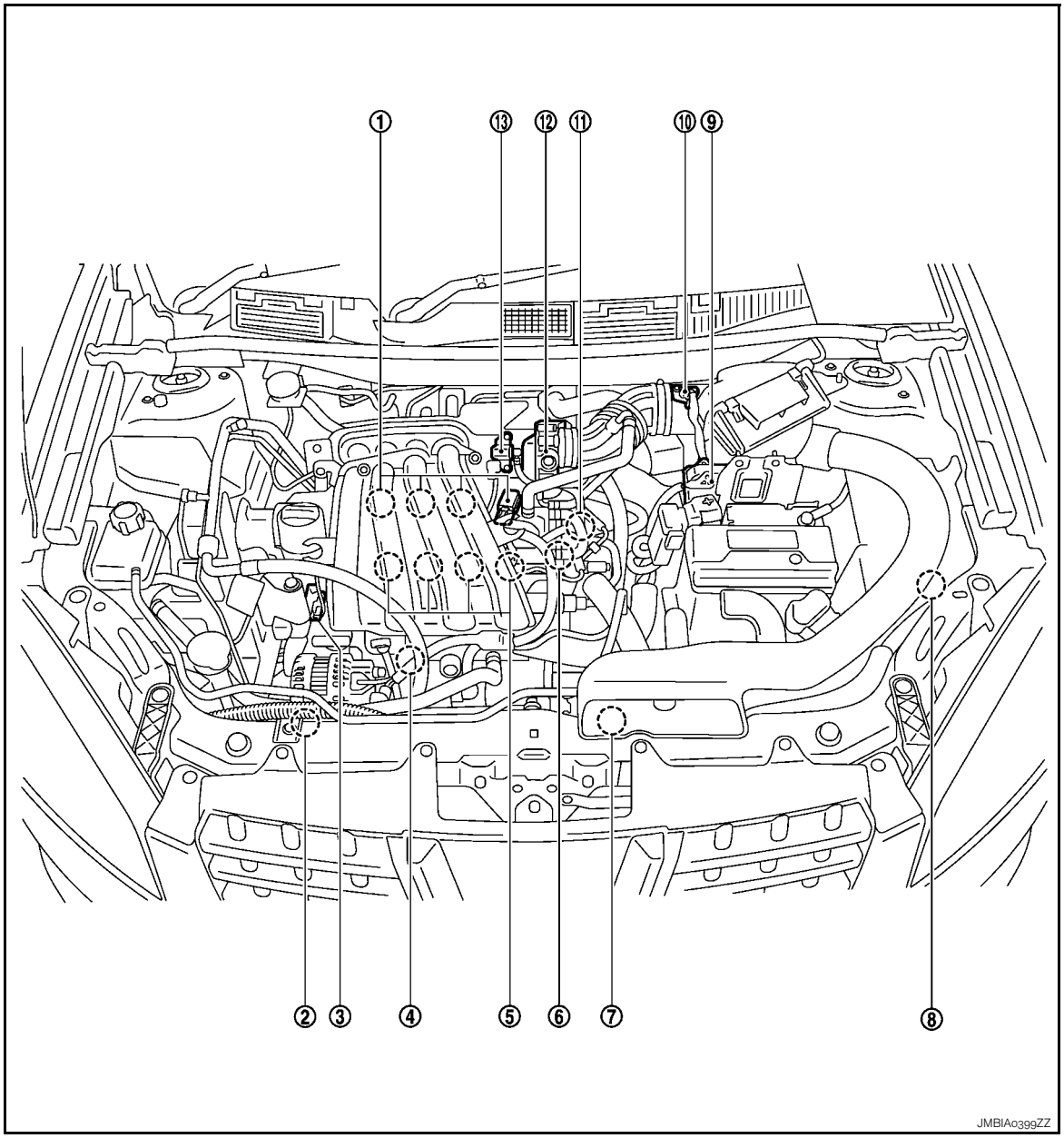
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

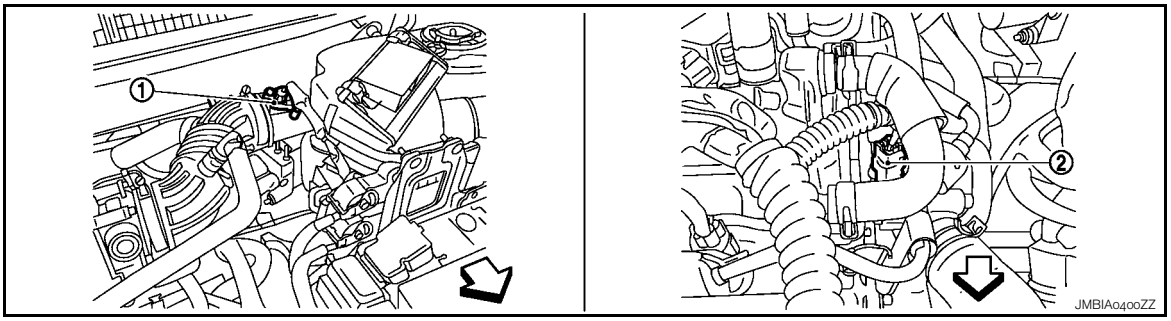
Component Parts Location

INFOID:0000000001060014



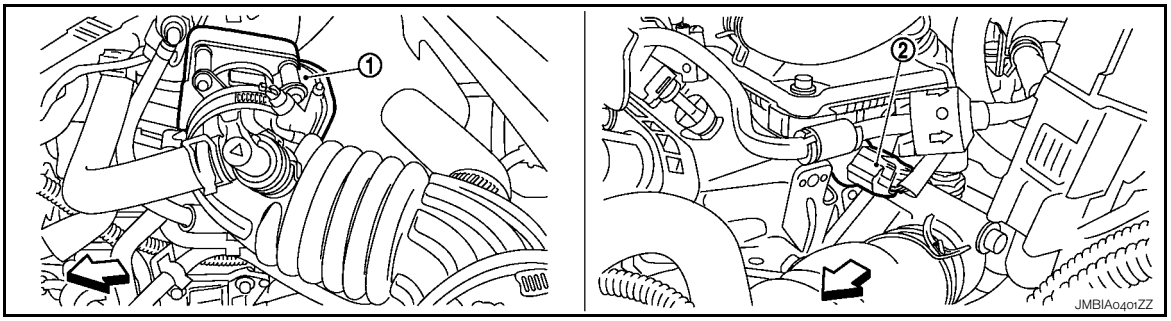
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



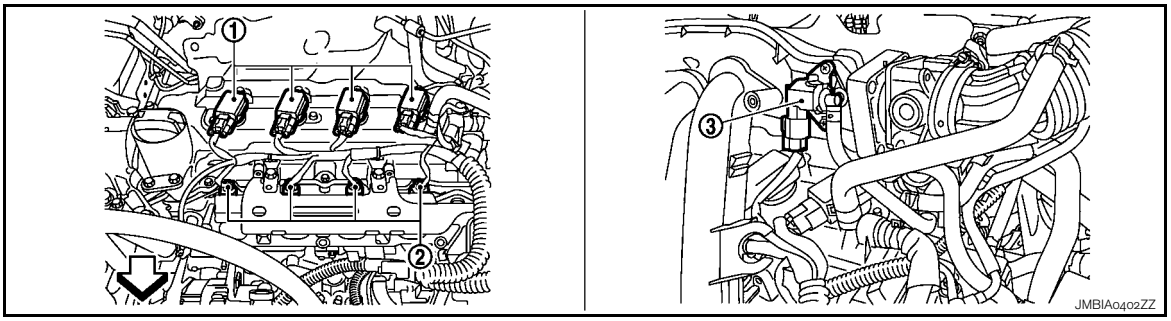
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



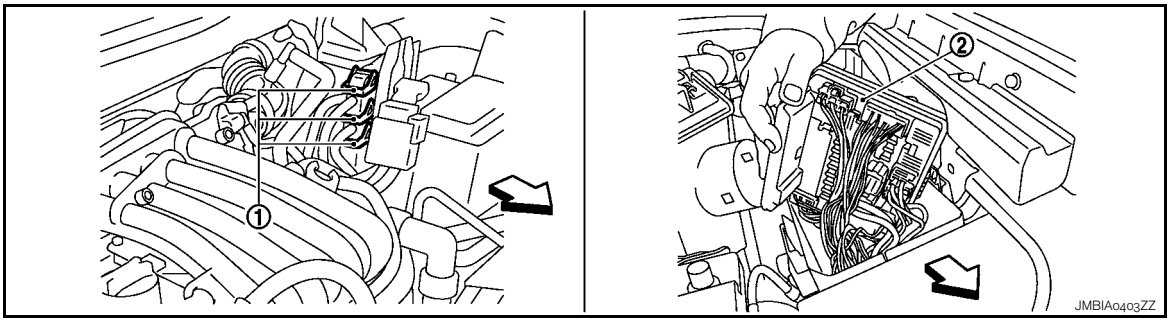
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

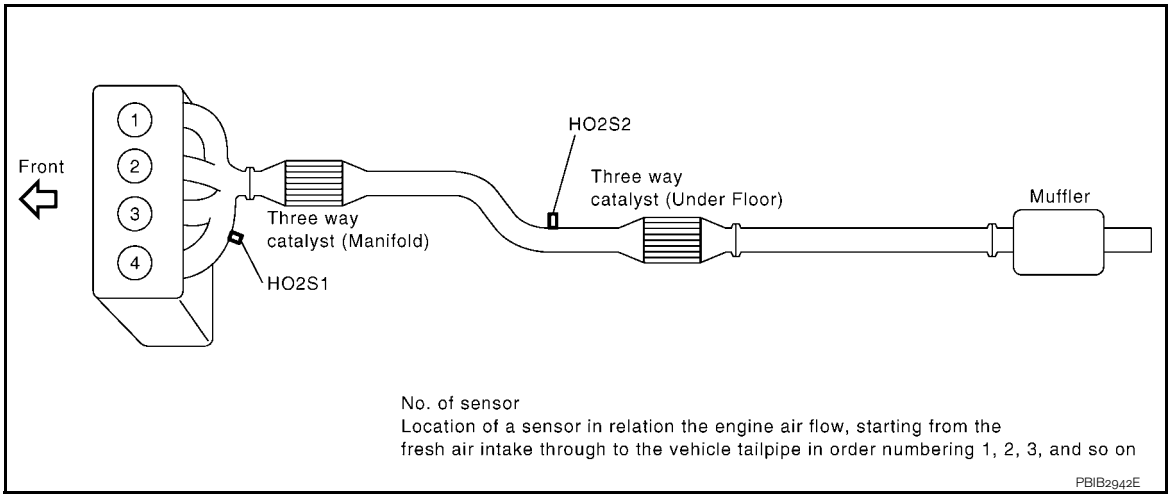
⇦ Vehicle front

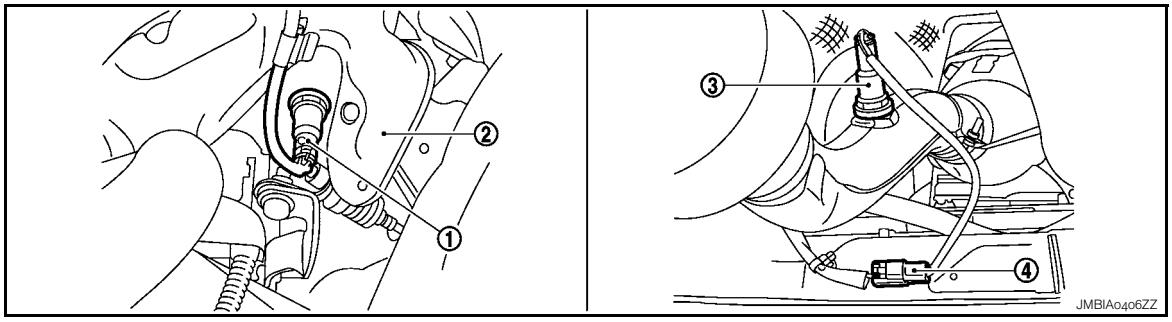


1. ECM harness connector
2. IPDM E/R

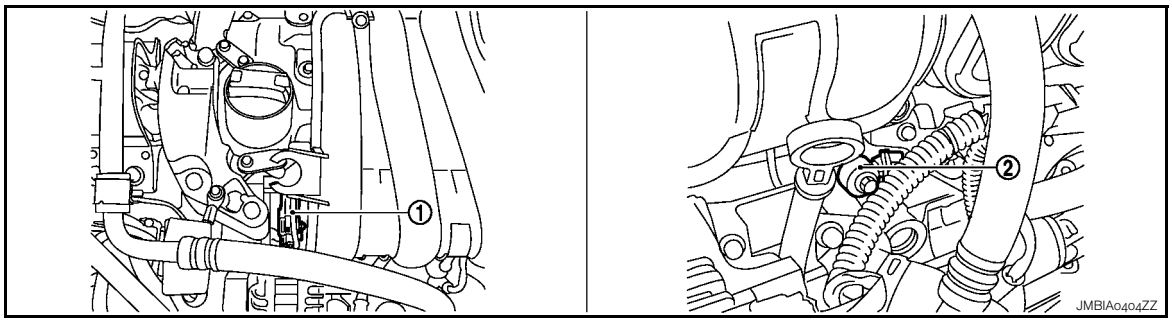
⇦ Vehicle front

cardiagn.com

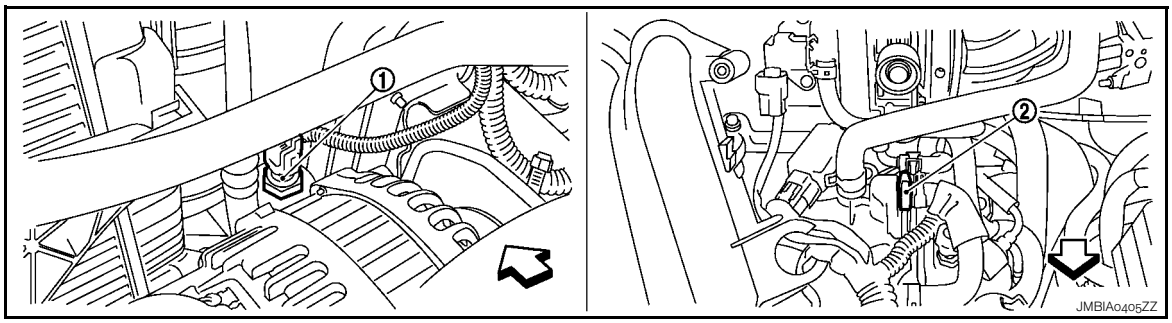




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



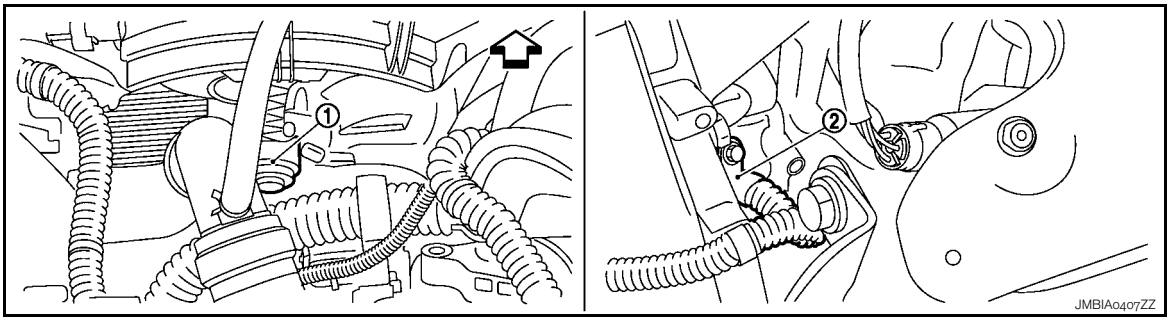
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

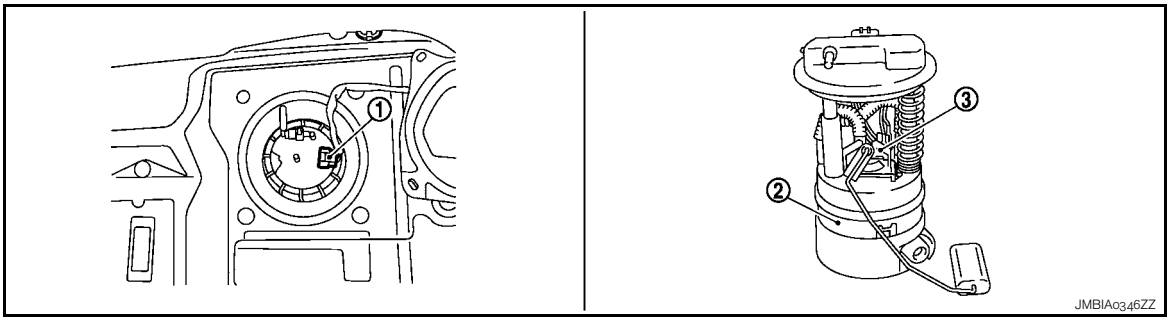
⇦ Vehicle front

cardiagn.com

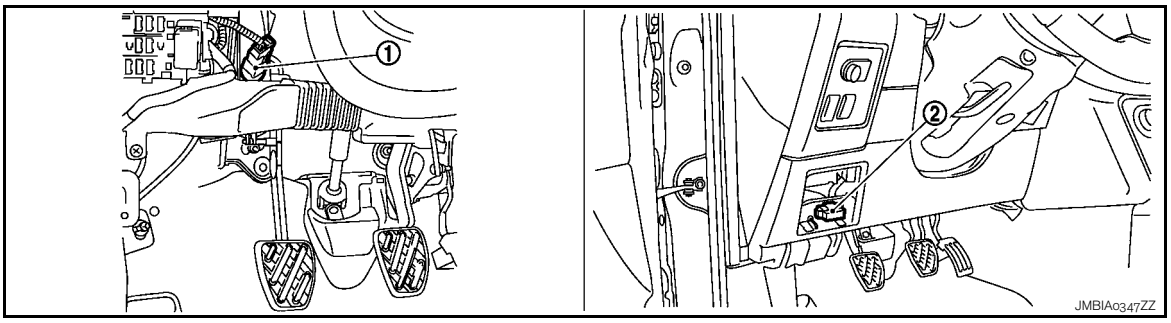


1. Cooling fan motor
2. Crankshaft position sensor (POS)

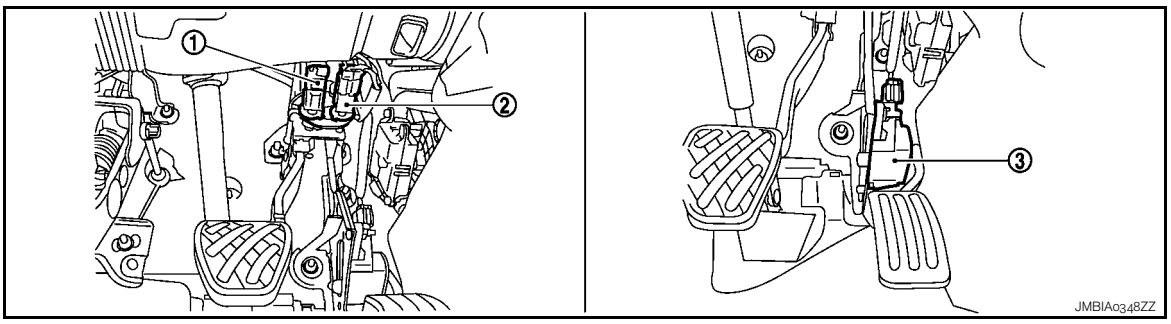
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

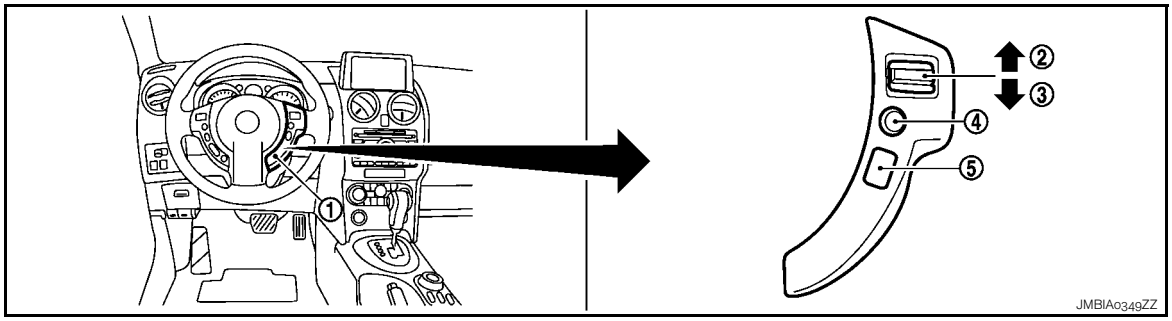


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056157

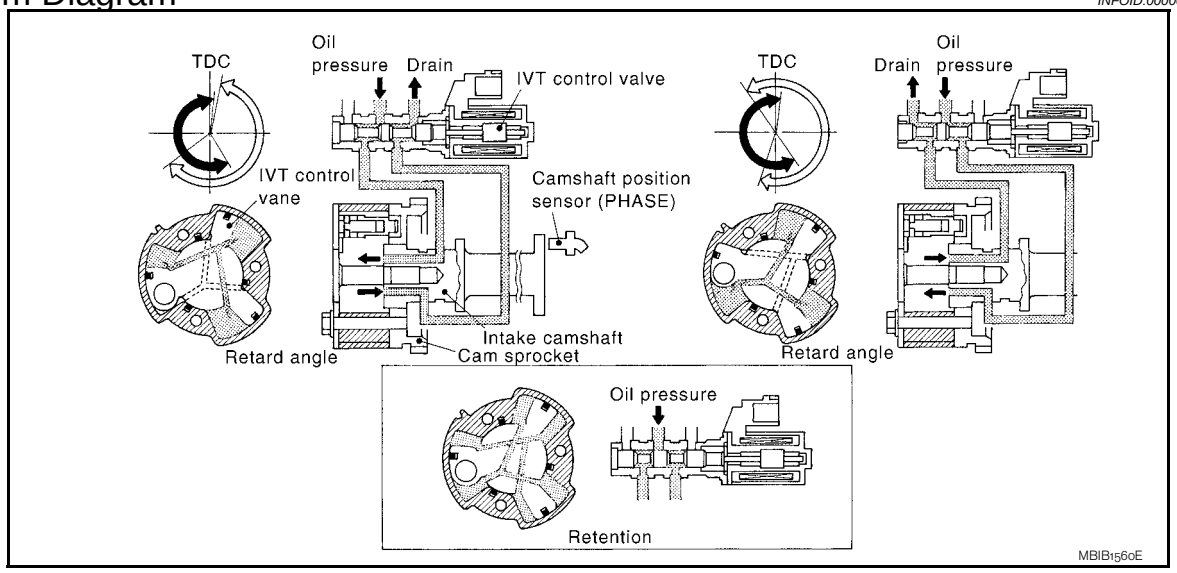
Component	Reference
Accelerator pedal position sensor	EC-280, "Description"
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Engine coolant temperature sensor	EC-135, "Description"
EVAP canister purge volume control solenoid valve	EC-206, "Description"
Heated oxygen sensor 1	EC-141, "Description"
Mass air flow sensor	EC-127, "Description"
Throttle position sensor	EC-138, "Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001056158



System Description

INFOID:0000000001056159

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

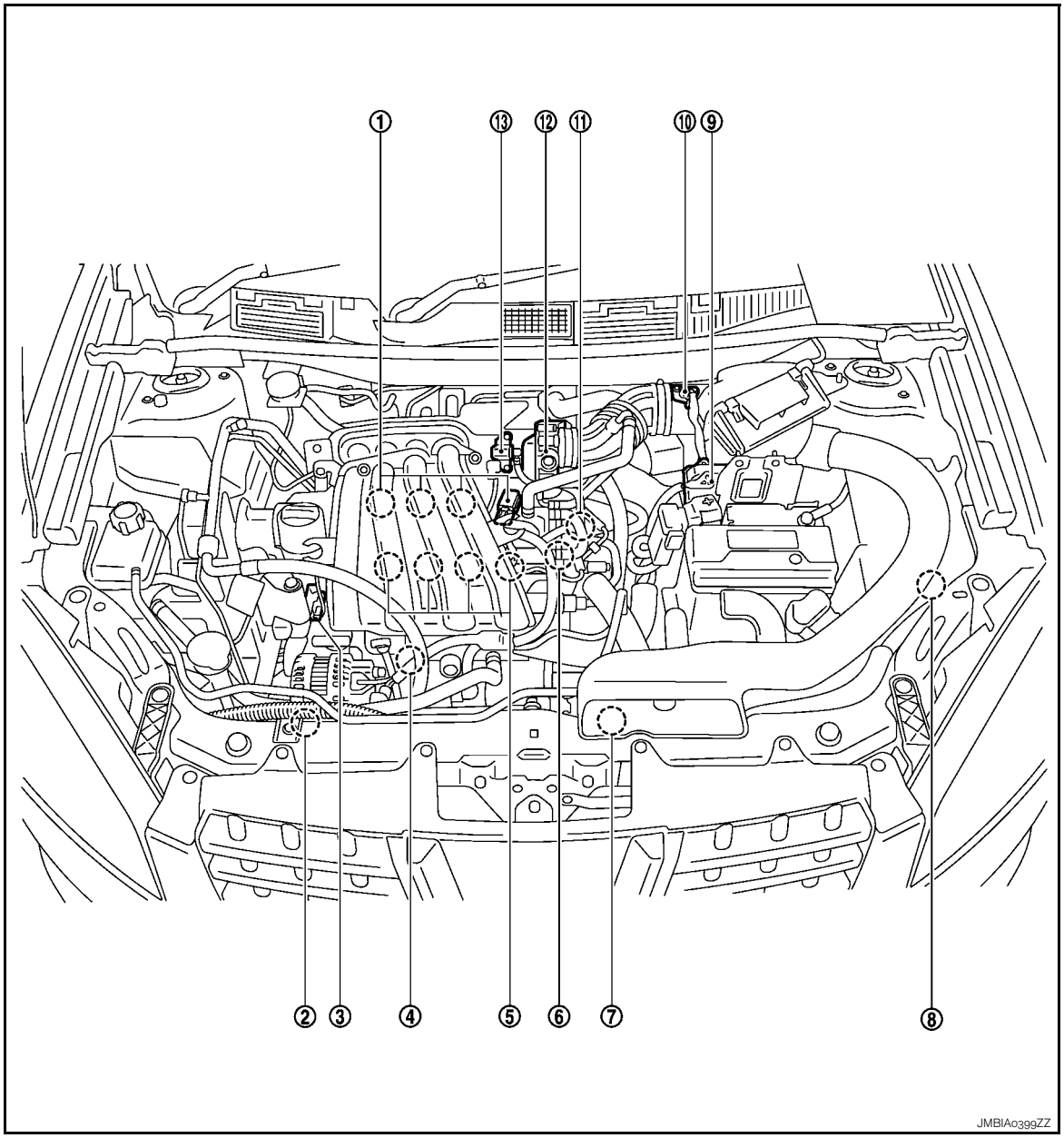
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

Component Parts Location

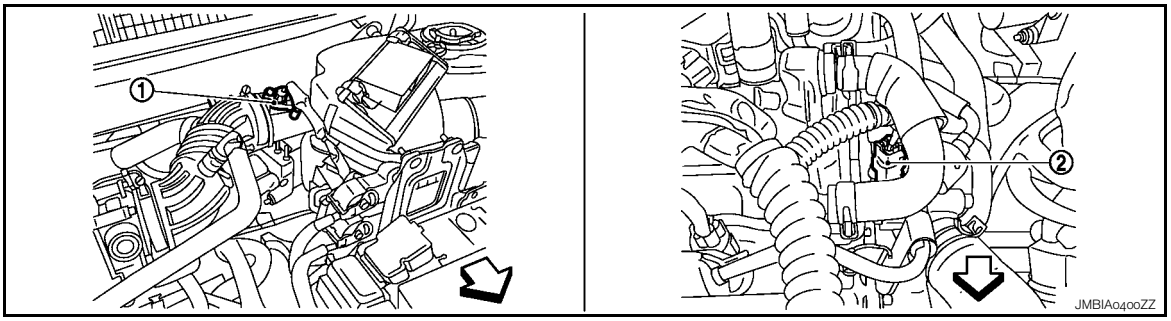
INFOID:0000000001060015

cardiagn.com



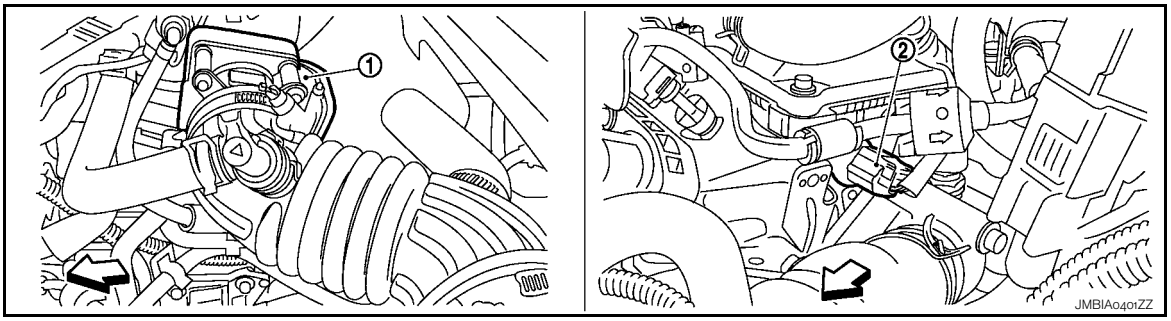
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



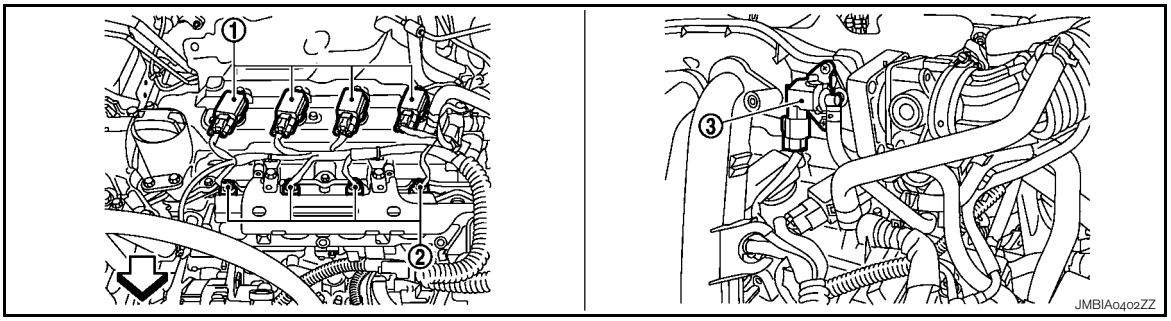
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



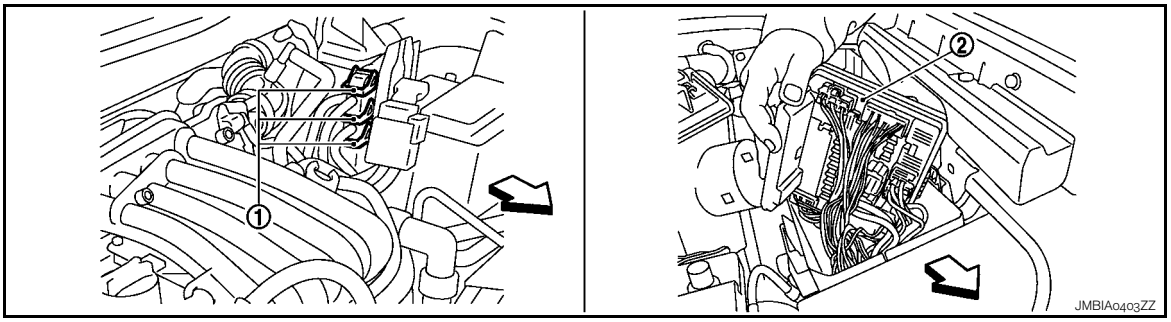
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

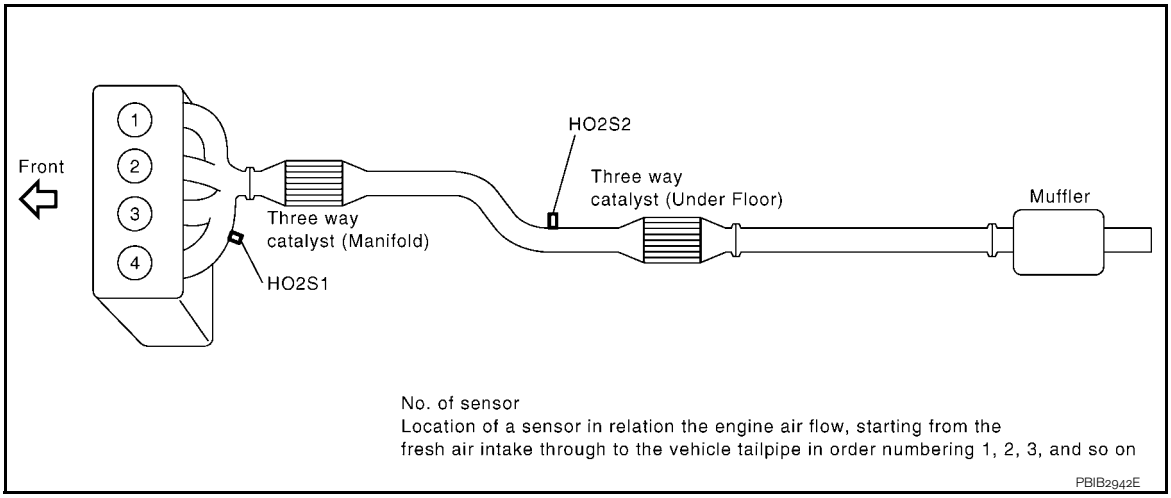
⇦ Vehicle front

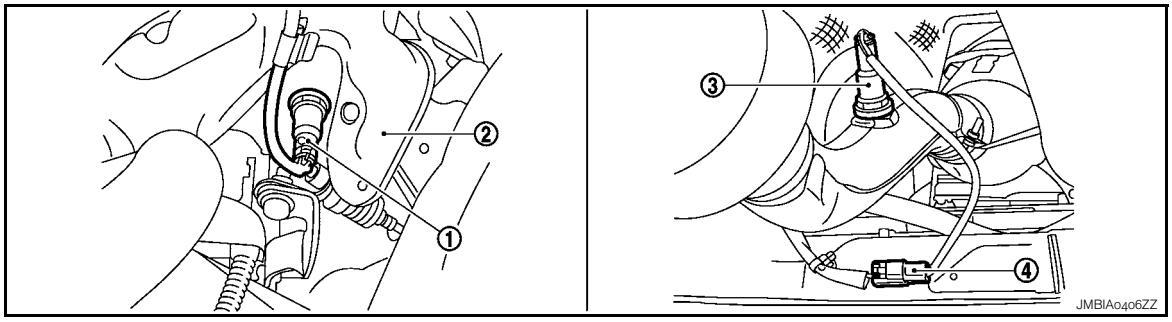


1. ECM harness connector
2. IPDM E/R

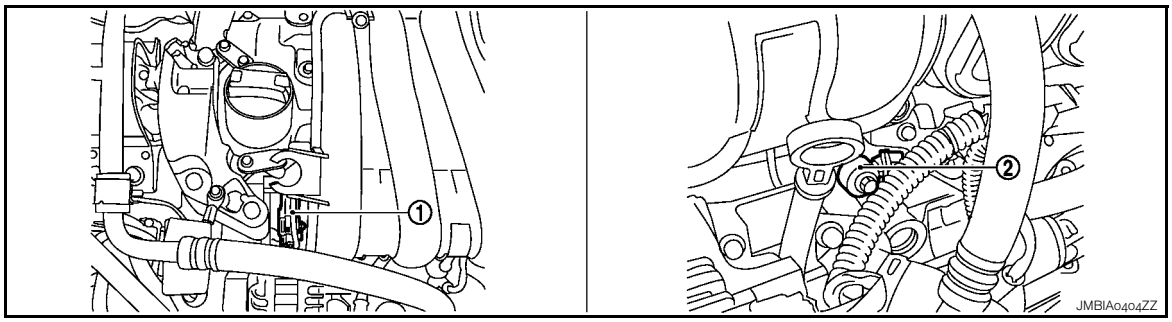
⇦ Vehicle front

cardiagn.com

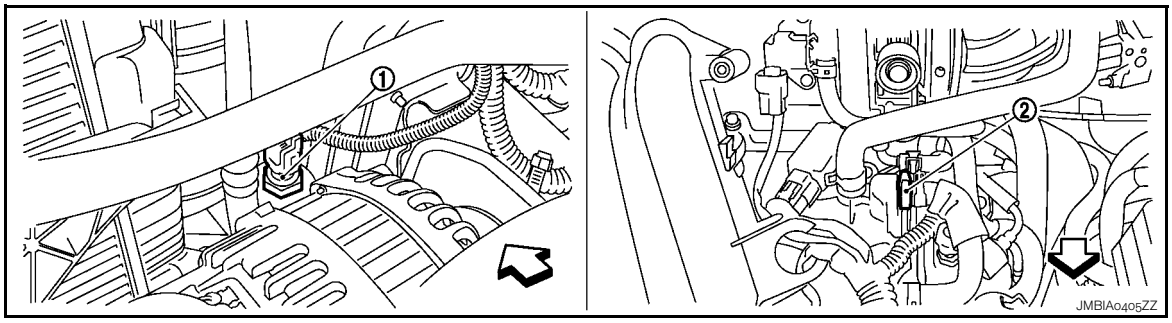




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



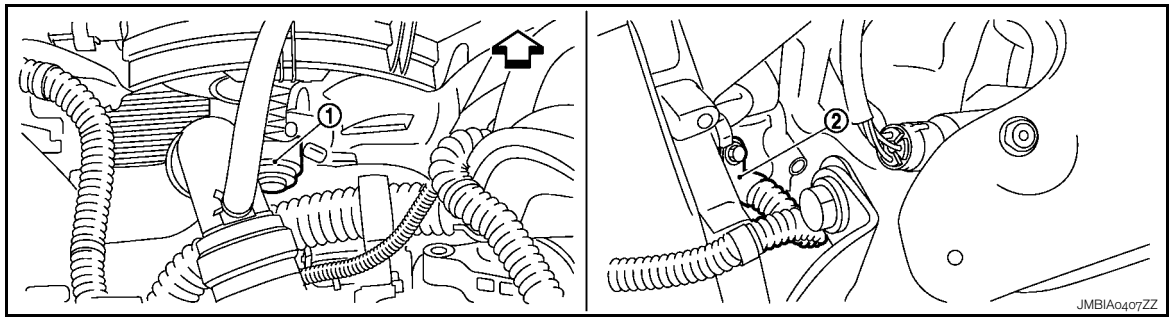
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

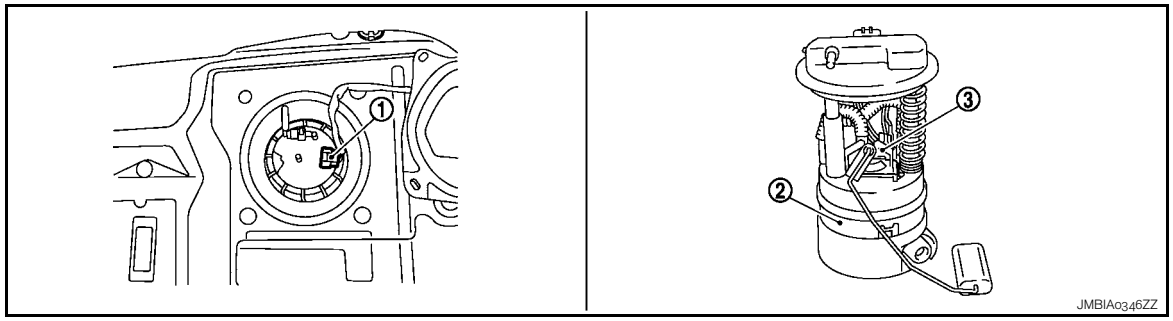
⇦ Vehicle front

cardiagn.com

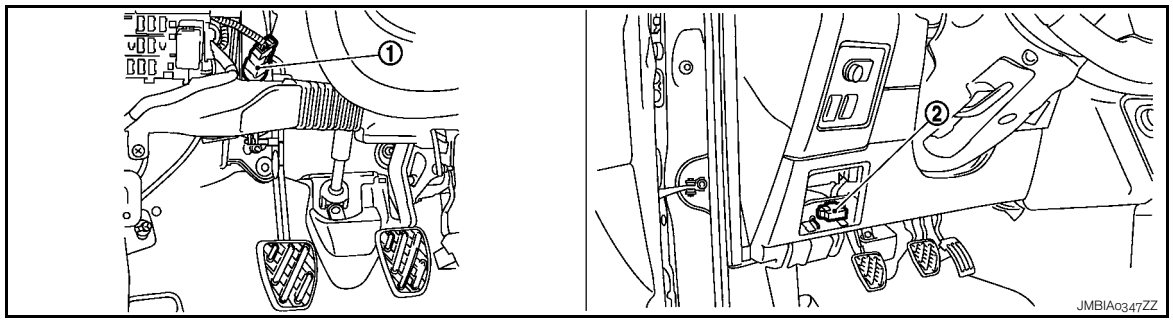


1. Cooling fan motor
2. Crankshaft position sensor (POS)

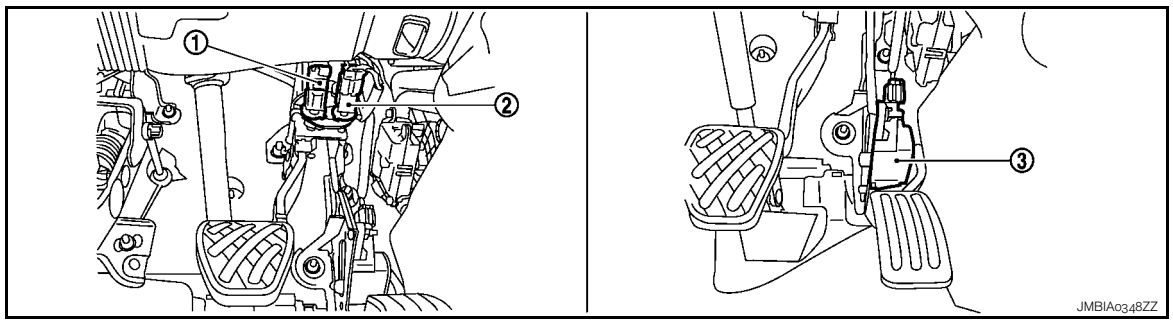
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

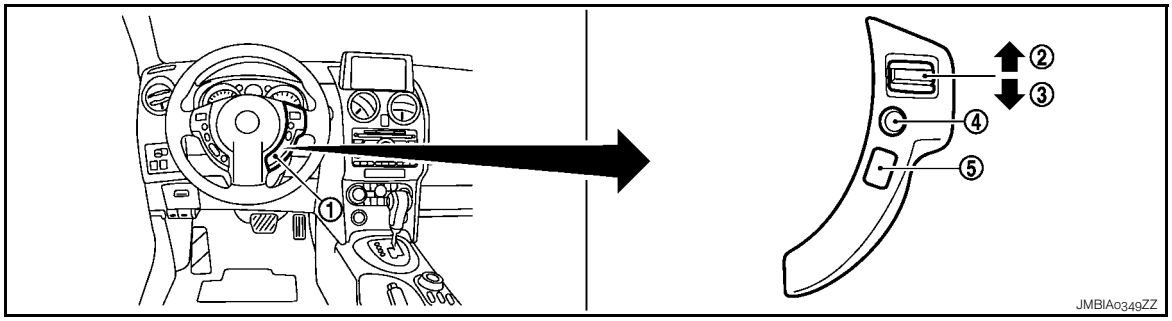


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001056161

Component	Reference
Camshaft position sensor (PHASE)	EC-197, "Description"
Crankshaft position sensor (POS)	EC-193, "Description"
Engine coolant temperature sensor	EC-135, "Description"
Intake valve timing control solenoid valve	EC-81, "System Description"
Vehicle speed sensor	EC-209, "Description"

cardiagn.com

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001056166

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of ISO 15031-5
Freeze Frame data	Service $02 of ISO 15031-5
System Readiness Test (SRT) code	Service $01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-III	×	×	×	×	×	—
GST	×	×	×	—	×	×
ECM	×	×*	—	—	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-339, "Fail Safe".)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MI				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-341, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

cardiagn.com

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.
For malfunctions in which 1st trip DTCs are displayed, refer to “EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS”. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-22, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P1148, 1706, etc.
These DTCs are prescribed by ISO 15031-5.

cardiagn.com

(CONSULT-III also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Select Service $04 with GST (Generic Scan Tool).

No Tools

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:

The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

cardiagn.com

If MI is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI ON)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

cardiagn.com

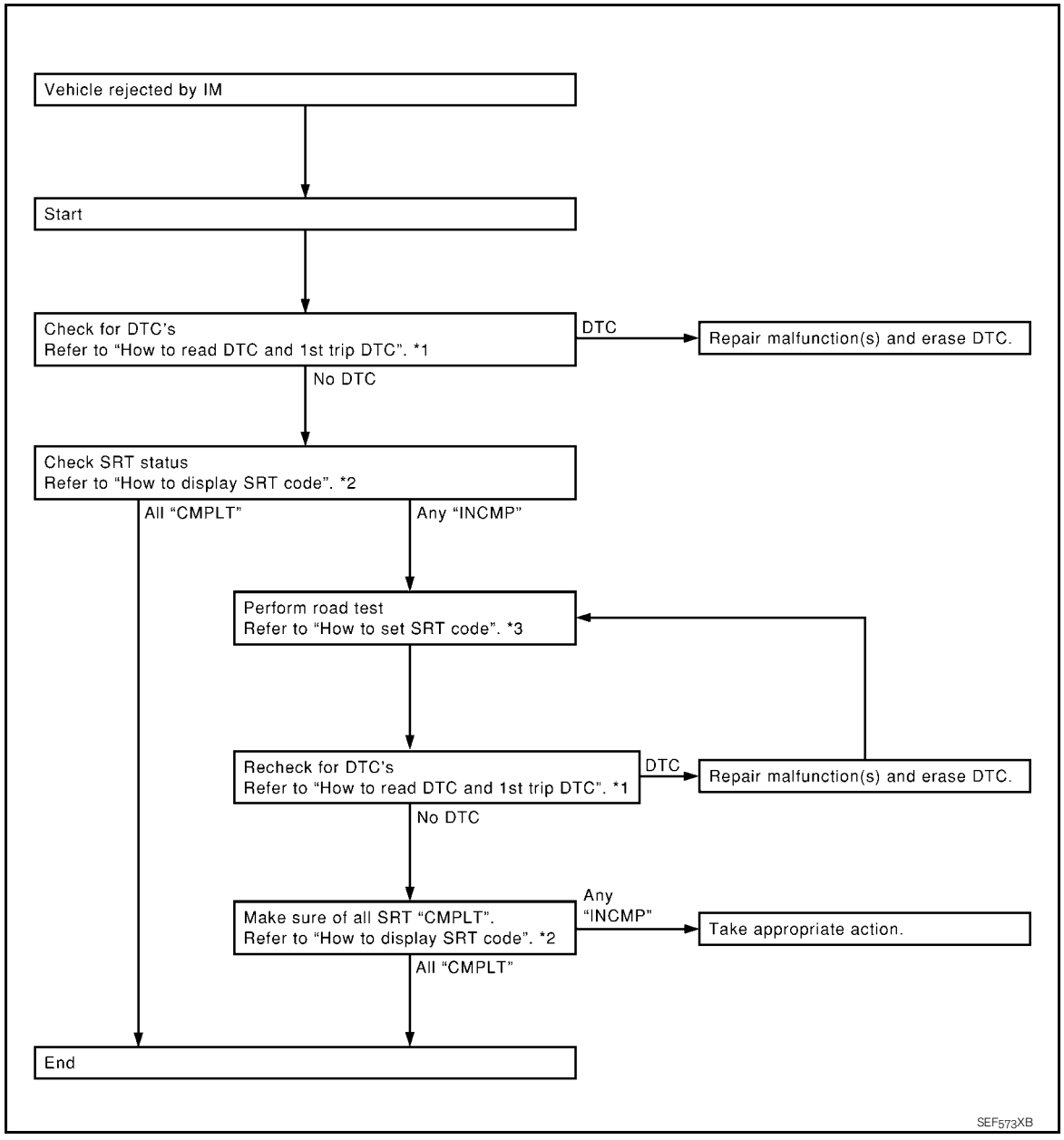
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:
SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



*1 “How to Read DTC and 1st Trip DTC” *2 “How to Display SRT Status” *3 “How to Set SRT Code”

How to Display SRT Status

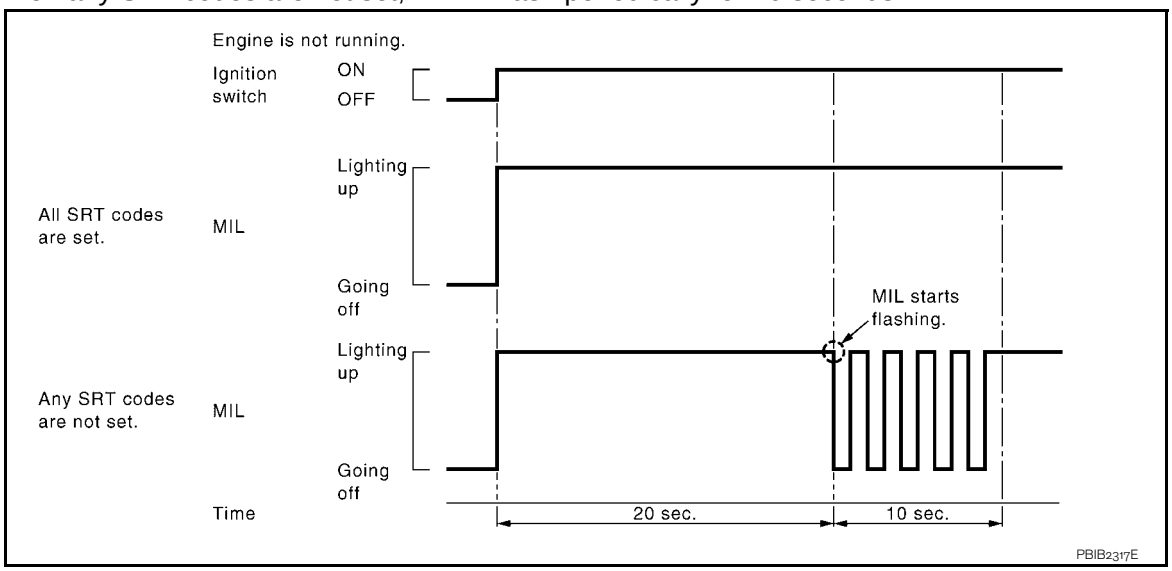
cardiagn.com

WITH CONSULT-III
Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-III.
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-III screen; for items whose SRT codes are not set, “INCMP” is displayed.

WITH GST
Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS
A SRT code itself can not be displayed while only SRT status can be.

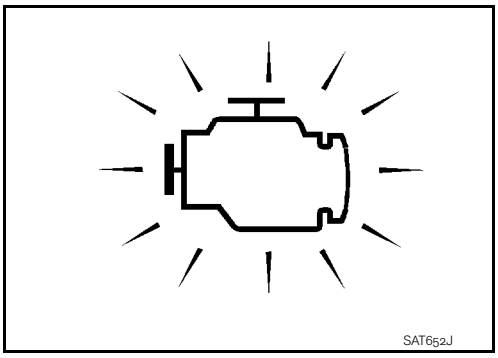
1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MI lights up continuously.
   - When any SRT codes are not set, MI will flash periodically for 10 seconds.



MALFUNCTION INDICATOR (MI)

Description
The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to EC-314, "Component Function Check".
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function
The on board diagnostic system has the following four functions.

cardiagn.com

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

MI Flashing Without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test function modes, and details of the above functions are described later.

The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble code
- 1st trip diagnostic trouble code
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-314, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

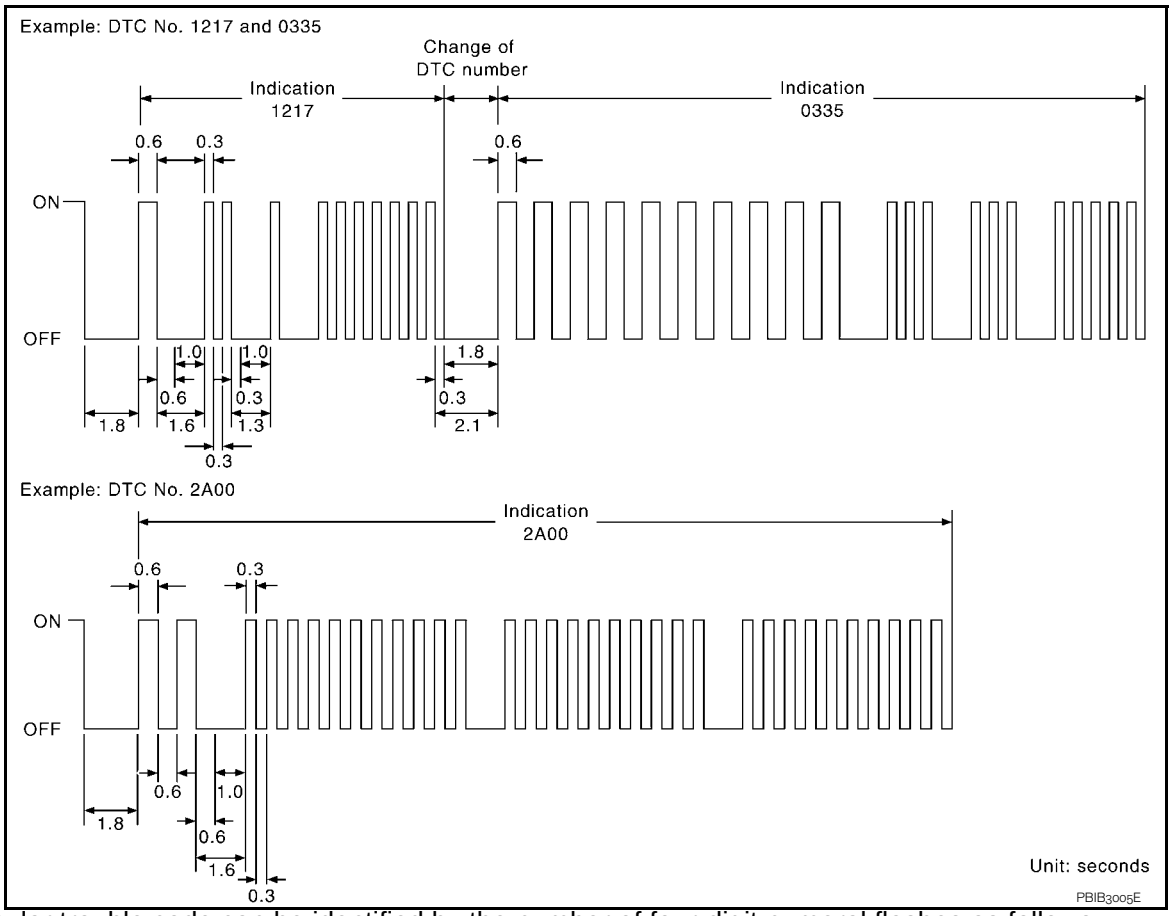
Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.

The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illumi-

cardiagn.com

nates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes as follows.

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-341, "DTC Index")

Diagnostic Test Mode II — Heated oxygen sensor 1 monitor
In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.
To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Nest run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 1 seconds with engine running at 2,000 rpm under no load.

cardiagn.com

How to Switch Diagnostic Test Mode

NOTE:

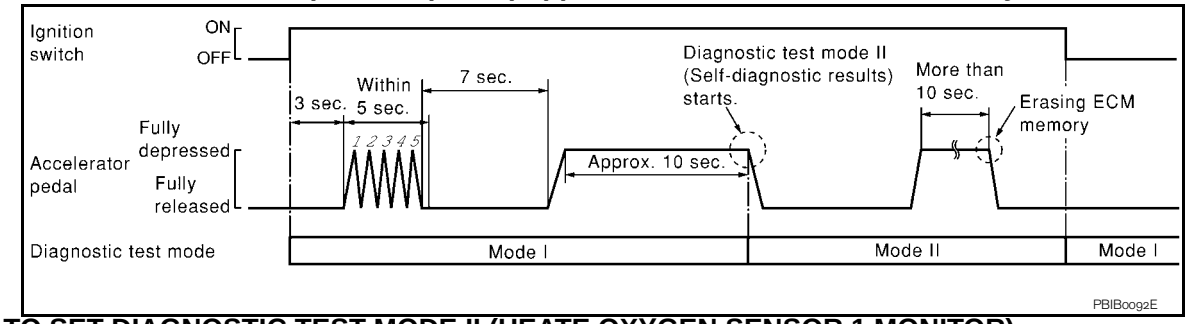
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
   NOTE:
   Do not release the accelerator pedal for 10 seconds if MI may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW TO SET DIAGNOSTIC TEST MODE II (HEATE OXYGEN SENSOR 1 MONITOR)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to “How to Erase Diagnostic Test Mode II (Self-diagnostic Results)”.

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

Relationship Between MI, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on.
- The MI will go off after the vehicle is driven 3 times (pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (pattern C) without

cardiagn.com

the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other
MI (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

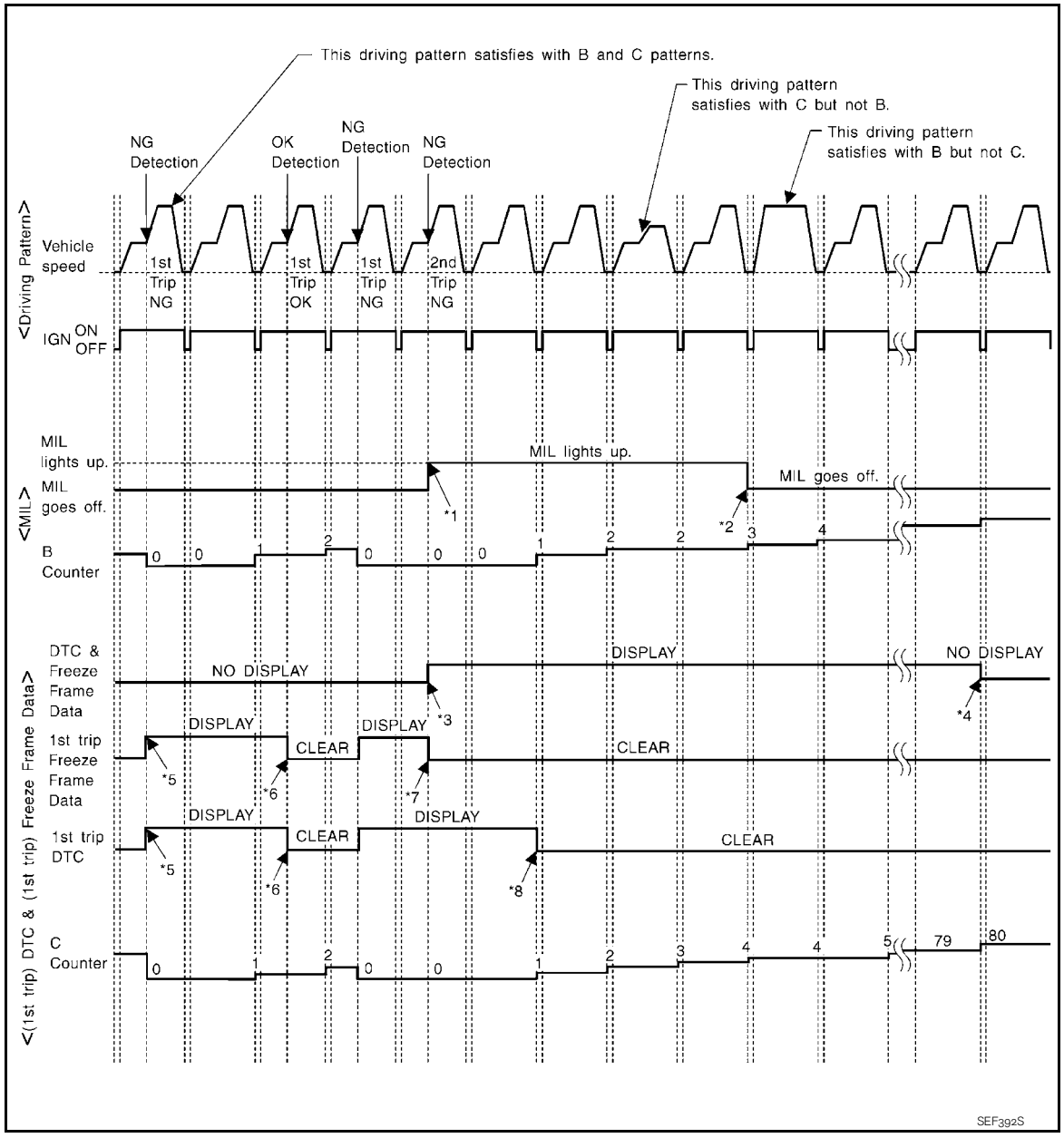
For details about patterns A and B under Other, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

cardiagn.com



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System” <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

cardiagn.com

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MI will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

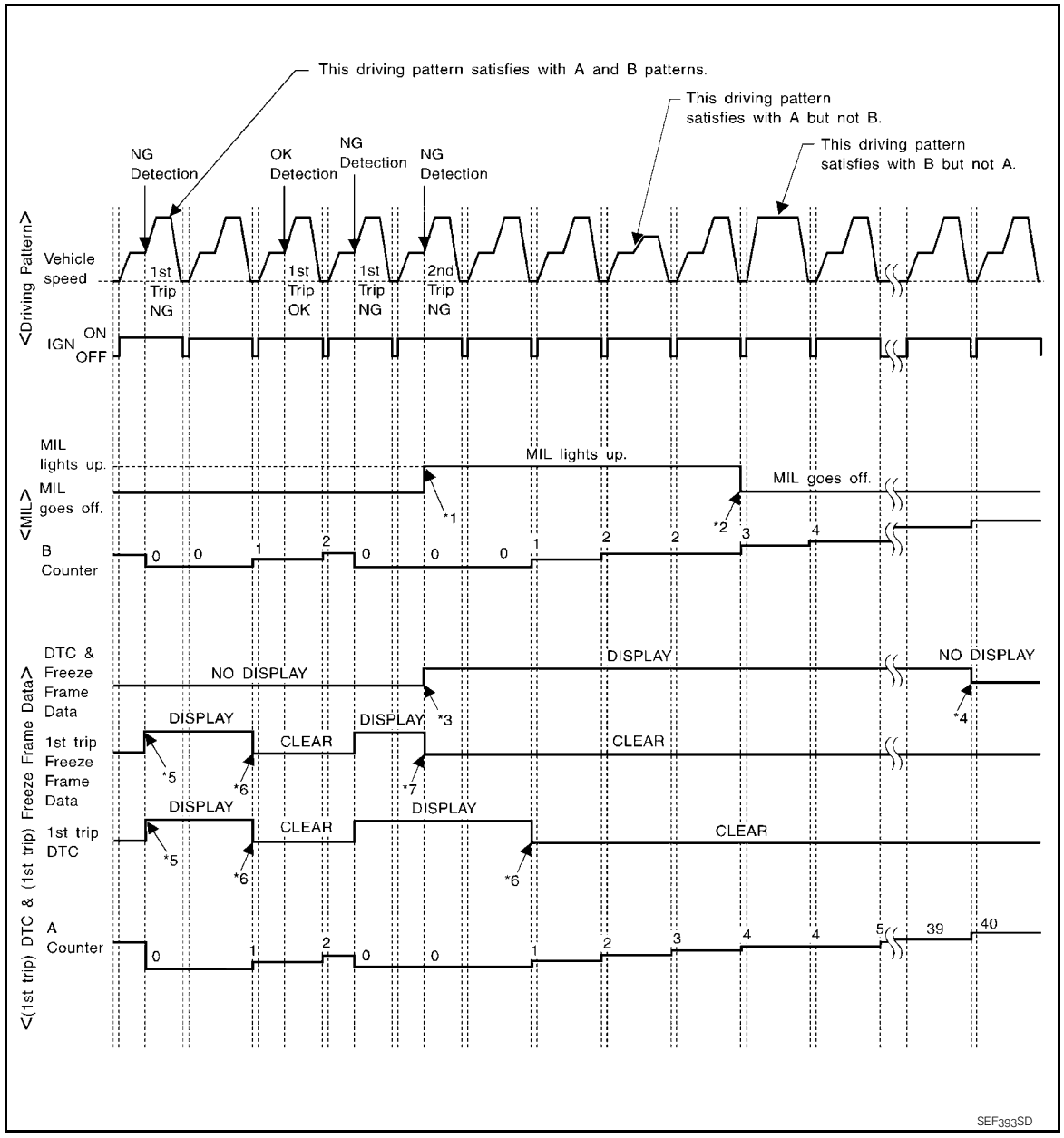
- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns Except For “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

cardiagn.com



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

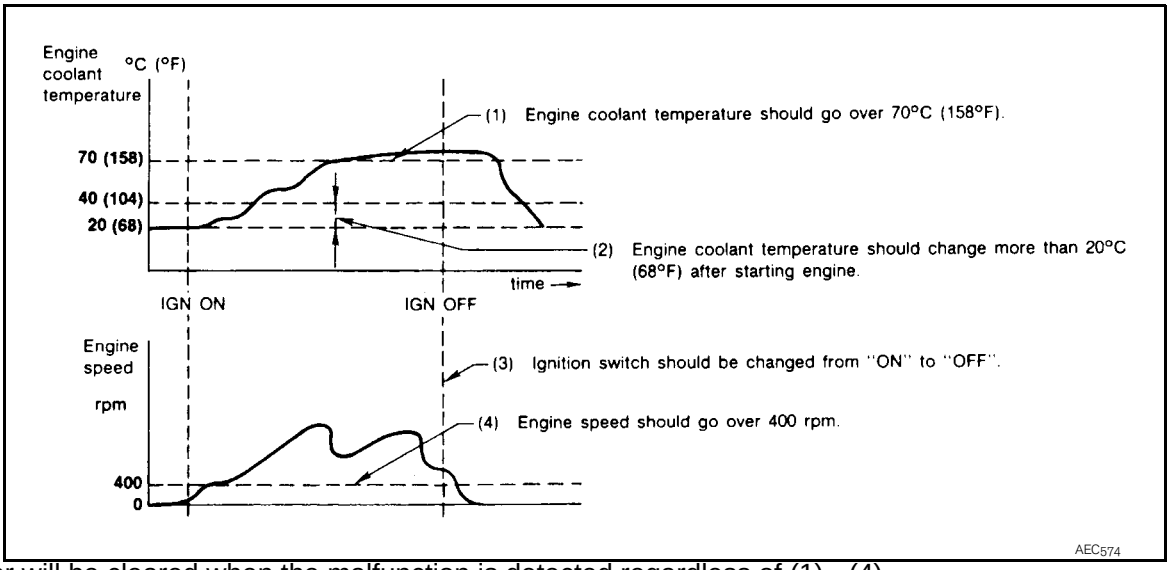
*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

cardiagn.com

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MI will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

INFOID:0000000001056167

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

cardiagn.com

Item			DIAGNOSTIC TEST MODE						
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×			
		Camshaft position sensor (PHASE)		×	×	×			
		Mass air flow sensor		×		×			
		Engine coolant temperature sensor		×	×	×	×		
		Heated oxygen sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Vehicle speed sensor		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		Refrigerant pressure sensor				×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×			
		Air conditioner switch				×			
		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		EPS control unit				×			
		Battery voltage				×			
		Load signal				×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
ENGINE COTNROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×		
		Power transistor (Ignition timing)				×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
		EVAP canister purge volume control solenoid valve		×		×	×		×
		Air conditioner relay				×			
		Fuel pump relay	×			×	×		
		Cooling fan relay		×		×	×		
		Heated oxygen sensor 1 heater		×		×		×	
		Heated oxygen sensor 2 heater		×		×		×	
		Intake valve timing control solenoid valve		×		×	×		
		Calculated load value			×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-87, "Diagnosis Description".

WORK SUPPORT MODE

cardiagn.com

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item
Regarding items of DTC and 1st trip DTC, refer to EC-341, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-341, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	• Always a certain value is displayed. • This item is not efficient for J10 models.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

cardiagn.com

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2 SEN1 (B1)	V	• The A/F signal computed from the input signal of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became ″rich″, and control is being affected toward a leaner mixture. LEAN: means the mixture became ″lean″, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, ″RICH″ is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1			
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.

cardiagn.com

Monitored item	Unit	Description	Remarks
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
CLUTCH P/P SW	ON/OFF	• Indicates [ON/OFF] condition from the clutch switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• “Calculated load value” indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	• Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	

cardiagn.com

Monitored item	Unit	Description	Remarks
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI is activated.	
O2 SEN HTR DTY	%	• Heated oxygen sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	

cardiagn.com

Monitored item	Unit	Description	Remarks
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Heated oxygen sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: Neutral • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan "LOW", "HI" and "OFF" CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-87, "Diagnosis Description".

SRT WORK SUPPORT Mode

cardiagn.com

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

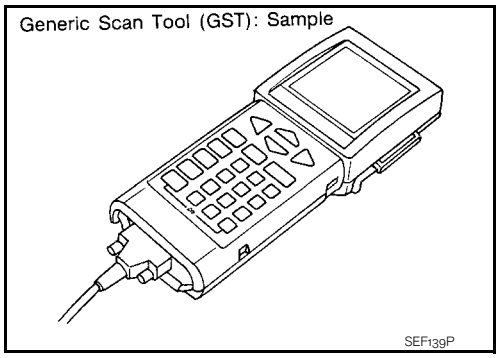
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-145
	HO2S1 (B1) P0134		EC-151
	HO2S1 (B1) P1143		EC-228
	HO2S1 (B1) P1144		EC-233
HO2S2	HO2S2 (B1) P0139		EC-164
	HO2S2 (B1) P1146		EC-238
	HO2S2 (B1) P1147		EC-245

Diagnosis Tool Function

INFOID:0000000001056168

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



FUNCTION

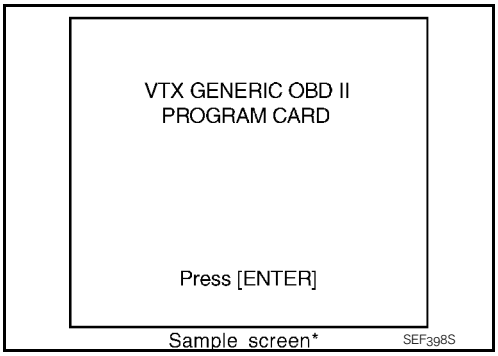
Diagnostic Service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-341, "DTC Index".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service is not applicable on this vehicle.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under dash panel near the hood opener handle.

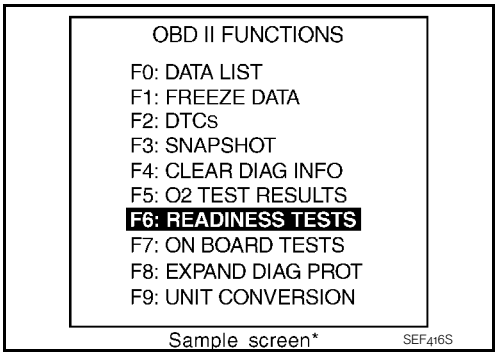
cardiagn.com

3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
   (*: Regarding GST screens in this section, sample screens are shown.)



Sample screen* SEF398S

5. Perform each diagnostic mode according to each service procedure.
   For further information, see the GST Operation Manual of the tool maker.



Sample screen* SEF416S

cardiagn.com

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000001056169

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000001056170

1. START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-26, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

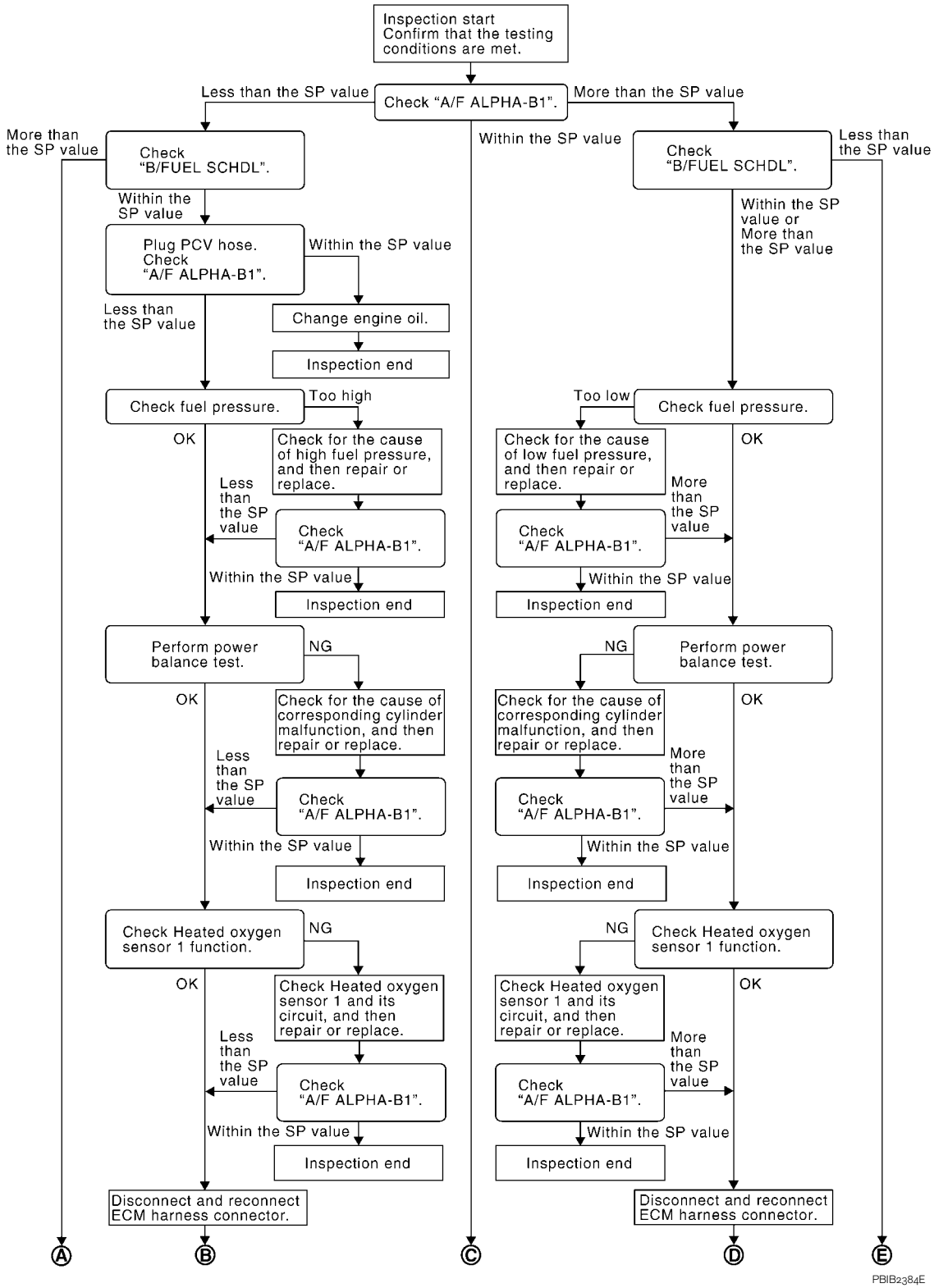
YES >> END
NO >> Go to EC-109, "Diagnosis Procedure".

Diagnosis Procedure

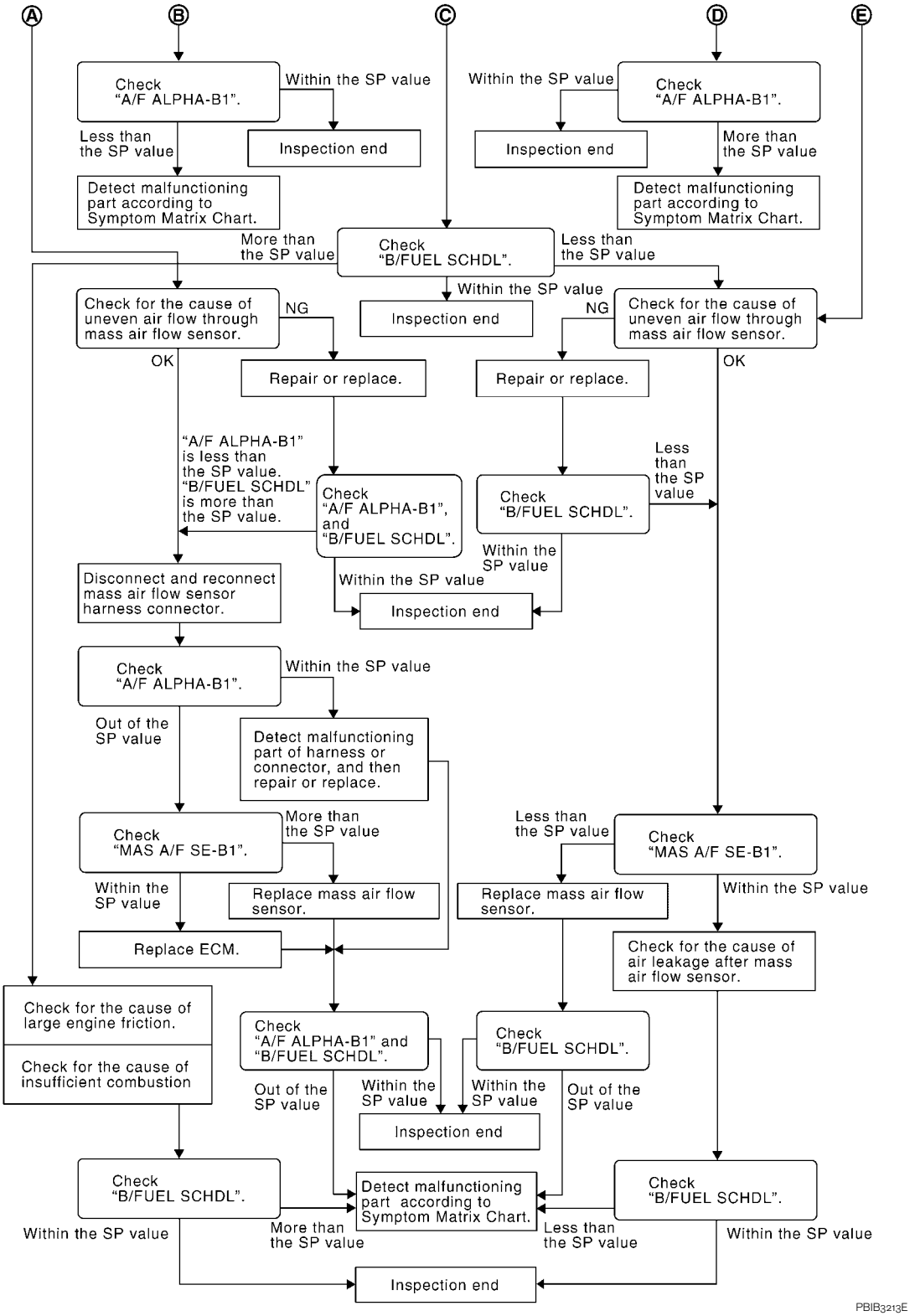
INFOID:0000000001056171

cardiagn.com

OVERALL SEQUENCE



cardiagn.com



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-109, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:

cardiagn.com

Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.
   NOTE:
   This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-357, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

1. Start engine.

cardiagn.com

2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-309, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-303, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-24, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH

Is the inspection result more than 5 times during 10 seconds?

YES >> GO TO 15.
NO >> GO TO 13.

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor and its circuit. Refer to EC-141, "DTC Logic".

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

cardiagn.com

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-346, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

cardiagn.com

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-127, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Go to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.
NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

cardiagn.com

- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-346, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-346, "Symptom Table".

cardiagn.com

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001056172

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

cardiagn.com

>> Repair open circuit or short to power in harness or connectors.

7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E11	15	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-309, "Diagnosis Procedure".
NO >> GO TO 8.

8.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for more than a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 15.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9.CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10.CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E11	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11.CHECK ECM POWER SUPPLY CIRCUIT-VI

cardiagn.com

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	32	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 51) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

cardiagn.com

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

cardiagn.com

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000001056173

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001056174

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> EC-121, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056175

Go toLAN-46, "Trouble Diagnosis Flow Chart".

cardiagn.com

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001056176

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001056177

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056178

1.INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-122, "DTC Logic".
5. Check DTC.

With GST
1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-122, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

cardiagn.com

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001056179

DTC DETECTION LOGIC

NOTE:

- **If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for DTC P1111, refer to EC-215, "Description".**

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Shift lever	Neutral position

CAUTION:

Always drive at a safe speed.

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-124, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

1. Maintain the following conditions for at least 20 consecutive seconds.

cardiagn.com

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

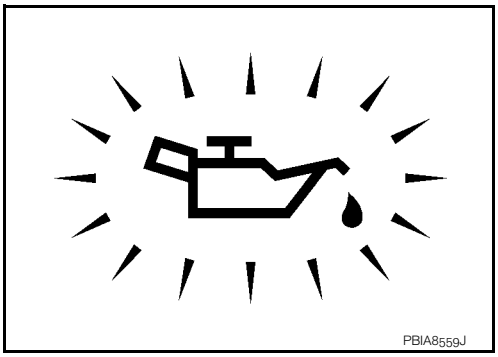
YES >> Go to EC-124, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056180

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



Is oil pressure warning lamp illuminated?

YES >> Go to MWI-34, "Description".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-196, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-199, "Component Inspection".

Is the inspection result normal?

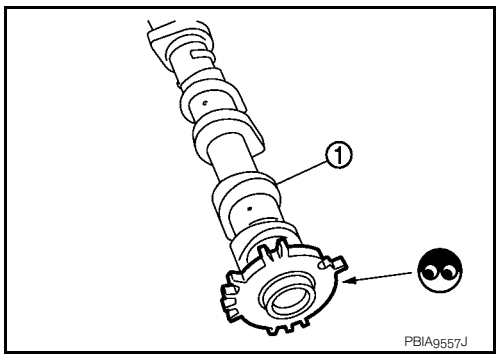
YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

cardiagn.com

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-46, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-3, "Engine Lubrication System".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056181

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

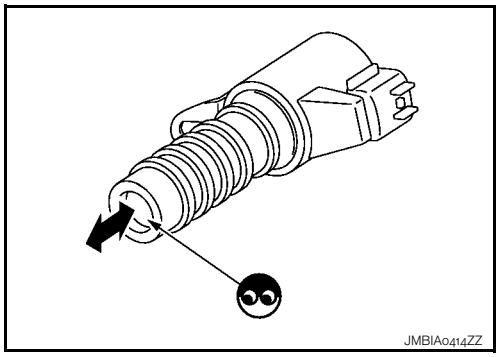
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

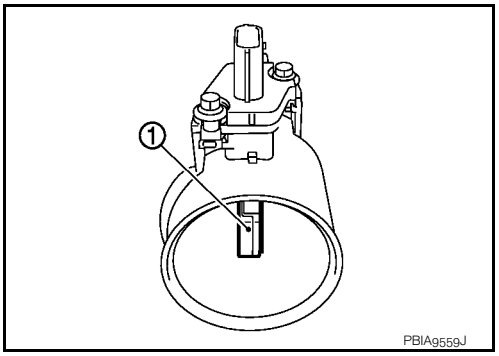
cardiagn.com

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001056203

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001056204

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-128, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-128, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-128, "Diagnosis Procedure".

cardiagn.com

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056205

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between mass air flow sensor and ECM

cardiagn.com

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-129, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056206

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

cardiagn.com

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

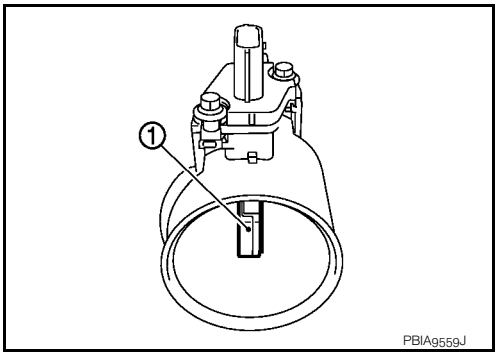
cardiagn.com

P0112, P0113 IAT SENSOR

Description

INFOID:0000000001056207

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



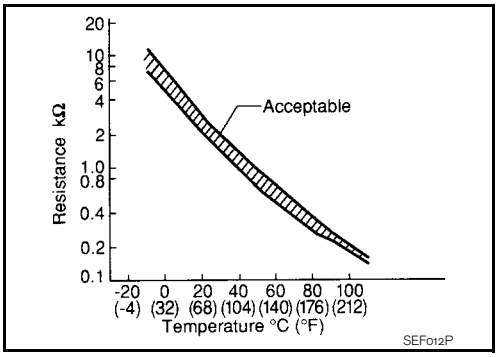
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



DTC Logic

INFOID:0000000001056208

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-133, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001056209

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F8	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-133, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056210

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

cardiagn.com

Terminals	Condition		Resistance
1 and 2	Temperature C°(F°)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

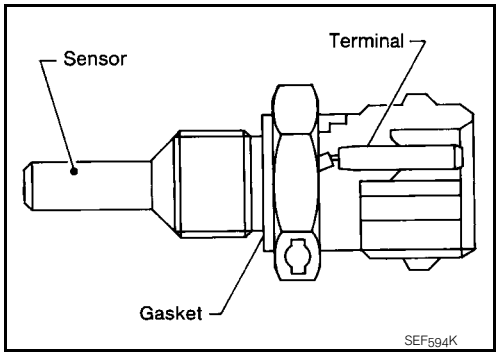
cardiagn.com

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001056211

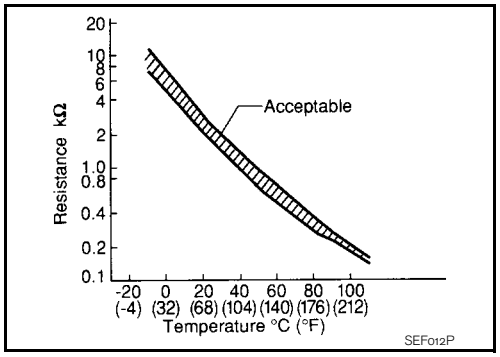
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:0000000001056212

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-136, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001056213

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F28	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-136, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

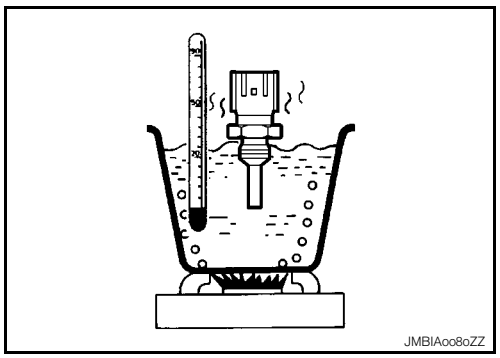
INFOID:0000000001056214

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

cardiagn.com

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

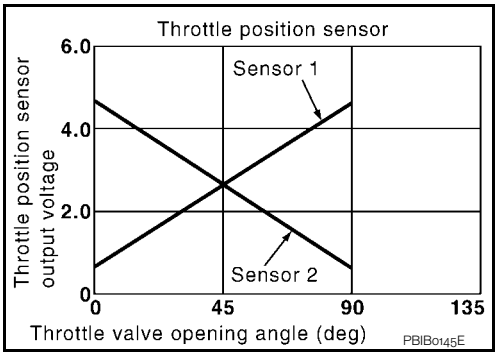
cardiagn.com

P0122, P0123 TP SENSOR

Description

INFOID:0000000001056215

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001056216

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-138, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056217

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-140, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056218

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-140, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056219

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

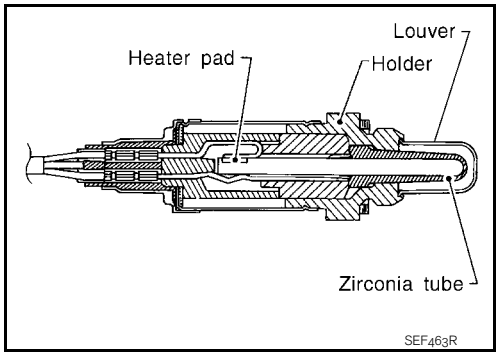
cardiagn.com

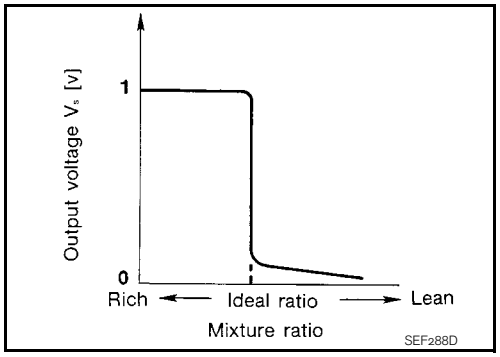
P0132 HO2S1

Description

INFOID:0000000001095653

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



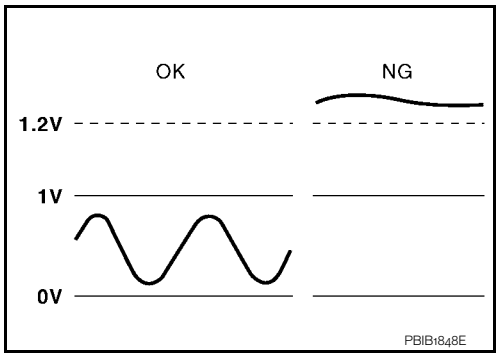


DTC Logic

INFOID:0000000001095654

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

cardiagn.com

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-142, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001095655

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

cardiagn.com

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-143, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001095656

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

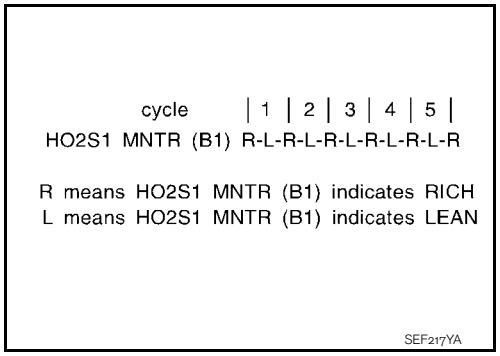
YES >> GO TO 2.
NO >> GO TO 3.

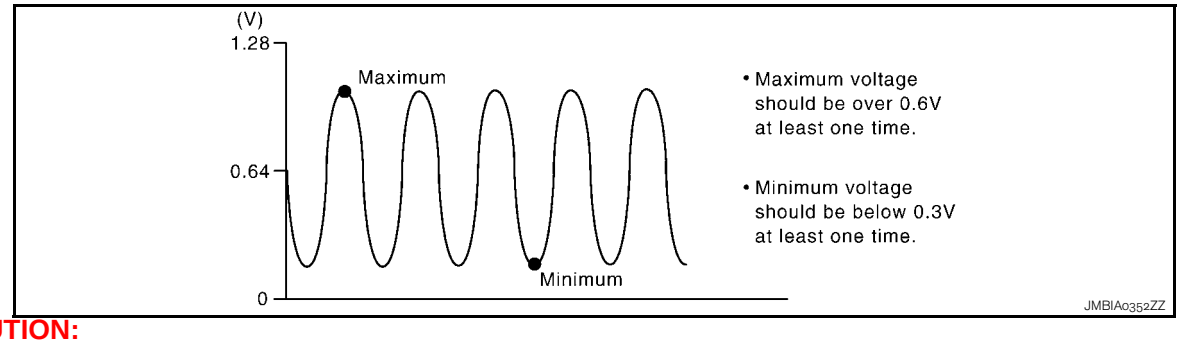
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1

Ⓧ Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

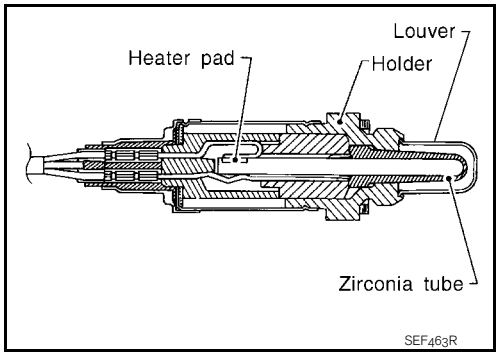
cardiagn.com

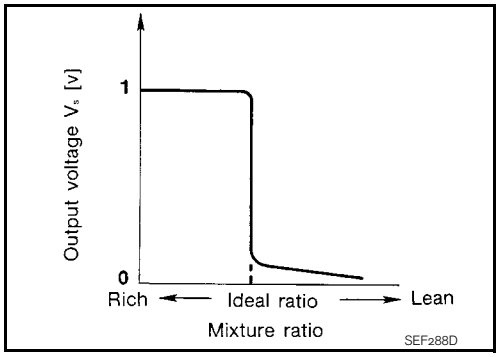
P0133 HO2S1

Description

INFOID:0000000001095657

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



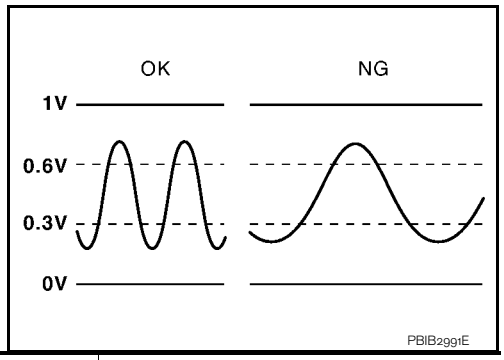


DTC Logic

INFOID:0000000001095658

DTC DETECTION LOGIC

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

cardiagn.com

TESTING CONDITION:
Always perform at a temperature above -10°C (14°F).
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	2,400 - 4,200 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 12.0 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-146, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 yo 0.3v and 0.6 to 1.0v more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-146, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001095659

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

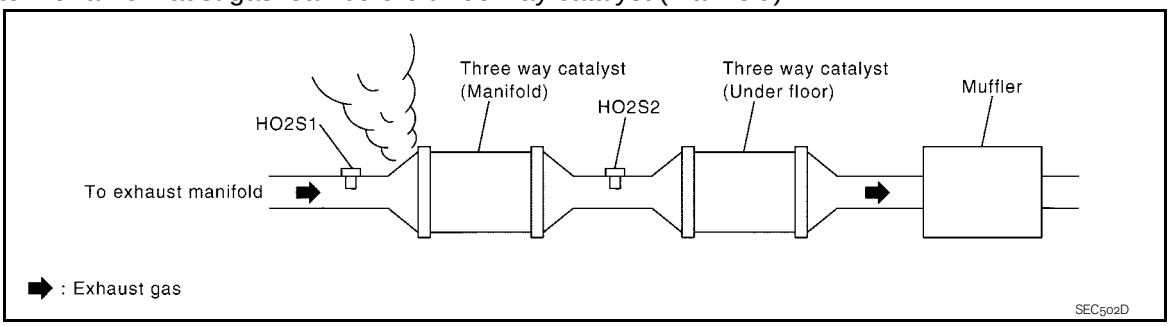
Loosen and retighten the heated oxygen sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-174, "DTC Logic" or EC-178, "DTC Logic".
NO >> GO TO 6.

6. CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

cardiagn.com

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-129, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK PCV VALVE

Refer to EC-315, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace PCV valve.

9.CHECK HEATED OXYGEN SENSOR 1

Perform EC-148, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heated oxygen sensor 1.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001095660

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

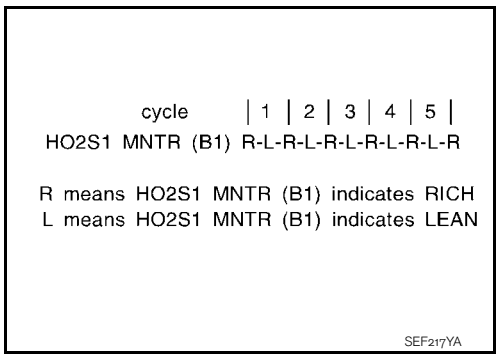
2.CHECK HEATED OXYGEN SENSOR 1

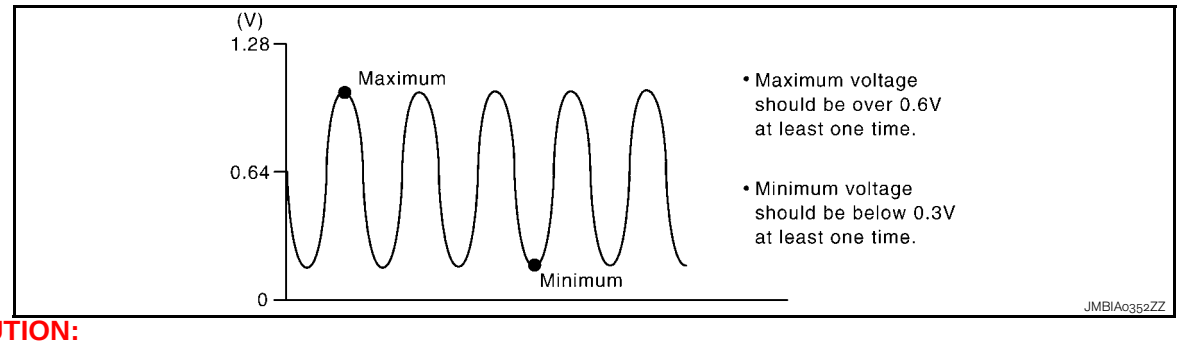
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

cardiagn.com

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

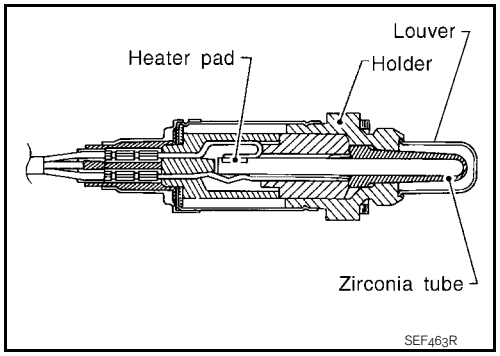
cardiagn.com

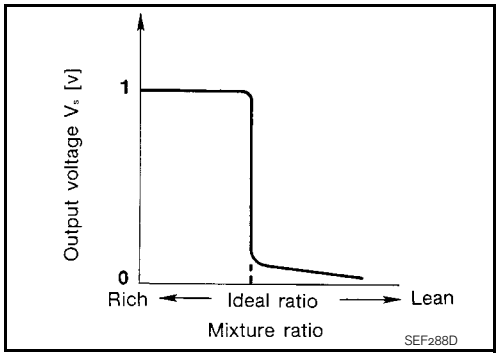
P0134 HO2S1

Description

INFOID:0000000001082937

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



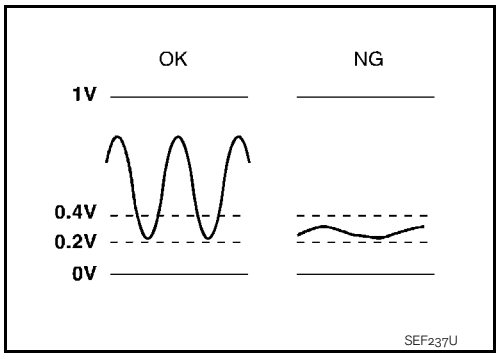


DTC Logic

INFOID:0000000001097223

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,800 - 3,400 rpm
VHCL SPEED SE	More than 60 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 12.0 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-765, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001082939

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.

cardiagn.com

3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Also check harness for short to ground and short to power.

Is inspection result normal?

YES >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector 49.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

2. Check harness continuity between ECM harness connector 49 or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-153, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001082940

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

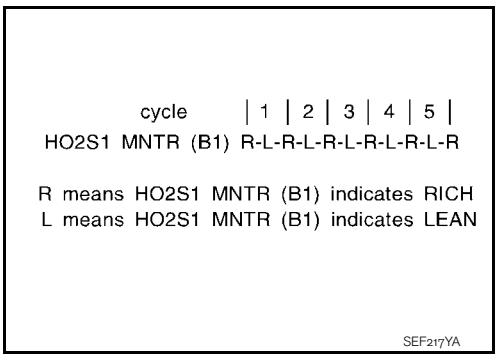
2.CHECK HEATED OXYGEN SENSOR 1

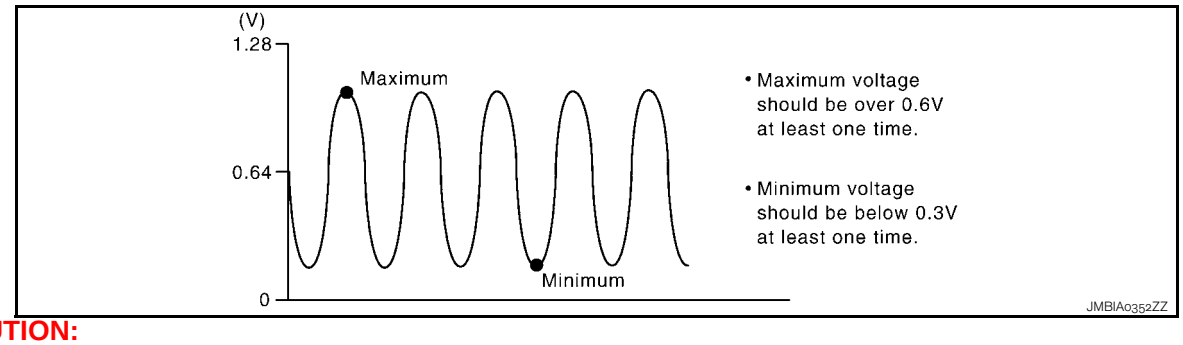
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

cardiagn.com

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0135 HO2S1 HEATER

Description

INFOID:0000000001056182

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the Heated oxygen sensor 1 heater corresponding to the engine operating condition to keep the temperature of Heated oxygen sensor 1 element at the specified range.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up	ON

DTC Logic

INFOID:0000000001056183

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • heated oxygen sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-156, "Diagnosis Procedure".
NG >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056184

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

cardiagn.com

2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect HO2S1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F30	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 56)
- Harness for open or short between HO2S1 and fuse

>> Repair or replace harness or connectors.

4. CHECK HO2S1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F7	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S1 HEATER

Refer to EC-158, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE HO2S1

Replace HO2S1.

CAUTION:
- **Discard any heated oxygen sensor 1 which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor 1, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> Repair or replace.

cardiagn.com

Component Inspection

INFOID:0000000001056185

1. CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

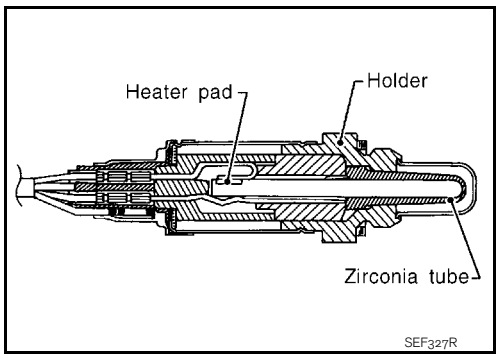
cardiagn.com

P0138 HO2S2

Description

INFOID:0000000001082941

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

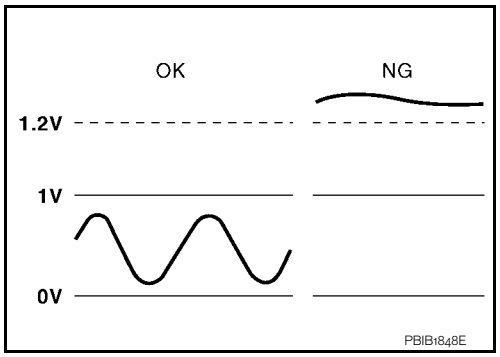


DTC Logic

INFOID:0000000001082942

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001082943

cardiagn.com

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

cardiagn.com

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connectors.

7.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001082944

1.INSPECTION START

Do you have CONSULT-III?

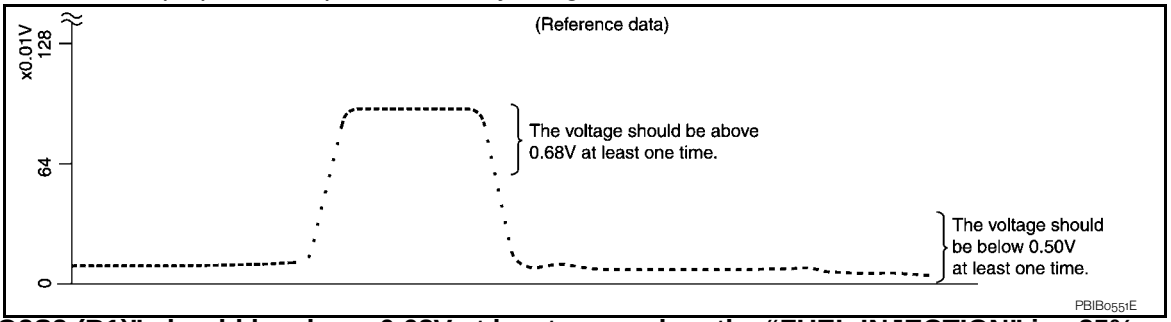
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

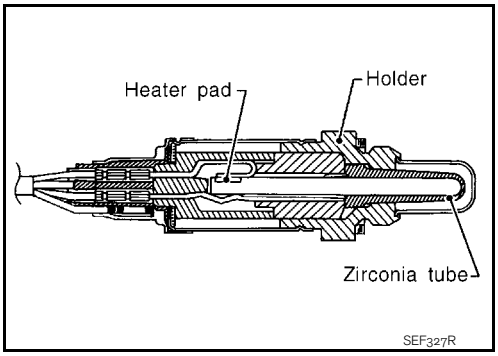
cardiagn.com

P0139 HO2S2

Description

INFOID:0000000001082945

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

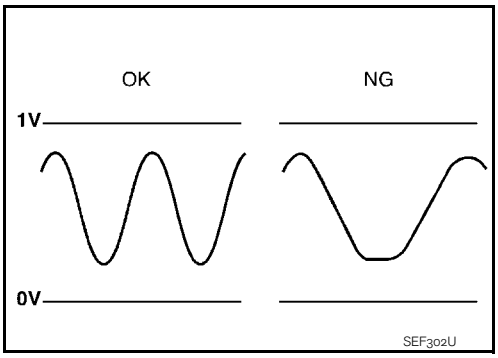


DTC Logic

INFOID:0000000001082946

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds.
- **For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F)**
- **"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.**

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry this procedure from 4. PERFORM PROCEDURE FOR COND1-I.

cardiagn.com

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-I

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-II

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-167, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

cardiagn.com

10. PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-168, "Component Inspection".
NOTE:
Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-168, "Component Inspection".

Component Function Check

INFOID:0000000001082947

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	A change of voltage should be more than 0.12V for 1 second during this procedure.

Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Go to EC-167, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001082948

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-174, "DTC Logic" or EC-178, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-168, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001082949

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

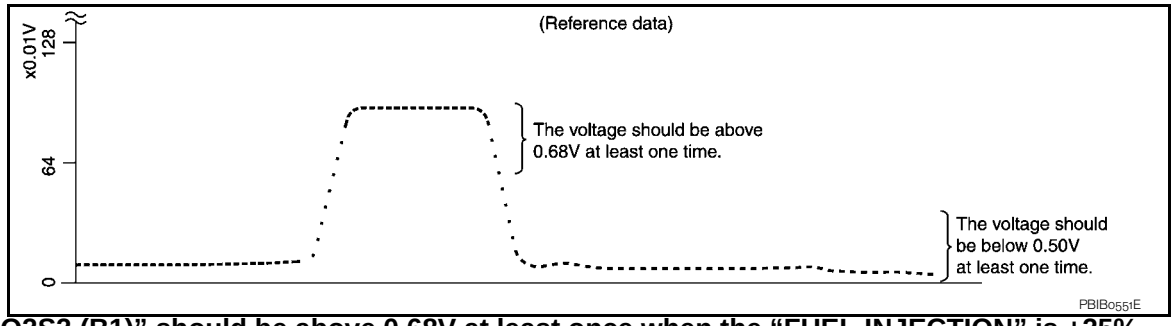
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

cardiagn.com

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0141 HO2S2 HEATER

Description

INFOID:0000000001056186

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,900	OFF
Below 3,900 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:0000000001056187

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0141	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st tip DTC detected?

YES >> Go to EC-172, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001056188

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect HO2S2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 56)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	3	F7	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between heated oxygen sensor 2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 HEATER

Refer to EC-173, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

cardiagn.com

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056189

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001056275

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

Does engine start?

YES >> Go to EC-175, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-175, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

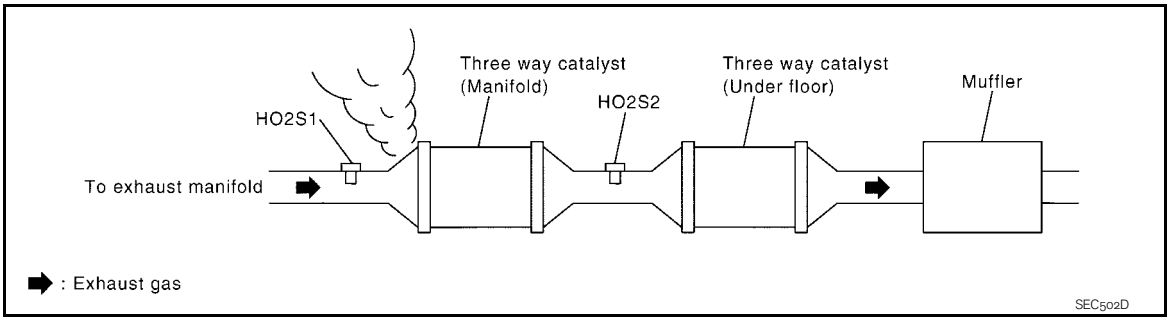
YES >> Go to EC-175, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056276

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

Heated oxygen sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

cardiagn.com

Heated oxygen sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-357, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-357, "Inspection".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-127, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

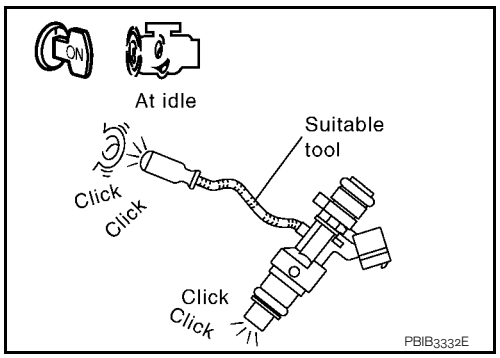
Without CONSULT-III

1. Let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



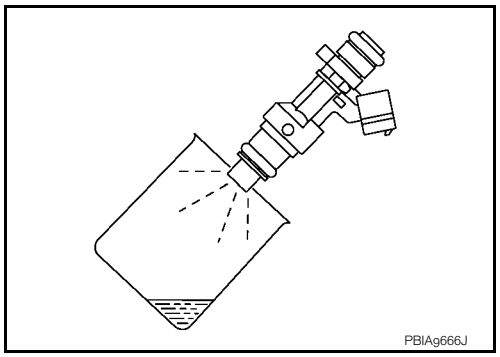
Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-303, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-35, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.



Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001056277

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

Does engine start?

YES >> Go to EC-179, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.

Is 1st trip DTC detected?

YES >> Go to EC-179, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

cardiagn.com

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

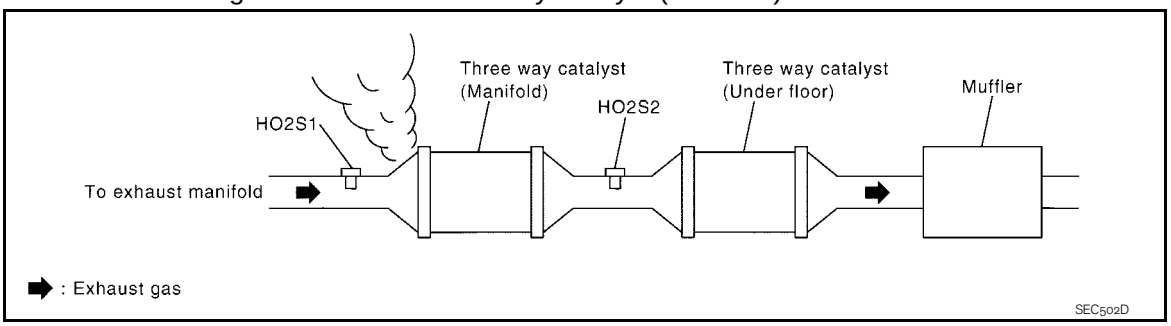
YES >> Go to EC-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056278

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

Heated oxygen sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

Heated oxygen sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

cardiagn.com

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-357, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-357, "Inspection".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.

1.0 - 4.0 g·m/sec: at idling
2.0 - 10.0 g·m/sec: at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-127, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

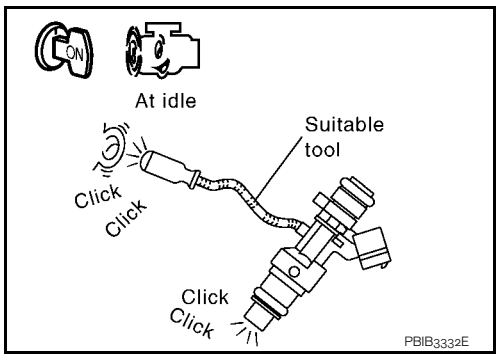
Without CONSULT-III

1. Let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-303, "Component Function Check".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-35, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

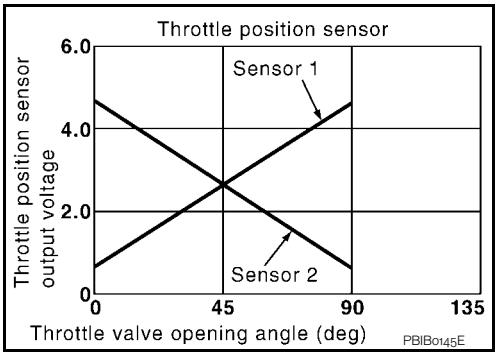
cardiagn.com

P0222, P0223 TP SENSOR

Description

INFOID:0000000001056287

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001056288

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-182, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056289

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-183, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-184, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056290

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-184, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056291

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000001056292

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • Heated oxygen sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-186, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-186, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056293

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

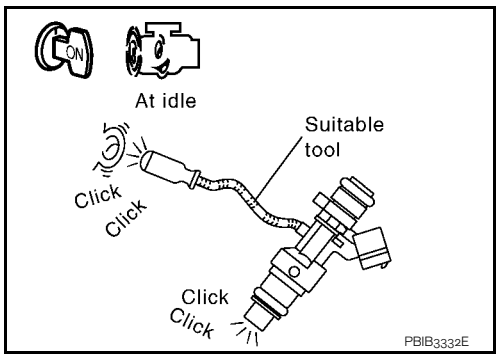
4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



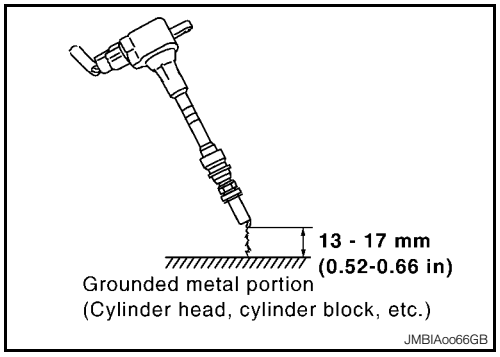
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-304, "Component Inspection".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-309, "Component Function Check".

cardiagn.com

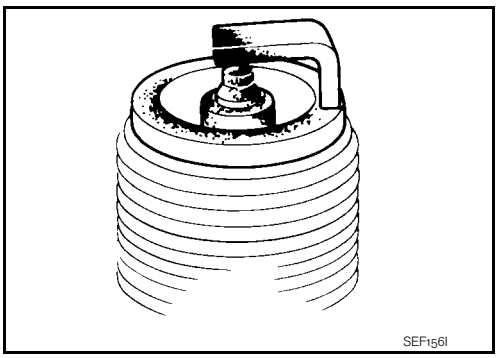
7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-19, "Removal and Installation".

NO >> Repair or clean spark plug. Then GO TO 8



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-19, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-24, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-357, "Inspection".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-357, "Inspection".

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.

NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-26, "BASIC INSPECTION : Special Repair Requirement".
For specification, refer to EC-360, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-26, "BASIC INSPECTION : Special Repair Requirement".

13. CHECK HO2S1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

cardiagn.com

2. Disconnect corresponding HO2S1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

5. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HO2S1 HEATER

Refer to EC-158, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace HO2S sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

With GST

Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec : at idling
2.0 - 10.0 g·m/sec : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 16.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-127, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-346, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-87, "Diagnosis Description".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0327, P0328 KS

Description

INFOID:0000000001056294

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001056295

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-191, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056296

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F8	40	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to EC-192, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056297

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

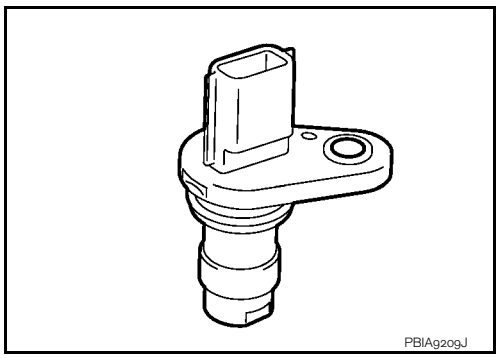
cardiagn.com

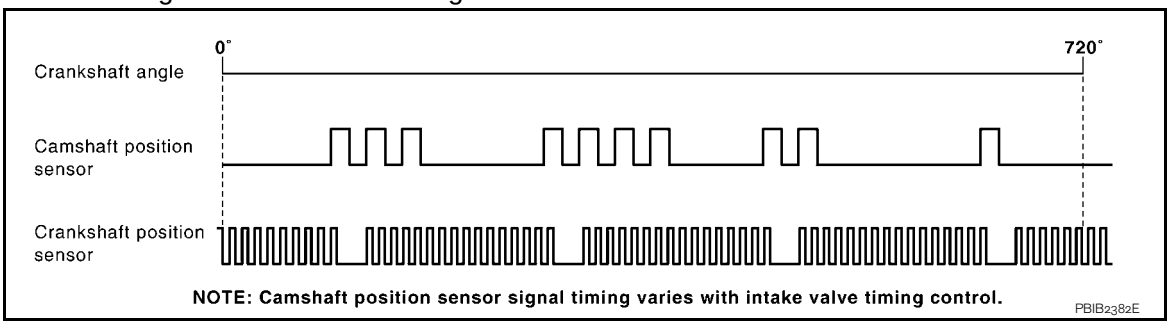
P0335 CKP SENSOR (POS)

Description

INFOID:0000000001056298

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.





DTC Logic

INFOID:0000000001056299

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.

cardiagn.com

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-194, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056300

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to HAC-161, "Component Inspection")

cardiagn.com

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to EC-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-286, "Special Repair Requirement".

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F8	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F8	61	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-196, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

cardiagn.com

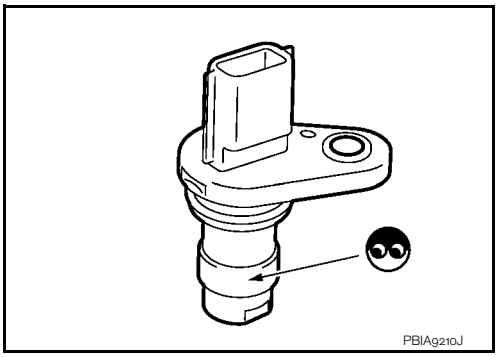
>> INSPECTION END

Component Inspection

INFOID:0000000001056301

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

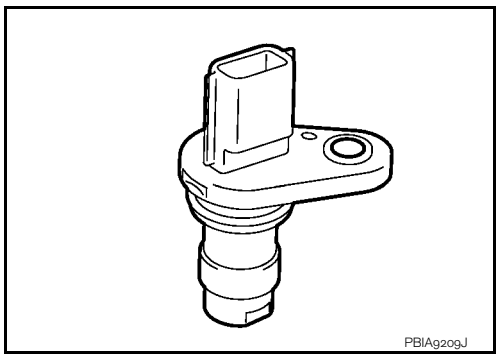
cardiagn.com

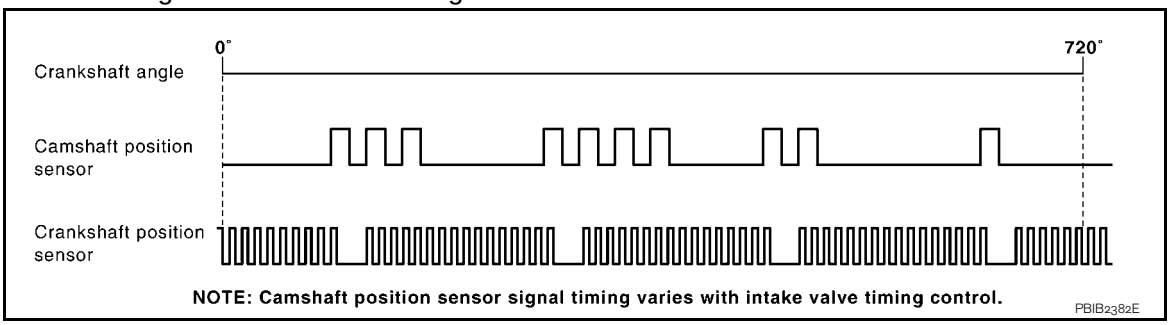
P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000001056302

The camshaft position sensor (PHASE) senses the protrusion of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.





DTC Logic

INFOID:0000000001056303

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-198, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-198, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056304

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F8	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

cardiagn.com

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F8	65	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-199, "Component Inspection".

Is the inspection result normal?

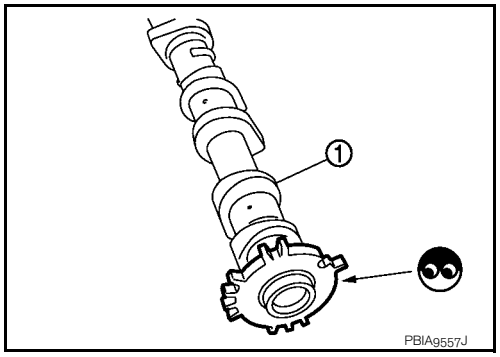
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

Check the following.
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

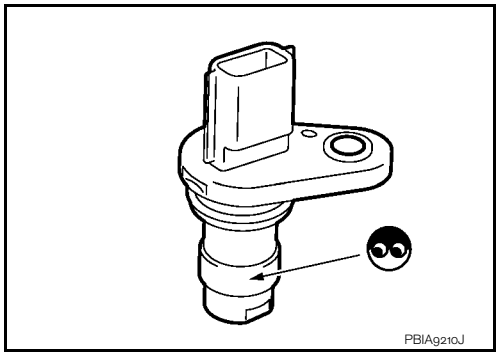
INFOID:0000000001056305

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

cardiagn.com

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

cardiagn.com

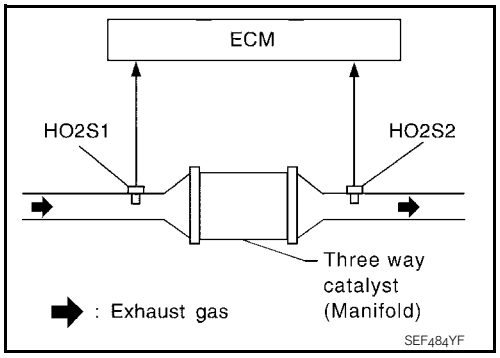
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000001056306

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-III screen?

cardiagn.com

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

YES >> GO TO 6.
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-203, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-202, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-203, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001096408

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Specification
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch peridically more than 5 times within 10 seconds.

Is the inspection result normal?

YES >> GO TO 2
NO >> Go to EC-764, "DTC Logic".

2. PERFORM COMPONENT FUNCTION CHECK-II

Without CONSULT-III

1. Set voltmeter probes between ECM terminals and ground.
2. Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

cardiagn.com

ECM		Ground	Condition	Specification
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Keeping engine speed at 2,000 rpm constant under no load	Switching freqency ratio (A/B) : Less than 0.75 A : Heated oxygen sensor 2 voltage switching frequency B : Heated oxygen sensor 1 voltage switching frequency
	50 (HO2S2 signal)			

Is the inspection result normal?

YES >> INSPECTION END
NO >> If the ratio is greater than above (0.75), it means three way catalyst does not operate properly. Go to EC-819, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056308

1.CHECK EXHAUST SYSTEM

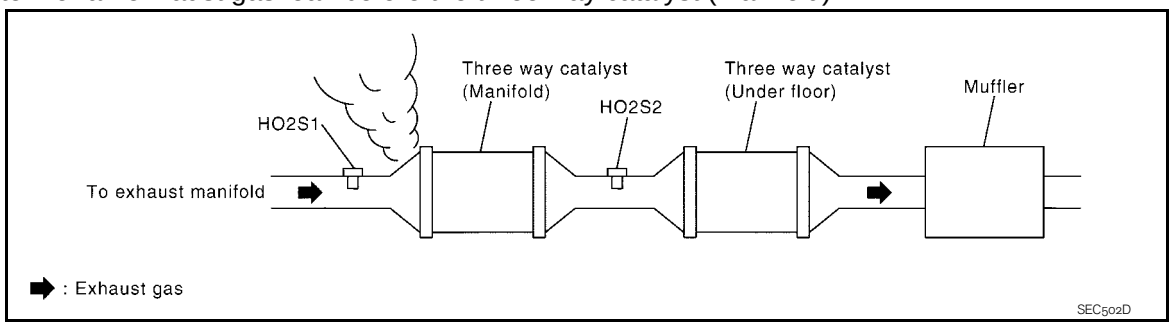
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-26, "BASIC INSPECTION : Special Repair Requirement".
For specification, refer to EC-360, "Ignition Timing"
For specification, refer to EC-360, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-26, "BASIC INSPECTION : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	31	Ground	Battery voltage
	30		
	29		
	25		

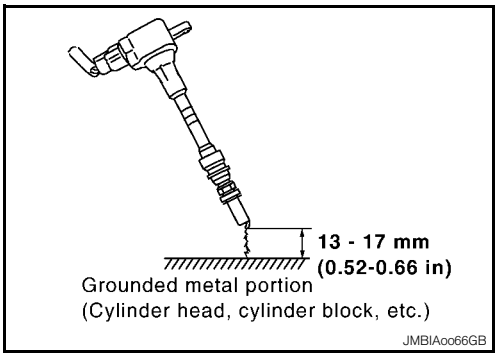
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-303, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

cardiagn.com

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-309, "Diagnosis Procedure".

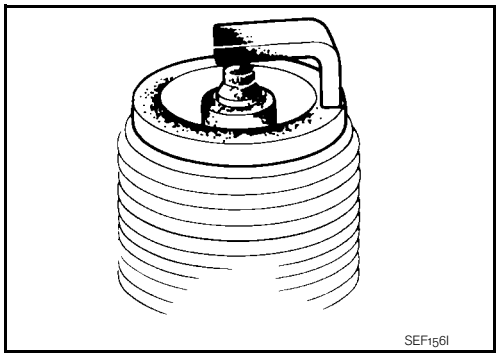
8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. EM-20, "Inspection"

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-43, "Removal and Installation".

NO >> Repair or clean spark plug. Then GO TO 9



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-43, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-35, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END

NO >> Replace three way catalyst assembly.

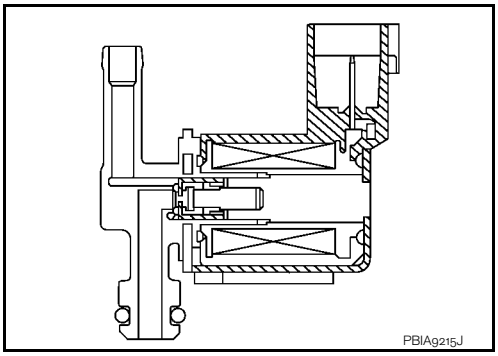
cardiagn.com

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001056319

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000001056320

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-206, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056321

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

cardiagn.com

YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-207, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

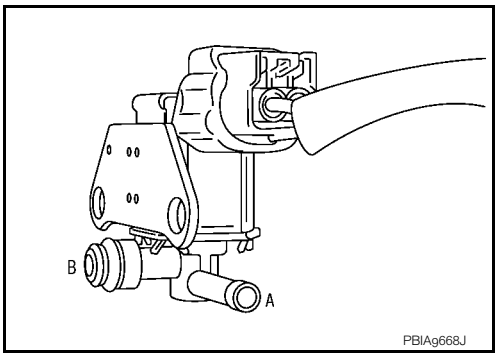
INFOID:0000000001056322

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.

cardiagn.com

5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

cardiagn.com

P0500 VSS

Description

INFOID:0000000001056360

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000001056361

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001.Refer to** EC-121, "DTC Logic".
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to** **EC-122, "DTC Logic"**.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK VEHICLE SPEED SENSOR FUNCTION

NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-210, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.
   CAUTION:
   Always drive vehicle at a safe speed.

cardiagn.com

ENG SPEED	2,500 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.3 - 31.8 msec
Shift lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-210, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-210, "Component Function Check".
Use component function check to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-210, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001056362

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-210, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056363

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-57, "DTC No. Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK COMBINATION METER

Refer to MWI-51, "DTC Index".

>> INSPECTION END

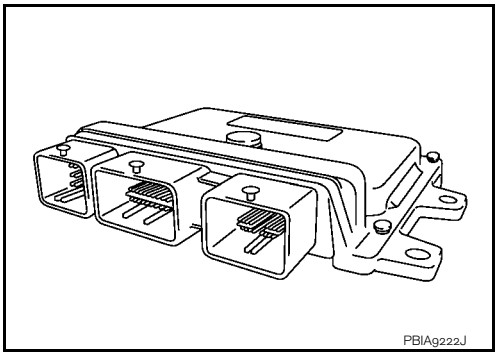
cardiagn.com

P0605 ECM

Description

INFOID:0000000001056377

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001056378

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-212, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-212, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and waitait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-212, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001056379

1. INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-211, "DTC Logic".

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-211, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Go to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

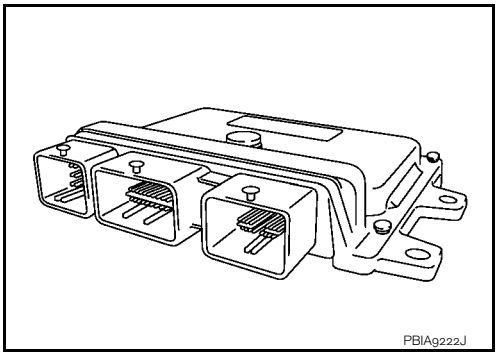
cardiagn.com

P1065 ECM

Description

INFOID:0000000001077001

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.



DTC Logic

INFOID:0000000001077002

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065	Engine control module	ECM back-up RAM system does not function properly.	• ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for four times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-213, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001077003

1.INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-213, "DTC Logic".

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-213, "DTC Logic".

Is the 1st trip DTC P1065 displayed again?

YES >> GO TO 2.

cardiagn.com

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

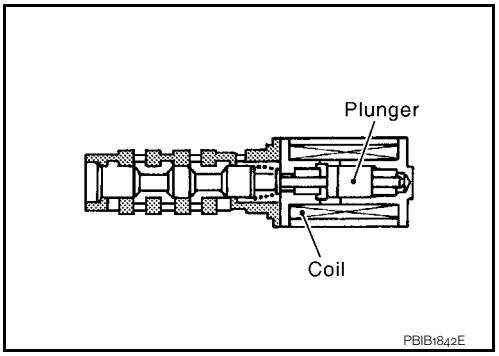
cardiagn.com

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001056194

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:0000000001056195

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-215, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056196

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F41	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN

cardiagn.com

AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	1	F8	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-216, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace intake valve timing control solenoid valve.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056197

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞Ω (Continuity should not exist)

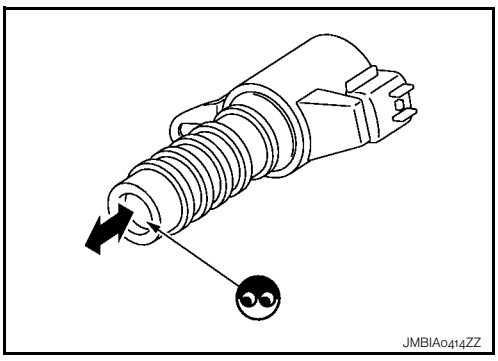
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

cardiagn.com

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001056458

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001056459

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to 1st position and wait at least 3 seconds.
7. Set shift lever to Neutral position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-217, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-217, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

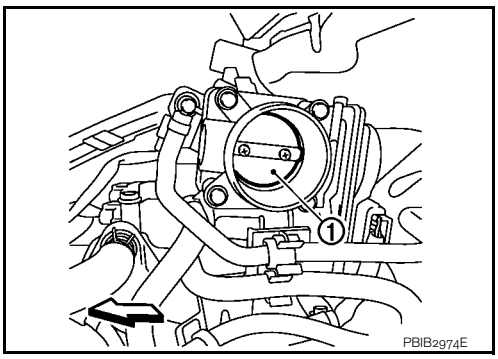
INFOID:0000000001056460

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

cardiagn.com

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-218, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056461

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001056448

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001056449

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-223, "DTC Logic" or EC-217, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-219, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056450

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, E9
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

7.CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

8.CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

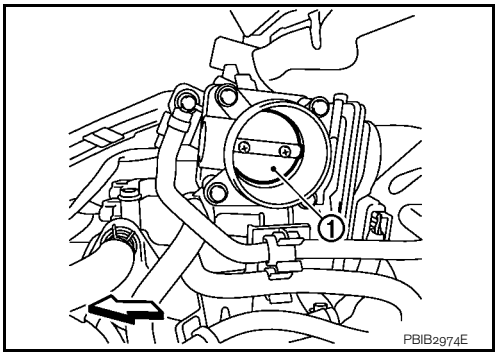
Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 11.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-221, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-222, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001056451

cardiagn.com

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25 °C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-222, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056452

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001056445

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001056446

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay
P1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P1124 >> GO TO 2.
P1126 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-223, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-223, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056447

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	15	E12	25	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Reconnect ECM and IPDM E/R harness connectors.
2. Turn ignition switch ON.
3. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

cardiagn.com

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	E12	32	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, E9
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

8. CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

cardiagn.com

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001056453

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001056454

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-226, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056455

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-227, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-227, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001056456

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25 °C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-227, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056457

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

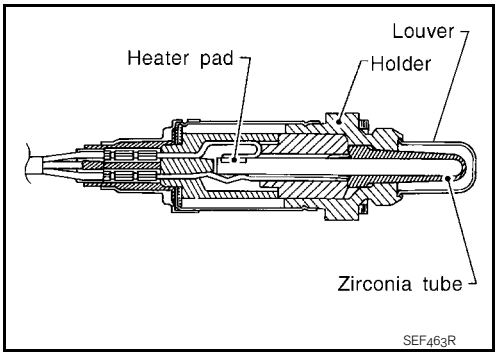
cardiagn.com

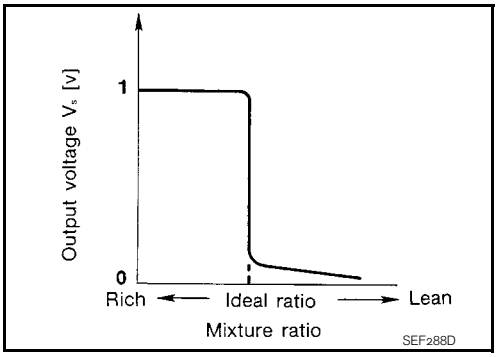
P1143 HO2S1

Description

INFOID:0000000001095662

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



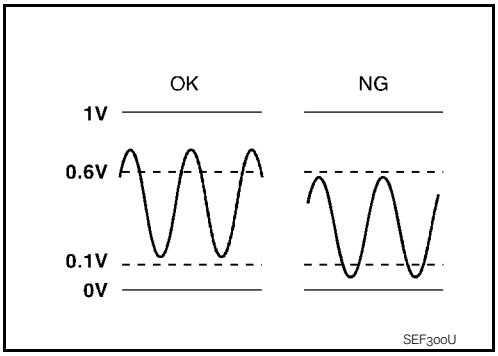


DTC Logic

INFOID:0000000001095663

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F)

cardiagn.com

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,500 - 3,900 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 12.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-229, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between EM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.6 at least 1 time. • The minimum voltage is over 0.1 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-229, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001095664

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-174, "DTC Logic".
No >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-230, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

>> INSPECTION END

Component Inspection

INFOID:0000000001095665

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

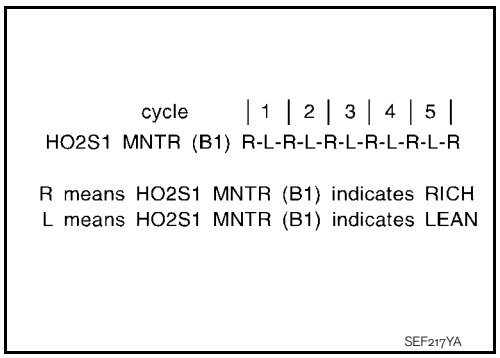
2.CHECK HEATED OXYGEN SENSOR 1

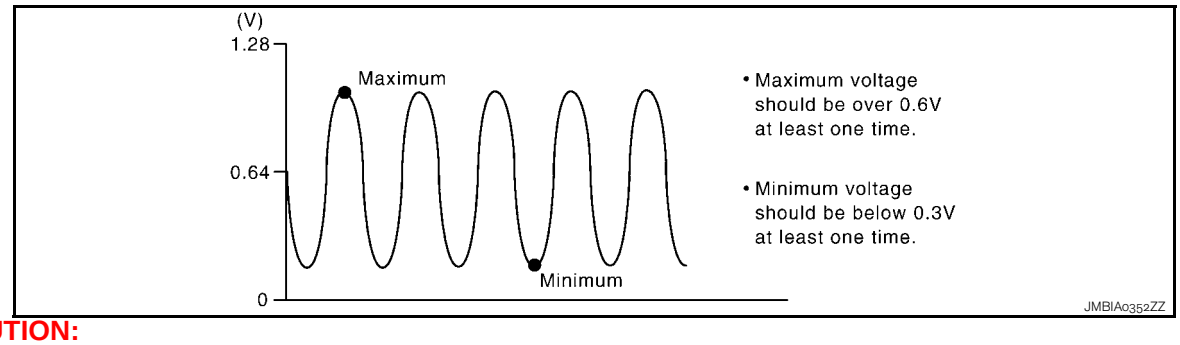
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

cardiagn.com

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

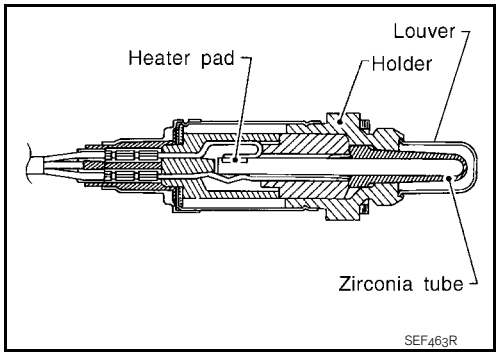
cardiagn.com

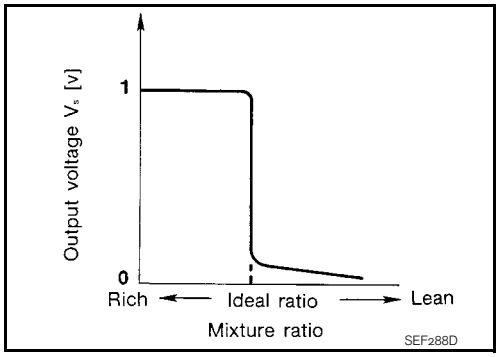
P1144 HO2S1

Description

INFOID:0000000001095666

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



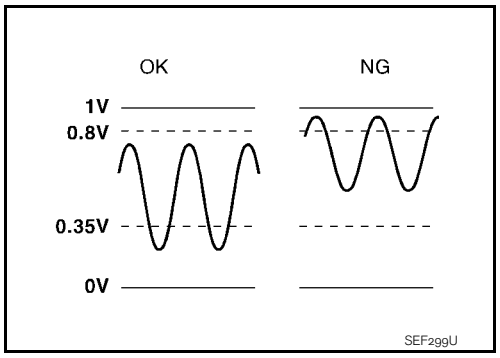


DTC Logic

INFOID:0000000001095667

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

cardiagn.com

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,500 - 3,900 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 12.0 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-229, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between EM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.8 at least 1 time. • The minimum voltage is over 0.35 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-229, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001095668

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

cardiagn.com

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-178, "DTC Logic".
No >> GO TO 4

4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-158, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-242, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".
For circuit, refer to EC-329, "Wiring Diagram - ENGINE CONTROL SYSTEM -".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001095669

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 1

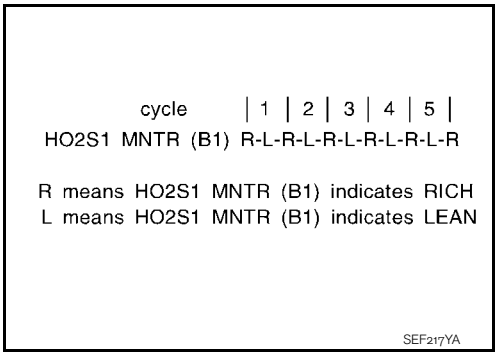
With CONSULT-III

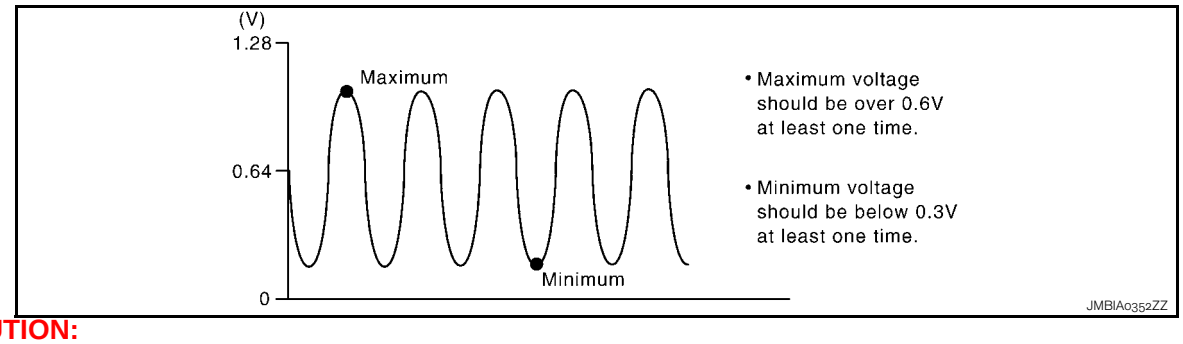
1. Start engine and warm it up to normal operating temperature.

cardiagn.com

2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

cardiagn.com

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

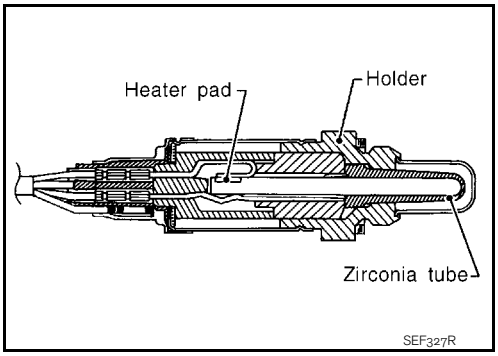
cardiagn.com

P1146 HO2S2

Description

INFOID:0000000001088479

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

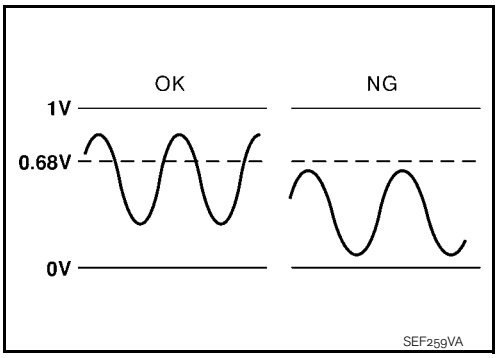


DTC Logic

INFOID:0000000001088480

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
For the best results, perform ″DTC WORK SUPPORT″ at a temperature of 0 to 30°C (32 to 86°F).
Never stop engine during this procedure. If the engine is stopped, retry this procedure from 4. PERFORM PROCEDURE FOR COND1-I.

cardiagn.com

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-I

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-II

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 7.
NO >> GO TO 4.

6. PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,200 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-241, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

cardiagn.com

10. PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-242, "Component Inspection".
NOTE:
Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-241, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001088481

1. PERFORM COMPONENT FUNCTION CHECK-I

With GST
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Go to EC-241, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001088482

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-178, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6..

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-242, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001088483

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

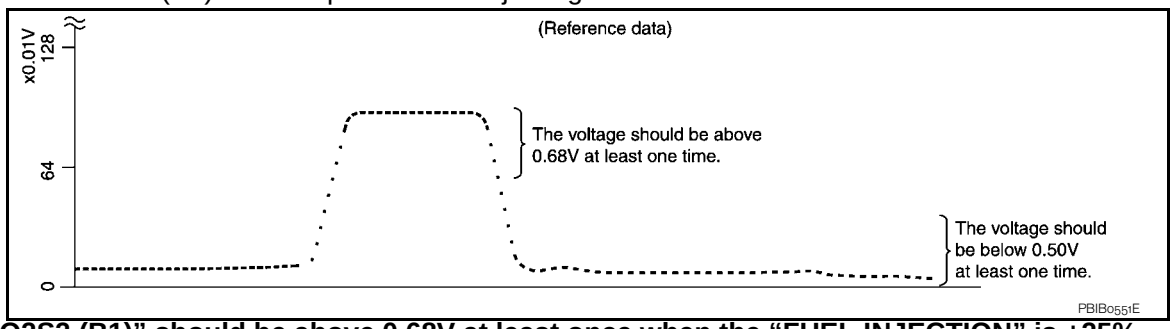
2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

cardiagn.com

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

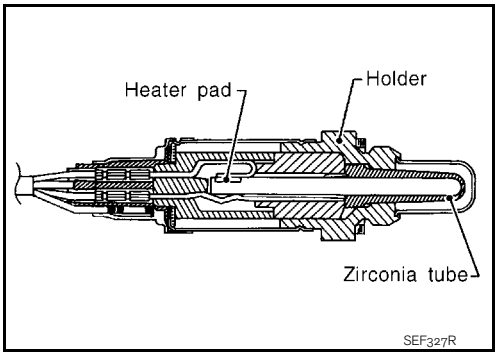
cardiagn.com

P1147 HO2S2

Description

INFOID:0000000001088484

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

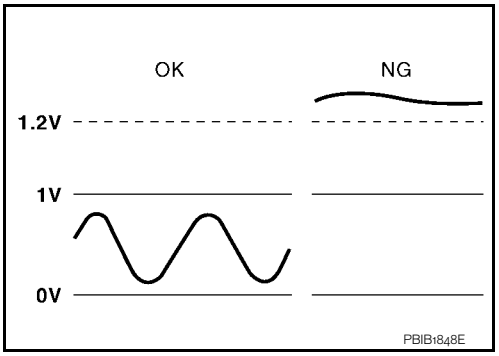


DTC Logic

INFOID:0000000001088485

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).
Never stop engine during this procedure. If the engine is stopped, retry this procedure from 4. PERFORM PROCEDURE FOR COND1-I.

>> GO TO 3.

cardiagn.com

3.PERFORM PROCEDURE FOR COND1

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-I

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-II

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,200 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158 °F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7.PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9.PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-248, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

cardiagn.com

10. PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-249, "Component Inspection".

NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-248, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001088486

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.50V at least once during this procedure.

Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Go to EC-248, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001088487

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connectors F121, E7.
- Harness for open or short between HO2S2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

- Harness connectors F121, E7.
- Harness for open or short between HO2S2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 CONNECTOR FOR WATER

cardiagn.com

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connectors.

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-249, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001088488

1. INSPECTION START

Do you have CONSULT-III?

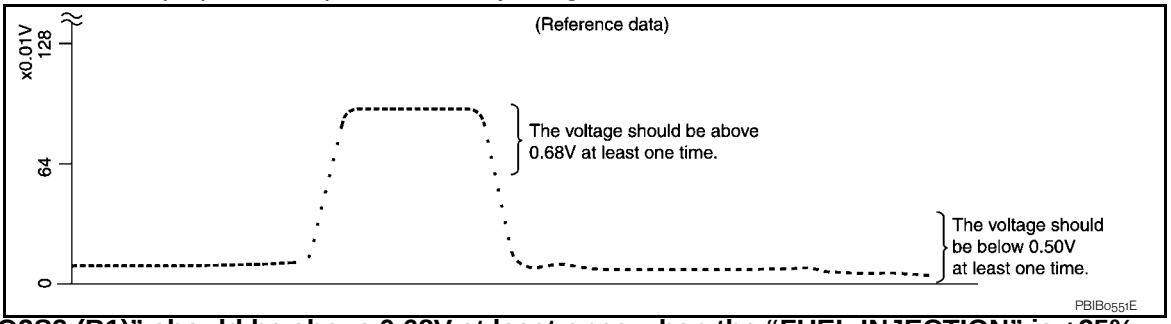
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

cardiagn.com

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001116296

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001116297

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-121, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-122, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-252, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116298

Go to BRC-6, "Work Flow".

cardiagn.com

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001056387

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-121, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-122, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relays -1 and -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Inspection". Also, replace the engine oil. Refer to LU-6, "Inspection".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to LU-6, "Inspection".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-253, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-254, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001056388

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

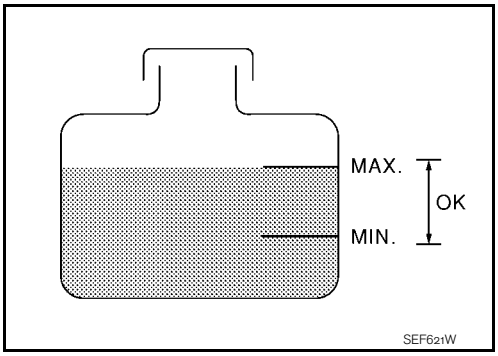
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

cardiagn.com

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-254, "Diagnosis Procedure".
NO >> GO TO 2



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-254, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to PCS-9, "Diagnosis Description".

Diagnosis Procedure

INFOID:0000000001056389

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".
2. Make sure that cooling fan motor operate at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-299, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-9, "Inspection".
- Hose
- Radiator
- Water pump

cardiagn.com

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-19, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-136, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace engine coolant temperature sensor.

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	CO-9, "Inspection"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-14, "Inspection"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-9, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-20, "Inspection"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-300, "Component Inspection (Cooling Fan Motor)"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-9, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-80, "Inspection"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-101, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

cardiagn.com

*4: After 60 minutes of cool down time.

For more information, refer to CO-5, "Troubleshooting Chart".

>> INSPECTION END

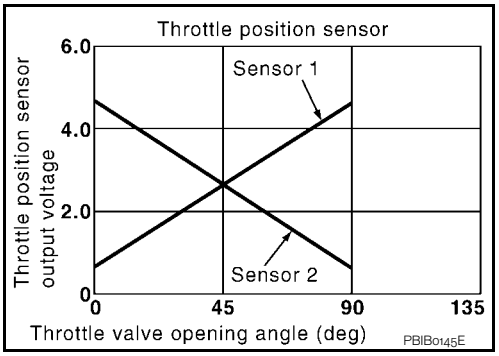
cardiagn.com

P1225 TP SENSOR

Description

INFOID:0000000001056390

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001056391

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-257, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056392

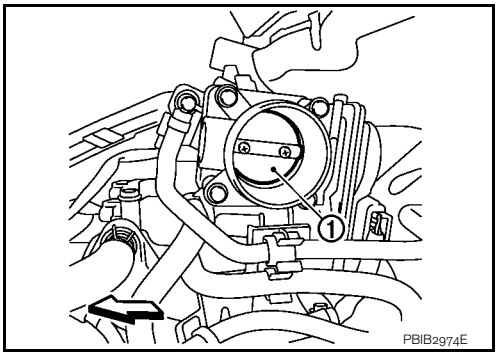
1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-258, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056393

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

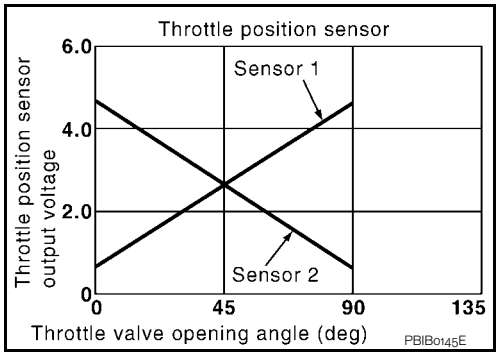
cardiagn.com

P1226 TP SENSOR

Description

INFOID:0000000001056394

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001056395

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-259, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

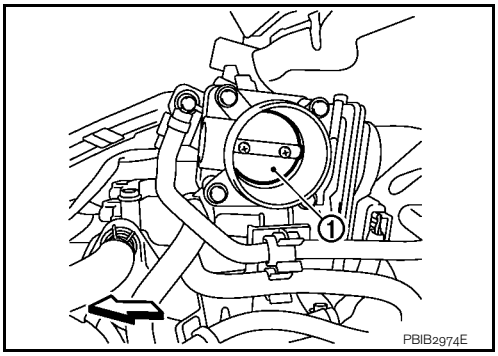
INFOID:0000000001056396

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-258, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056397

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001062567

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-261, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001062568

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

cardiagn.com

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	72	Electric throttle control actuator	F29	1
	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	4

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.
• Camshaft position sensor (PHASE) (Refer to EC-199, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to EC-183, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001116260

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-60, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116261

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-211, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to EC-263, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116262

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

cardiagn.com

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	94 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector M352.
4. Check the continuity between ASCD steering switch and ECM harness connector.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Check the continuity between ECM harness connector and ASCD steering switch.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
14	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-265, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001116263

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M325	14 and 15	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch

cardiagn.com

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001116264

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-60, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116265

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-211, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572	ASCD brake switch	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • ASCD clutch switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

cardiagn.com

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-267, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-267, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116266

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> GO TO 3.

2.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD Clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH

Refer to EC-270, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 14.

cardiagn.com

NO >> Replace ASCD brake switch.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ASCD brake switch harness connector.

ECM		ASCD brake switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	100	E112	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD CLUTCH SWITCH

Refer to EC-270, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace ASCD clutch switch.

9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E114	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

cardiagn.com

• Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-271, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001116267

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-18, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001116268

1. CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

cardiagn.com

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-8, "Removal and Installation".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001116269

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-18, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

cardiagn.com

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001116270

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-60, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001116271

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-121, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-122, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-209, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-211, "DTC Logic"**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-272, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116272

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace.

2.CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

cardiagn.com

P1706 PNP SWITCH

Description

INFOID:0000000001062572

When the shift lever position is in the neutral position, ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001062573

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	Known-good signal
Neutral position	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-275, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	1,925 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.5 - 31.8 msec

cardiagn.com

VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-275, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-275, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-275, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001062574

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	69 (PNP switch signal)	Ground	Shift lever	Neutral position	Approx. 0V
				Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-275, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001062575

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F46	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following
- Harness connectors E6, F123
- Harness for open or short between neutral position switch and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

cardiagn.com

2. Disconnect ECM harness connector.
3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F8	69	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PNP SWITCH

Refer to TM-10, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1805 BRAKE SWITCH

Description

INFOID:0000000001056434

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001056435

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-277, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056436

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E105, M77

cardiagn.com

- 10A fuse (No. 11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E114	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to EC-278, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001056437

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-18, "Inspection and Adjustment"(LHD) or BR-62, "Inspection and Adjustment"(LHD).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

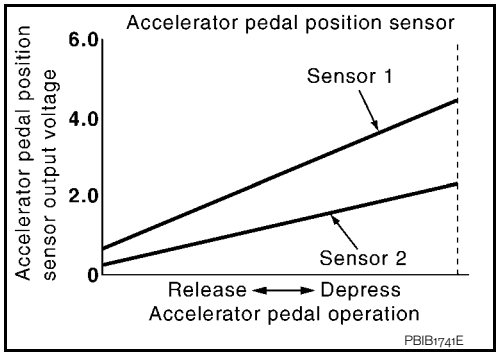
cardiagn.com

P2122, P2123 APP SENSOR

Description

INFOID:0000000001056462

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001056463

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-280, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056464

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-282, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection

INFOID:0000000001056465

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-282, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056466

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

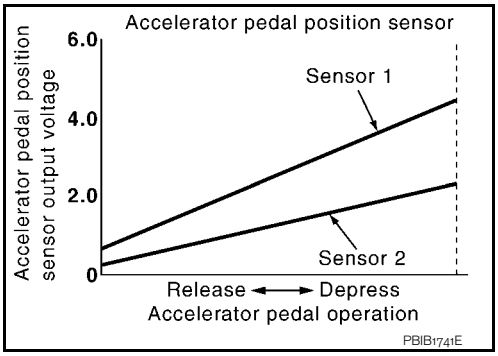
cardiagn.com

P2127, P2128 APP SENSOR

Description

INFOID:0000000001056467

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001056468

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-283, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056469

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-196, "Component Inspection".)
- Refrigerant pressure sensor (Refer to HAC-70, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

cardiagn.com

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-286, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056470

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-286, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056471

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

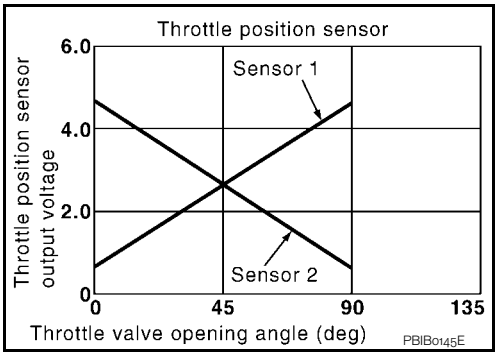
cardiagn.com

P2135 TP SENSOR

Description

INFOID:0000000001056472

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001056473

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-287, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056474

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F8	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-289, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

cardiagn.com

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-289, "Special Repair Requirement"

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056475

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-289, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-289, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056476

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

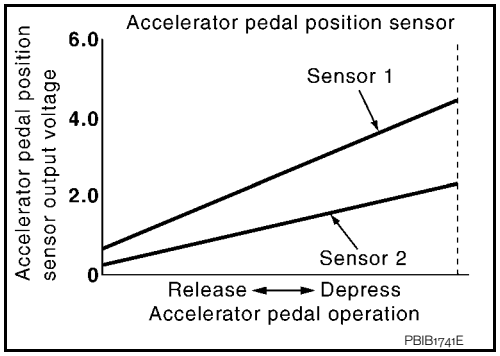
cardiagn.com

P2138 APP SENSOR

Description

INFOID:0000000001056477

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001056478

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-290, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001056479

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

cardiagn.com

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

cardiagn.com

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-196, "Component Inspection".)
- Refrigerant pressure sensor (Refer to HAC-70, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed
	2		111	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-292, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-293, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001056480

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E110	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-293, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001056481

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-30, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

ASCD BRAKE SWITCH

Description

INFOID:0000000001056487

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-60, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001056488

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-294, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056489

1.CHECK ASCD BRAKE SWITCH CIRCUIT - I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD clutch switch		Ground	Voltage (V)
Connector	Terminal		
E112	1	Ground	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT - II

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

cardiagn.com

ASCD clutch switch		Ground	Voltage (V)
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH

Refer to EC-296, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace ASCD clutch switch.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-296, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD brake switch.

cardiagn.com

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001056490

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-17, "Removal and Installation" (LHD) or BR-61, "Removal and Installation" (RHD).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001056491

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-8, "Removal and Installation".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

cardiagn.com

ASCD INDICATOR

Description

INFOID:0000000001056492

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-60, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001056493

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-298, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056494

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-121, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-43, "Wiring Diagram - METER -".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

COOLING FAN

Description

INFOID:0000000001056495

Cooling fan operates at low and high speed when the current flows in the cooling fan motor.
Refer to EC-68, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001056496

1.CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan operates at low and high speed.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".
2. Make sure that cooling fan operates at low and high speed.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-299, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056497

1.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E14.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E14	53	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors

2.CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Check the continuity between cooling fan motor harness connector and IPDM E/R harness connector.

Cooling fan motor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E14	52	Existed
			54	

4. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		IPDM/ER		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E10	5	Ground	Existed
			6		

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Resistor E57.
- Harness for open or short between IPDM E/R and cooling fan.
- Harness for open or short between cooling fan and ground.
- Harness for open or short between IPDM E/R and ground.

>> Repair or replace malfunctioning part.

4. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5. CHECK COOLING FAN MOTOR

Refer to EC-300, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning cooling fan motor.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001056498

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E3.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

cardiagn.com

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001056500

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001056501

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-301, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-301, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-301, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056502

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-301, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-3, "Work Flow".

cardiagn.com

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-191, "System Description".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

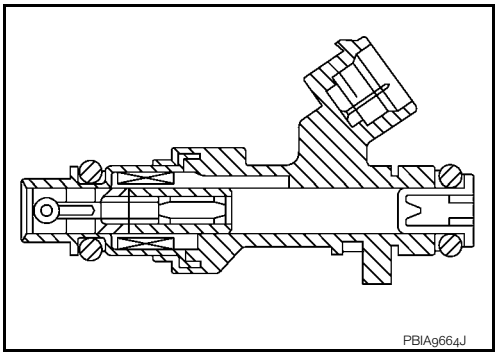
cardiagn.com

FUEL INJECTOR

Description

INFOID:0000000001056503

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000001056504

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-303, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

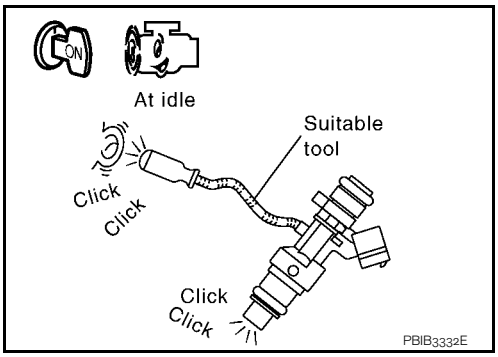
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-303, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056505

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

cardiagn.com

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 58)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	2	F7	31	Existed
2	F38	2		30	
3	F39	2		29	
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001056506

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

cardiagn.com

Terminals	Resistance [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

cardiagn.com

FUEL PUMP

Description

INFOID:0000000001056507

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

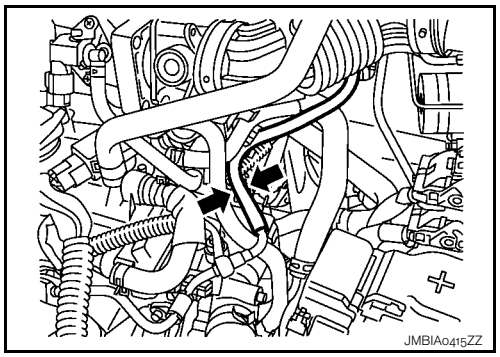
Component Function Check

INFOID:0000000001056508

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-306, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001116056

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	23	E13	33	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E6, F123.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 10A fuse (No. 57) from IPDM E/R.
3. Check 10A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F13	42	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

cardiagn.com

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK FUEL PUMP

Refer to EC-928, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001056510

1. CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 3	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

cardiagn.com

IGNITION SIGNAL

Description

INFOID:0000000001056512

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001056513

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-309, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

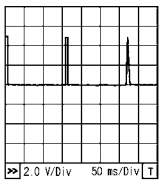
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-309, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal
Connector	Terminal		
F7	17	Ground	 PBIAg2265J
	18		
	22		
	21		

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-309, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056514

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

cardiagn.com

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-117, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E11	10	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-117, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER

Refer to EC-312, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

cardiagn.com

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F7	17	Existed
2	F34	1		18	
3	F35	1		22	
4	F36	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-312, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001056515

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

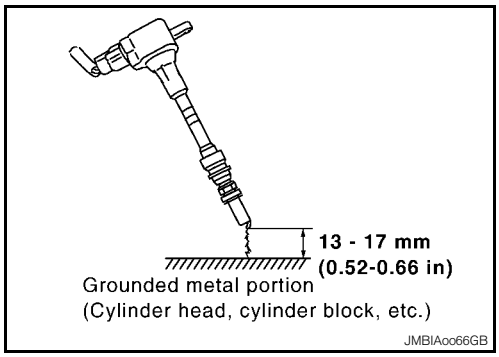
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001056516

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

cardiagn.com

3. Check resistance between condenser terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Above 1 MΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

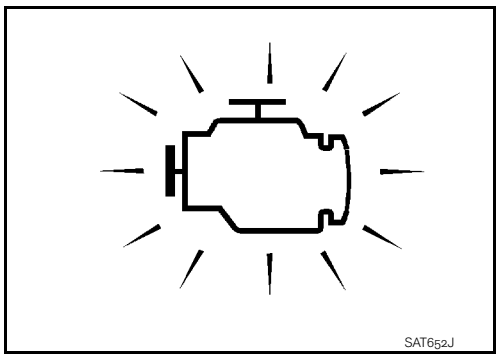
cardiagn.com

MALFUNCTION INDICATOR

Description

INFOID:0000000001056517

The Malfunction Indicator (MI) is located on the combination meter.
The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-314, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001056518

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-314, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056519

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-121, "Diagnosis Procedure".

2.CHECK COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

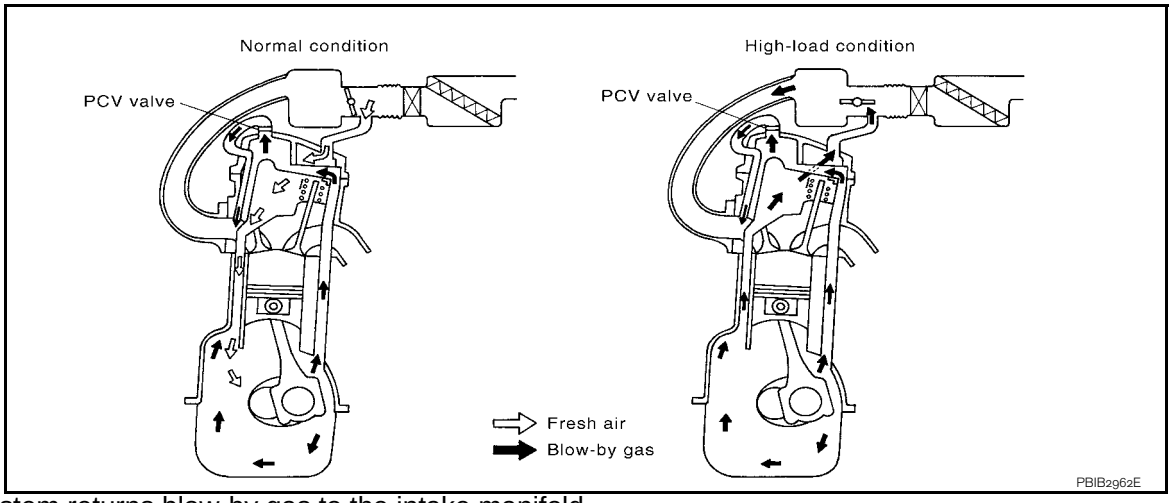
YES >> Replace combination meter.
NO >> Repair or replace.

cardiagn.com

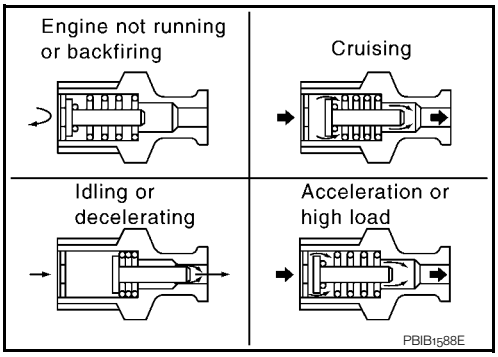
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001056524



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

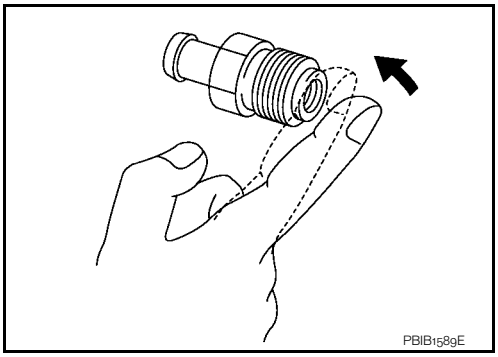


Component Inspection

INFOID:0000000001056525

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve.

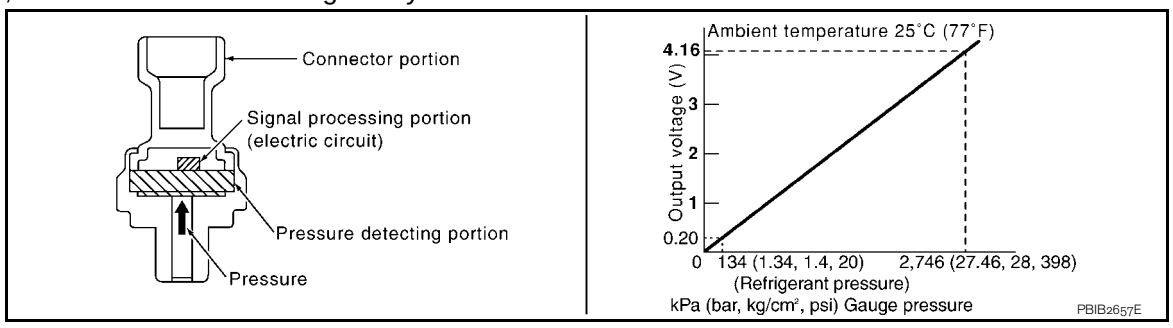
cardiagn.com

REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001056526

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001056527

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-316, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001056528

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

cardiagn.com

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F8	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F8	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

cardiagn.com

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001056529

VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

*Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-109, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-109, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-109, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds
HO2S2 MNTR (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: 1st	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1	• Ignition switch: ON (Engine stopped) • Shift lever:1st	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

cardiagn.com

Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: Neutral	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/ALD VALUE	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON

cardiagn.com

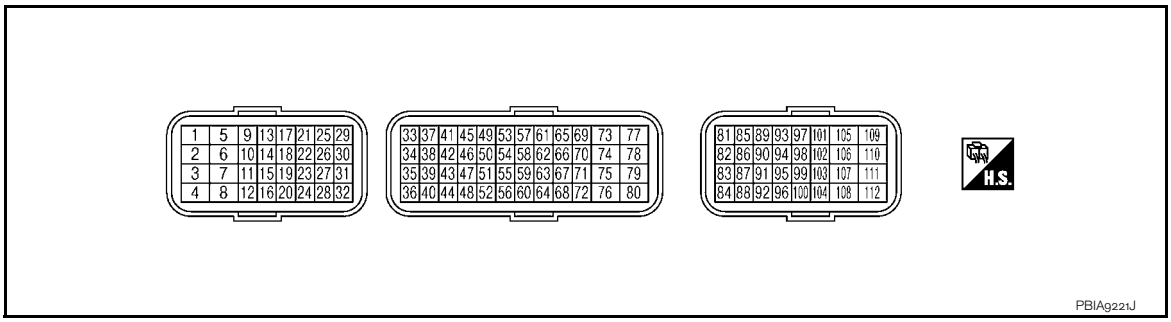
Monitor Item	Condition		Values/Status
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Below 3,600rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Below 3,900 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
O2 SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176 − F) • Engine speed: Below 3,600 rpm		Approx. 30%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal and clutch pedal: Fully released	ON
		Brake pedal and/or clutch pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF

cardiagn.com

Monitor Item	Condition		Values/Status
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

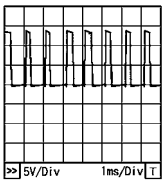
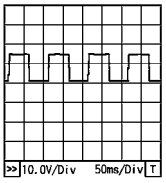
TERMINAL LAYOUT



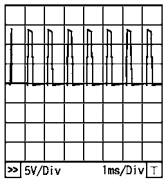
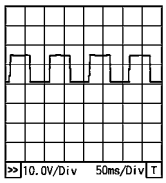
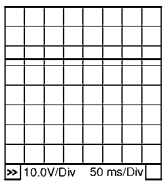
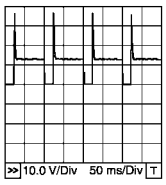
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

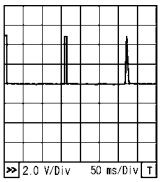
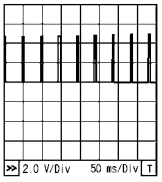
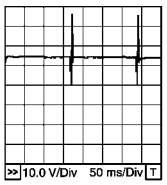
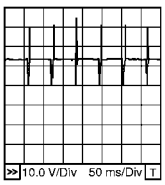
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/Output	Condition	Value (Approx.)
1	Ground	L/W	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	3.2V★  PBIA8150J
2	Ground	R/Y	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3	Ground	LG/R	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm up condition • Engine speed: Below 3,600 rpm	Approximately 3.2V★  PBIA8148J
					[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	0 - 14V★  PBIA8149J
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,900 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  PBIA8148J
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/B	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  PBIB0520E
10 11	Ground	B B/W	ECM ground	—	[Engine is running] • Idle speed	Body ground
15	Ground	G/L	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V

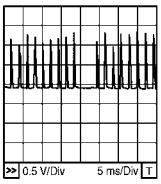
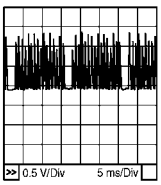
cardiagn.com

Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
17 18 21 22	Ground	L/Y BR/Y R/G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  PBIAg265J
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5V★  PBIAg266J
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
					[Ignition switch: ON] • More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	Ground	R/O Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIA4943J
32	Ground	Y/L	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

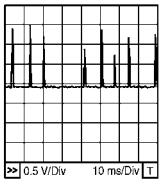
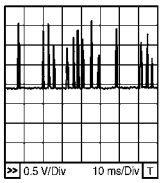
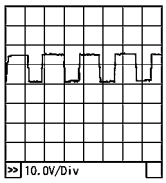
cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
33	Ground	L/R	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	L/O	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	More than 0.36V
36	Ground	V/W	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	GR/B	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	—	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G/P	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
44	Ground	B	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4V
					[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
					[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	1.0 - 1.3 to 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46	Ground	V	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48	Ground	R/L	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
49	Ground	L/G	Heated oxygen sensor 1	—	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V (Periodically change)
50	Ground	Y	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	P	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	LG/B	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1453E
					[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★  MBIB1454E
62	Ground	GR/L	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	L	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
65	Ground	G	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1455E
					[Engine is running] • Engine speed is 2,000 rpm	0 - 1.0V★  MBIB1456E
69	Ground	W/B	Neutral position switch	Input	[Ignition switch: ON] • Neutral	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above position	0V
72	Ground	V/R	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
73	Ground	Y/R	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
					[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 10V★  PBIA4937J
74	Ground	Y/W	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
75	Ground	L/W	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	Y/V	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	2.7V
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

cardiagn.com

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	Ground	R	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal and clutch pedal: Slightly depressed	0V
					[Ignition switch: ON] • Brake pedal and/or clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
103	Ground	GR	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Ground	Y	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	V	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground

cardiagn.com

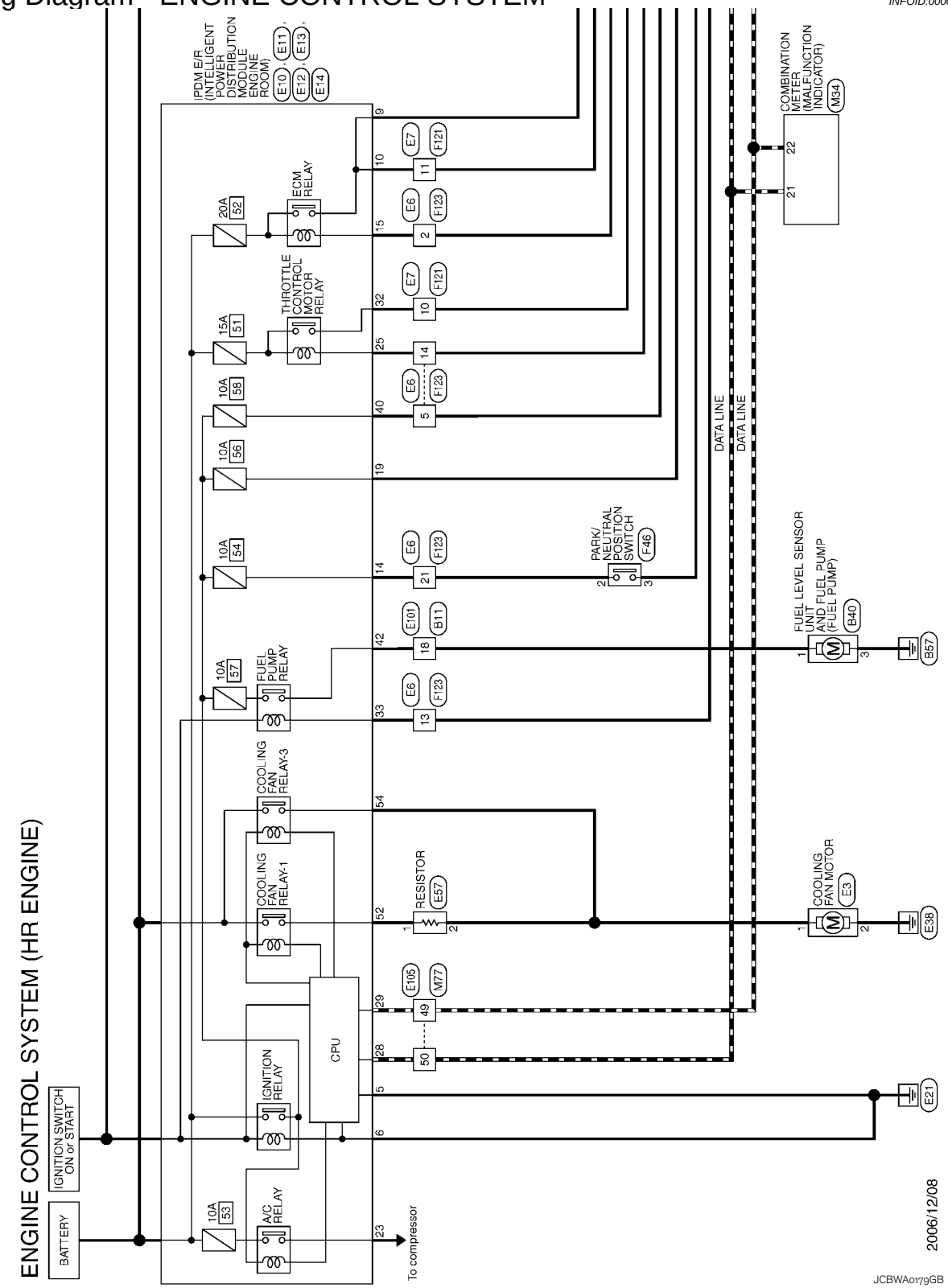
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
110	Ground	G	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	Ground	R	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

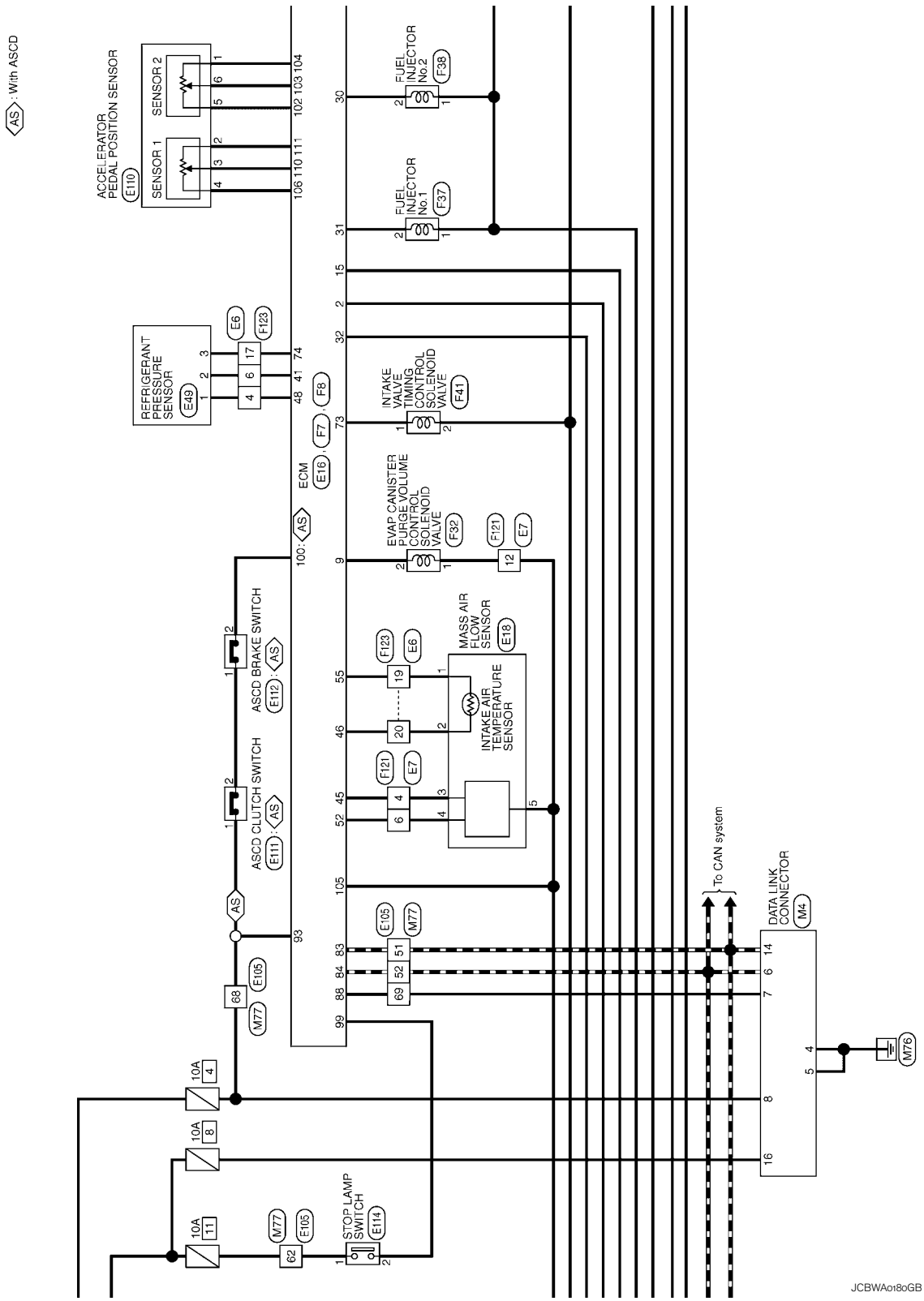
cardiagn.com

Wiring Diagram - ENGINE CONTROL SYSTEM -

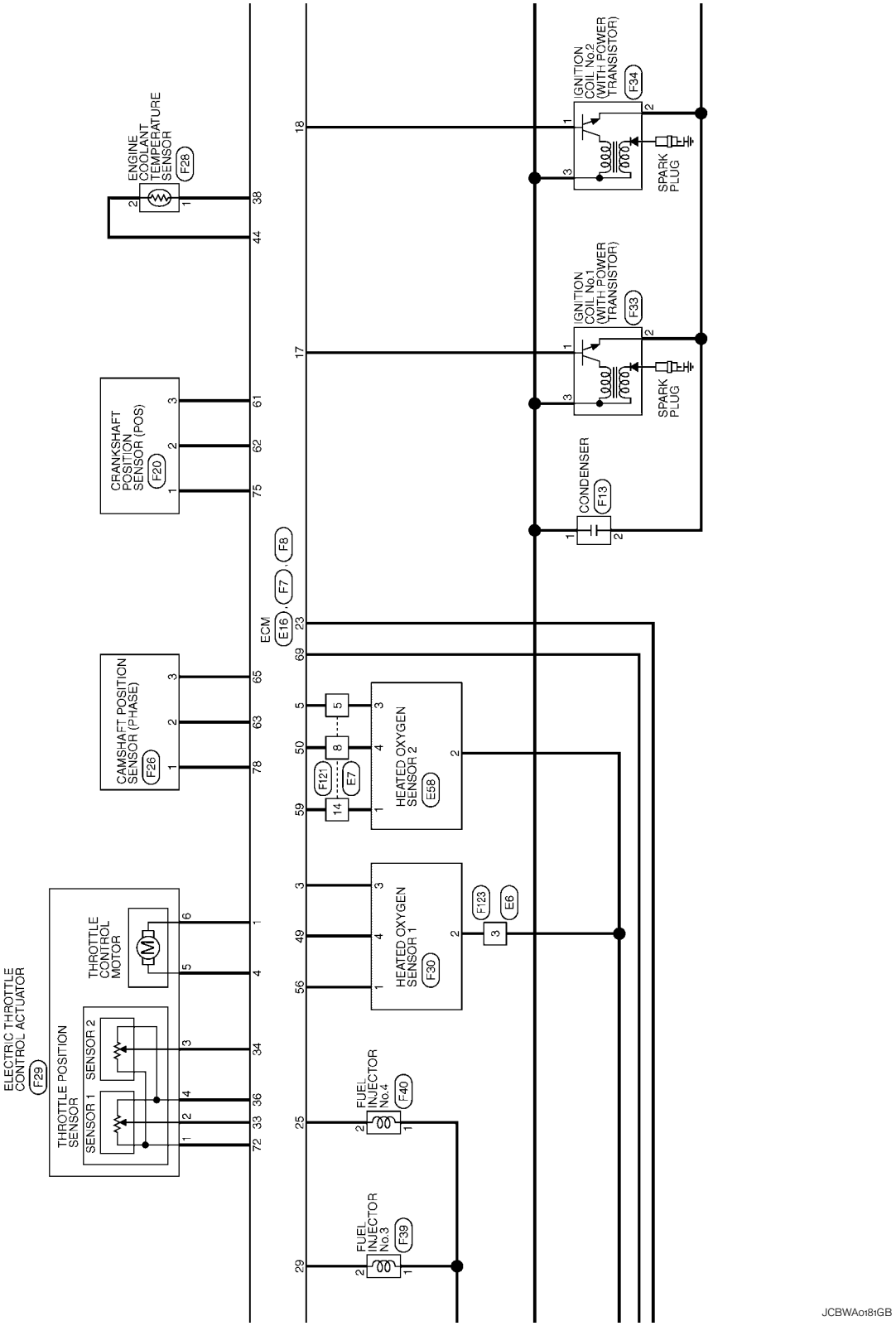
INFOID:0000000001056530



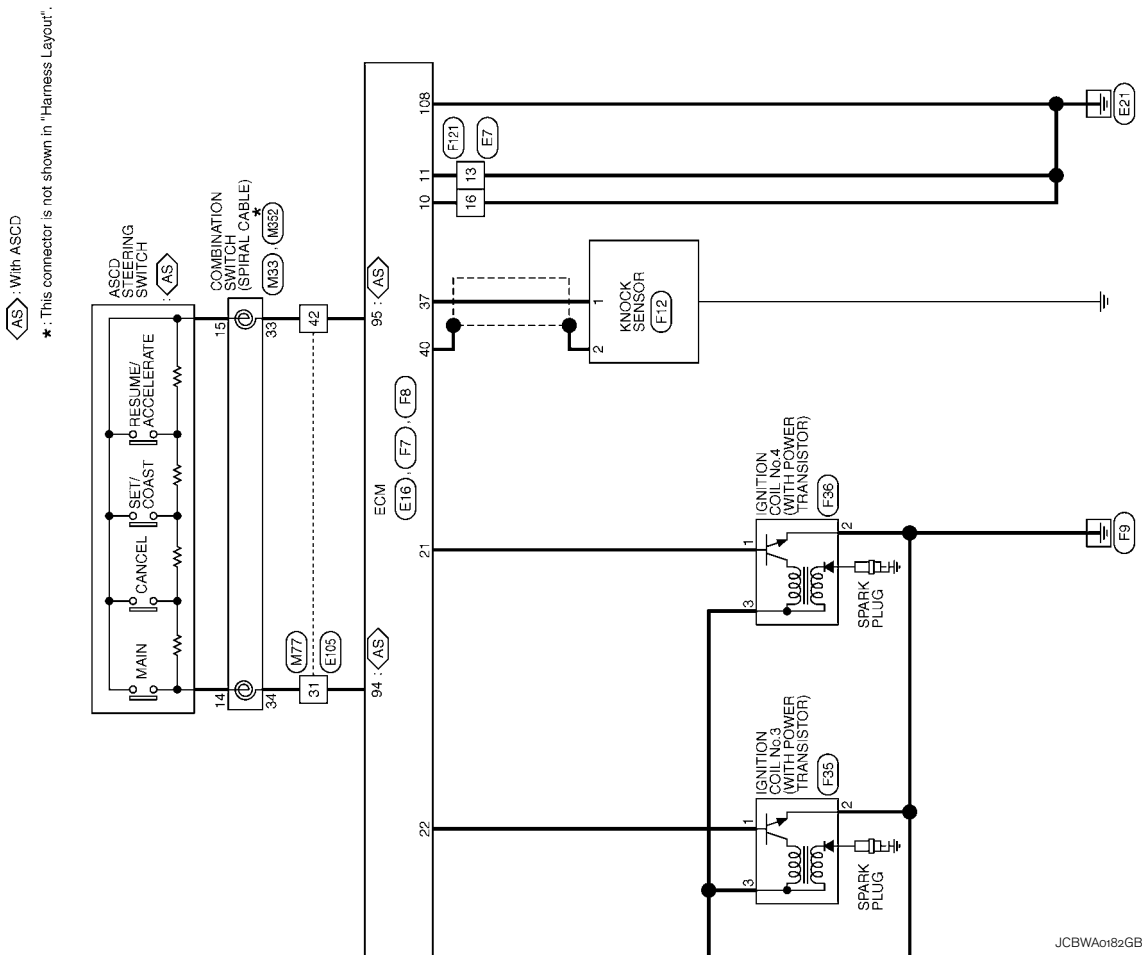
cardiagn.com



cardiagn.com

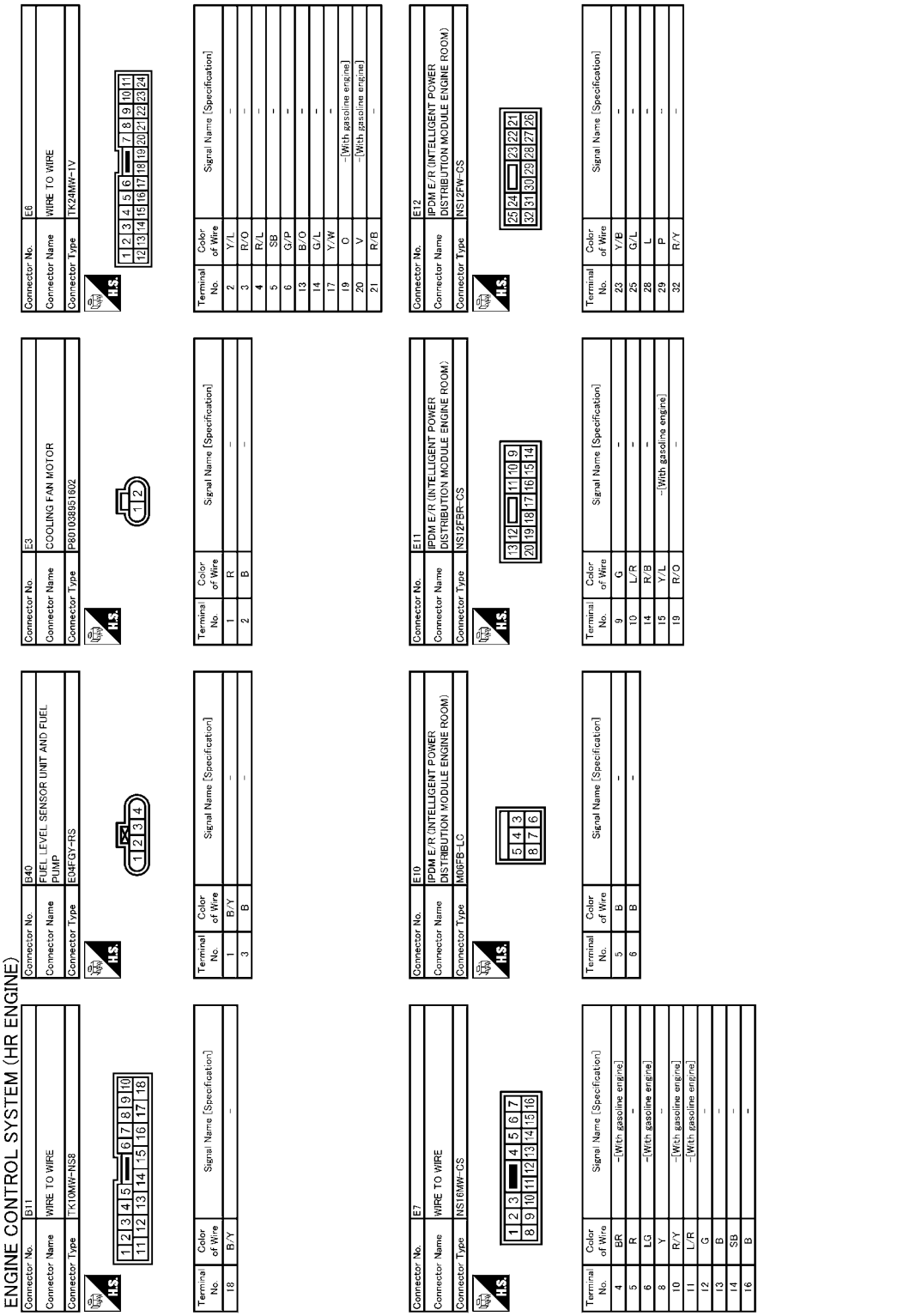


cardiagn.com



cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)



JCBWA0183GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

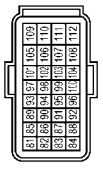
Terminal No.	Color of Wire	Signal Name [Specification]
33	B/O	–
40	BR/Y	–[With HR engine]
42	B/Y	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	Y2K 7263-5591-40-F



Terminal No.	Color of Wire	Signal Name [Specification]
52	W	–
54	R	–

Connector No.	E16
Connector Name	ECM
Connector Type	MAA24FB-ME48-LH



Terminal No.	Color of Wire	Signal Name [Specification]
83	P	CAN-LI
84	L	CAN-HI
88	O	K-LINE
93	W/L	IGN SW
94	V	ASCD STRG SW
95	B	GND-ASCD STRG SW
99	R/W	BRAKE
100	R	BNCSW(BNC)
102	BR	AVCC-APS2[With HR engine]
103	GR	APS2
104	Y	GND-A-APS2[With HR engine]

105	G	VBR
106	V	AVCC-APS1[With HR engine]
108	B	GND
110	G	APS1[With HR engine]
111	R	GND-A-APS1[With HR engine]

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH05FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	V	–
3	BR	–
4	LG	–
5	G	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	–
2	G/P	–
3	Y/W	–

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P801038951602



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	R	–

Connector No.	E58
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AF204FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–
3	R	–
4	Y	–

JCBWA0184GB

cardiagn.com

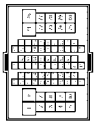
ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TK10FW-NS8



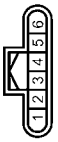
Terminal No.	Color of Wire	Signal Name [Specification]
18	B/Y	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-NS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
31	V	–
42	B	–
49	P	–
50	L	–
51	P	–
52	L	–
62	V	–
68	W/L	–
69	O	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	– [With HR engine]
2	R	– [With HR engine]
3	G	– [With HR engine]
4	V	– [With HR engine]
5	BR	– [With HR engine]
6	GR	– [Except K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	W/L	– [With gasoline engine]
2	O	– [With gasoline engine]

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC

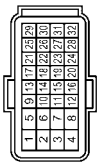
Terminal No.	Color of Wire	Signal Name [Specification]
1	O	– [With M/T]
1	W/L	– [With CVT]
2	R	–

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–

Connector No.	F7
Connector Name	ECM
Connector Type	MAA24FGY-MEA8-RH



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	MOTOR1
2	R/Y	VMOT
3	LG/R	O2HF[With HR engine]
4	P	MOTOR2
5	R	O2HR
9	W/B	EVAP
10	B	GND
11	B/W	GND
15	G/L	MOTRLY
17	L/Y	IGN COIL#1
18	BR/Y	IGN COIL#2
21	R/G	IGN COIL#4
22	Sb	IGN COIL#3[With HR engine]
23	B/O	FPR
25	R/O	INJ#4
29	Y	INJ#3[With HR engine]
30	O	INJ#2[With HR engine]
31	L	INJ#1
32	Y/L	SSOFF

JCBWA0185GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F8
Connector Name	ECM
Connector Type	MA440FBR-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
33	L/R	TPS1[With HR engine]
34	L/O	TPS2[With HR engine]
36	V/W	GND-A TPS[With HR engine]
37	W	KNK
38	GR/B	TW[With HR engine]
40	SHIELD	GND-A KNK
41	G/P	PDPRESS
44	B	GND-A TW[With HR engine]
45	BR	GA+
46	V	TA
48	R/L	GND-A(PDPRES)

Terminal No.	Color of Wire	Signal Name [Specification]
49	L/G	O2SF[With HR engine]
50	Y	O2SR
52	LG	GA-
55	O	GND-TA
56	P	GND-A O2SF[With HR engine]
59	SB	O2SR-GND
61	LG/B	POS
62	GR/L	GND-POS[With HR engine]
63	L	GND-(A)-PHASE[With HR engine]
65	G	PHASE[With HR engine]
69	W/B	NEUT HIGH
72	V/R	AVCC-TPS[With HR engine]
73	Y/R	CYTC
74	Y/W	AVCC(PDPRES)
75	L/W	POS AVCC
76	Y/V	PHASE AVCC

Connector No.	F20
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	-
2	GR/L	-[With HR engine]
3	LG/B	-

Connector No.	F26
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/V	-
2	L	-[With HR engine]
3	G	-[With HR engine]

Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BS02FB-AHY-S



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-
2	B/W	-

Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS



Terminal No.	Color of Wire	Signal Name [Specification]
1	GR/B	-[With HR engine]
2	B	-[With HR engine]

Connector No.	F13
Connector Name	CONDENSER
Connector Type	MG2FW-GY-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/R	-
2	B	-

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	V/R	-[With HR engine]
2	L/R	-[With HR engine]
3	L/O	-[With HR engine]
4	V/W	-[With HR engine]
5	P	-
6	L/W	-

JCBWA0186GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F30
Connector Name	HEATED OXYGEN SENSOR 1
Connector Type	AFZ04FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	– [With HR engine]
2	R/O	–
3	LG/R	– [With HR engine]
4	L/G	– [With HR engine]

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL-RS-LGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	W/B	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	–
2	B	–
3	L/R	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	BR/Y	–
2	B	–
3	L/R	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	– [With HR engine]
2	B	–
3	L/R	–

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/G	–
2	B	–
3	L/R	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	L	–

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	O	– [With HR engine]

JCBWA0187GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	Y	–[With HR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–

Connector No.	F41
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/R	–
2	L/R	–

Connector No.	F46
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	FEA03FG

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	R/B	–
3	W/B	–

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	BR	–[With gasoline engine]
5	R	–
6	LG	–[With gasoline engine]
8	Y	–
10	R/Y	–[With gasoline engine]
11	L/R	–[With gasoline engine]
12	G	–
13	B	–
14	SB	–
16	B	–

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	Y/L	–
3	R/O	–
4	R/L	–
5	SB	–
6	G/P	–
13	B/O	–
14	G/L	–
17	Y/W	–
19	O	–[With gasoline engine]
20	V	–[With gasoline engine]
21	R/B	–

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	B	–
5	B	–
6	L	–
7	O	–
8	W	–
14	P	–
16	Y	–

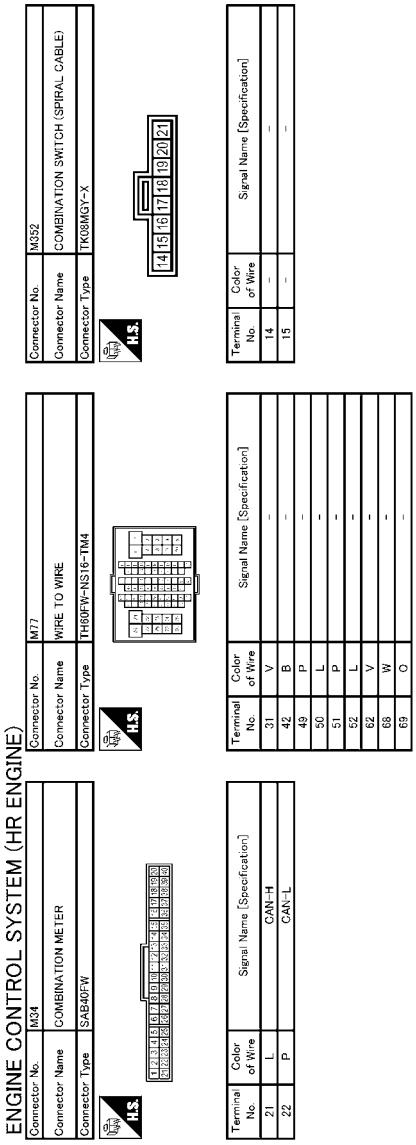
Connector No.	M33
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FGY-1V

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
33	B	–
34	V	–

JCBWA0188GB

cardiagn.com



JCBWA0189GB

Fail Safe

INFOID:0000000001056531

NON DTC RELATED ITEM

cardiagn.com

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	EC-314

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in Neutral position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

cardiagn.com

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. Vehicle condition: Driving condition When engine is idling: Normal When accelerating: Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000001056532

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1001 CAN communication line • U1010 CAN communication • P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 • P0135 Heated oxygen sensor 1 heater • P0138 P0139 P1146 P1147 Heated oxygen sensor 2 • P0141 Heated oxygen sensor 2 heater • P0444 EVAP canister purge volume control solenoid valve • P1065 ECM • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P1121 Electric throttle control actuator • P1212 ESP communication line

DTC Index

INFOID:0000000001056533

cardiagn.com

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
U1001	1001*4	CAN COMM CIRCUIT	—	—	2	—	EC-121
U1010	1010	CONTROL UNIT(CAN)	—	—	2	—	EC-122
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**Flashing***7	**—**
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	EC-123
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-127
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-127
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-132
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-132
P0117	0117	ECT SEN/CIRC	—	—	1	×	EC-135
P0118	0118	ECT SEN/CIRC	—	—	1	×	EC-135
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	EC-138
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	EC-138
P0132	0132	HO2S1 (B1)	—	×	2	×	EC-141
P0133	0133	HO2S1 (B1)	×	×	2	×	EC-145
P0134	0134	HO2S1 (B1)	—	×	2	×	EC-151
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	EC-156
P0138	0138	HO2S2 (B1)	×	×	2	×	EC-159
P0139	0139	HO2S2 (B1)	×	×	2	×	EC-164
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	EC-171
P0171	0171	FUEL SYS-LEAN-B1	—	—	2	×	EC-174
P0172	0172	FUEL SYS-RICH-B1	—	—	2	×	EC-178
P0222	0222	TP SEN 1/CIRC-B1	—	—	1	×	EC-182
P0223	0223	TP SEN 1/CIRC-B1	—	—	1	×	EC-182
P0300	0300	MULTICYL MISFIRE	—	—	2	×	EC-185
P0301	0301	CYL 1 MISFIRE	—	—	2	×	EC-185
P0302	0302	CYL 2 MISFIRE	—	—	2	×	EC-185
P0303	0303	CYL 3 MISFIRE	—	—	2	×	EC-185
P0304	0304	CYL 4 MISFIRE	—	—	2	×	EC-185
P0327	0327	KNOCK SEN/CIRC-B1	—	—	2	—	EC-191
P0328	0328	KNOCK SEN/CIRC-B1	—	—	2	—	EC-191
P0335	0335	CKP SEN/CIRCUIT	—	—	2	×	EC-193
P0340	0340	CMP SEN/CIRC-B1	—	—	2	×	EC-197
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	EC-201
P0444	0444	PURG VOLUME CONT/V	—	—	2	×	EC-206
P0500	0500	VEH SPEED SEN/CIRC*5	—	—	2	×	EC-209
P0605	0605	ECM	—	—	1 or 2	× or —	EC-211
P1065	1065	ECM BACK UP/CIRCUIT	—	—	2	×	EC-213
P1111	1111	INT/V TIM C/CIRC	—	—	1	×	EC-215
P1121	1121	ETC ACTR-B1	—	—	1	×	EC-217

cardiagn.com

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
P1122	1122	ETC FUNCTION/CIRC-B1	—	—	1	×	EC-219
P1124	1124	ETC MOT PWP	—	—	1	×	EC-223
P1126	1126	ETC MOT PWP-B1	—	—	1	×	EC-223
P1128	1128	ETC MOT-B1	—	—	1	×	EC-226
P1143	1143	HO2S1 (B1)	×	×	2	×	EC-228
P1144	1144	HO2S1 (B1)	×	×	2	×	EC-233
P1146	1146	HO2S2 (B1)	×	×	2	×	EC-238
P1147	1147	HO2S2 (B1)	×	×	2	×	EC-245
P1212	1212	TCS/CIRC	—	—	2	—	EC-252
P1217	1217	ENG OVER TEMP	—	—	1	×	EC-253
P1225	1225	CTP LEARNING-B1	—	—	2	—	EC-257
P1226	1226	CTP LEARNING-B1	—	—	2	—	EC-259
P1229	1129	SENSOR POWER/CIRC	—	—	1	×	EC-261
P1564	1564	ASCD SW	—	—	1	—	EC-263
P1572	1572	ASCD BRAKE SW	—	—	1	—	EC-266
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	EC-272
P1610	1610	LOCK MODE	—	—	2	—	SEC-14
P1611	1611	ID DISCARD IMM-ECM	—	—	2	—	SEC-14
P1612	1612	CHAIN OF ECM-IMMU	—	—	2	—	SEC-14
P1615	1615	DIFFERENCE OF KEY	—	—	2	—	SEC-14
P1706	1706	P-N POS SW/CIRCUIT	—	—	2	×	EC-274
P1805	1805	BRAKE SW/CIRCUIT	—	—	2	—	EC-277
P2122	2122	APP SEN 1/CIRC	—	—	1	×	EC-280
P2123	2123	APP SEN 1/CIRC	—	—	1	×	EC-280
P2127	2127	APP SEN 2/CIRC	—	—	1	×	EC-283
P2128	2128	APP SEN 2/CIRC	—	—	1	×	EC-283
P2135	2135	TP SENSOR-B1	—	—	1	×	EC-287
P2138	2138	APP SENSOR	—	—	1	×	EC-290

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the ECM is in the mode of displaying SRT status, MI may flash. For the details, refer to “How to Display SRT Status”.

How to Set SRT Code

INFOID:0000000001056534

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III

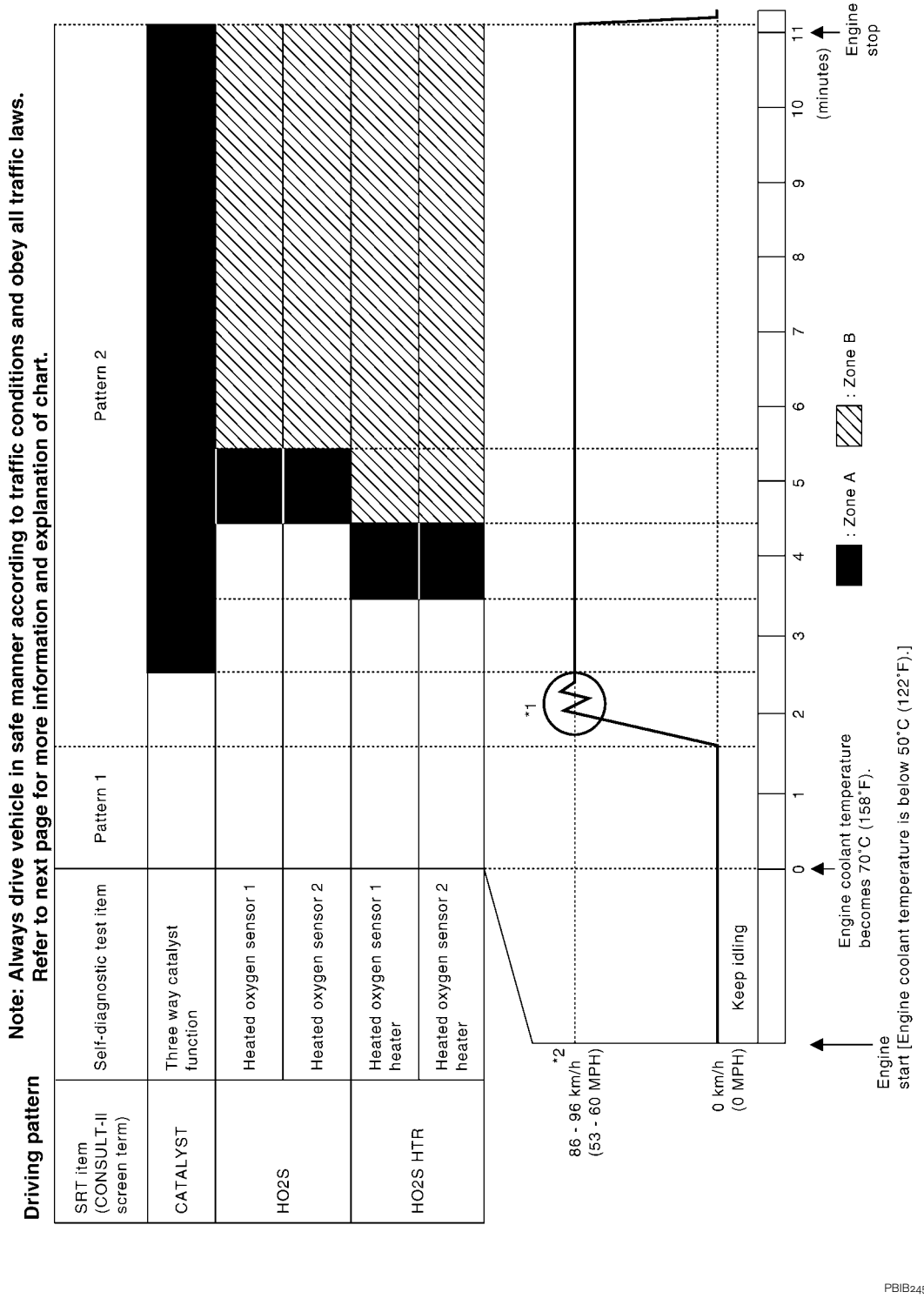
Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on “SRT Item”.

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

cardiagn.com

DRIVING PATTERN



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

cardiagn.com

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Checking the vehicle speed with GST is advised.

Test Value and Test Limit

INFOID:0000000001056535

The following is the information specified in Service $06 of ISO 15031-5.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
CATALYST	Three way catalyst function	P0420	01H	81H	Min.
		P0420	02H	81H	Min.
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
		P1144	08H	04H	Max.
		P0132	0CH	04H	Max.
		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
HO2S HEATER	Heated oxygen sensor 1 heater	P0135	29H	08H	Max.
			2AH	88H	Min.
	Heated oxygen sensor 2 heater	P0141	2DH	0AH	Max.
			2EH	8AH	Min.

cardiagn.com

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001056536

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-306
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-357
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-303
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-74
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-315
	Incorrect idle speed adjustment						1	1	1	1		1			EC-30
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-217, EC-219, EC-226
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-30
	Ignition circuit	1	1	2	2	2		2	2			2			EC-309
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-117
Mass air flow sensor circuit		1			2										EC-127, EC-127
Engine coolant temperature sensor circuit							3			3					EC-135
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-141, EC-145, EC-151, EC-151, EC-156
Throttle position sensor circuit							2			2					EC-138, EC-182, EC-257, EC-259, EC-287
Accelerator pedal position sensor circuit				3	2	1									EC-280, EC-283, EC-290
Knock sensor circuit				2								3			EC-191

cardiagn.com

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												EC-193
Camshaft position sensor (PHASE) circuit	3	2												EC-197
Vehicle speed signal circuit		2	3		3						3			EC-209
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-211, EC-213
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-215
PNP switch circuit			3		3		3	3			3			EC-274
Refrigerant pressure sensor circuit		2				3			3		4			EC-316
Electrical load signal circuit							3							EC-301
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-108 ,HAC-187
ABS actuator and electric unit (control unit)			4											BRC-9

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FL-16 ,FL-19
	Fuel piping			5	5	5		5	5			5			FL-5
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct														EM-28
	Air cleaner														EM-28
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5	5	5	5	5	5	5	5	5		5			EM-28
	Electric throttle control actuator														EM-29
	Air leakage from intake manifold/ Collector/Gasket														EM-29
Cranking	Battery	1	1	1		1		1	1			1		1	PG-3
	Generator circuit														CHG-15
	Starter circuit	3													STR-18
	Signal plate	6													EM-101
	PNP switch	4													TM-10
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-80
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-101
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-53
	Camshaft														EM-65
	Intake valve timing control														EM-53
	Intake valve												3		EM-80
	Exhaust valve														

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-75, EM-32
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-42, EM-92, LU-9, LU-3
	Oil level (Low)/Filthy oil														LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-12
	Thermostat									5					CO-20
	Water pump														CO-18
	Water gallery														CO-22
	Cooling fan									5					CO-15
	Coolant level (Low)/Contaminat-ed coolant														CO-9
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-14

1 - 6: The numbers refer to the order of inspection.

cardiagn.com

NORMAL OPERATING CONDITION

Description

INFOID:0000000001056537

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the shift lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-40, "System Description".

cardiagn.com

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001100451

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

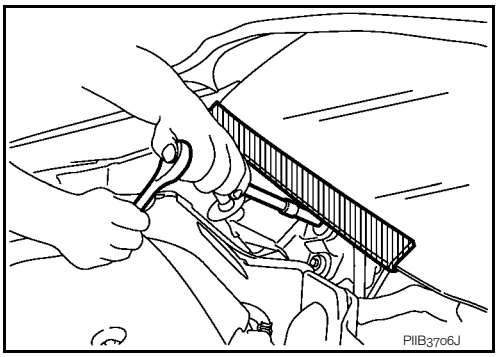
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRC section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001056539

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001056540

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)**
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

On Board Diagnostic (OBD) System of Engine

INFOID:0000000001056541

cardiagn.com

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

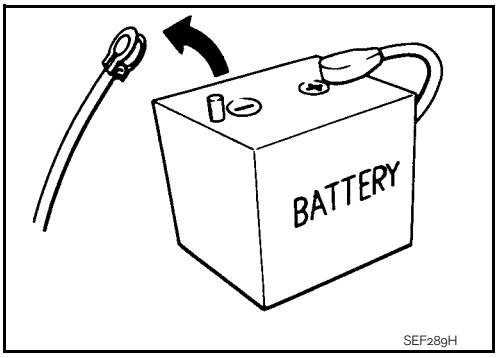
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-105, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

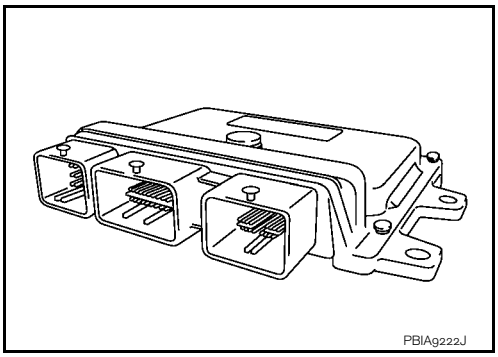
General Precautions

INFOID:0000000001056542

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

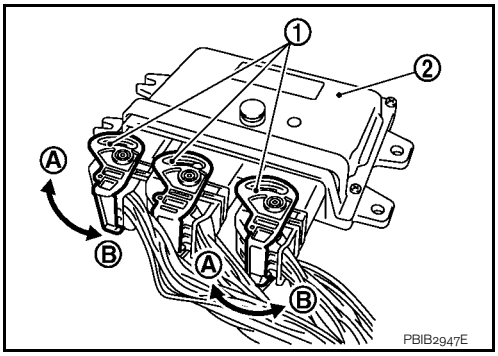


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**



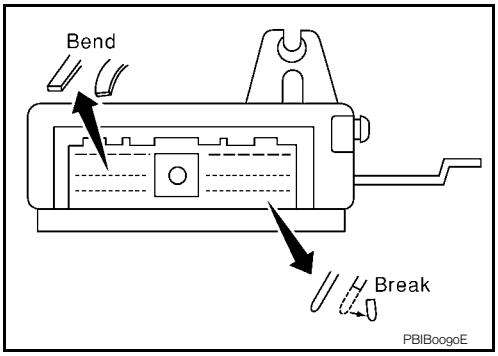
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

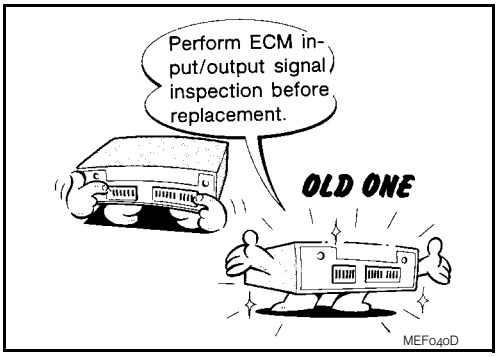
2. ECM
A. Loosen



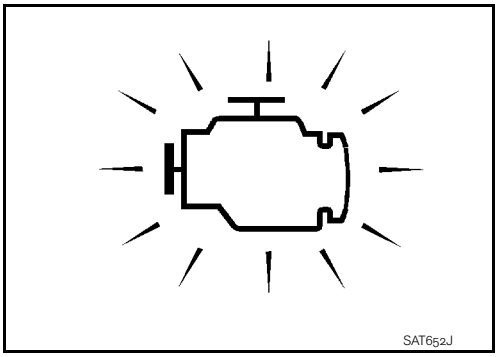
cardiagn.com

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-318, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



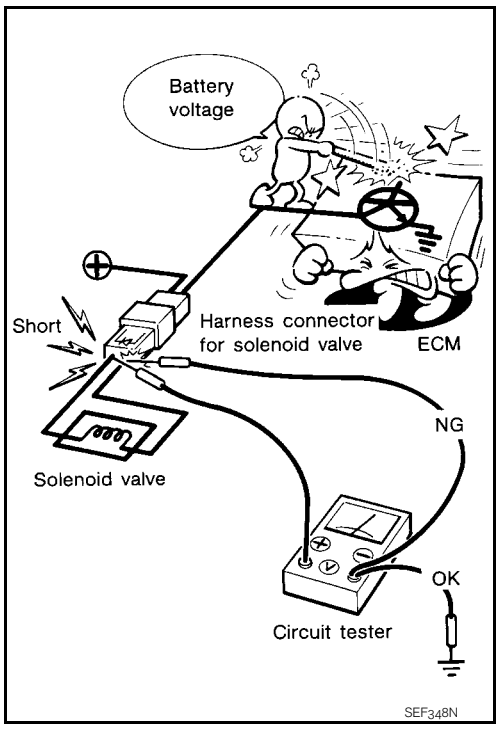


- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



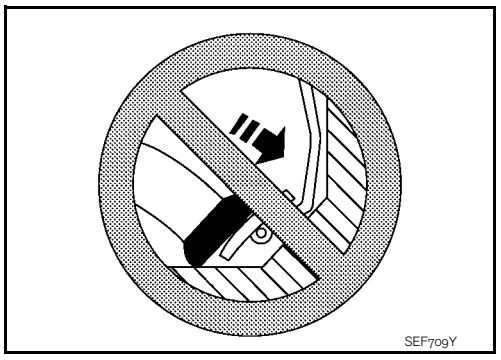
cardiagn.com

- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

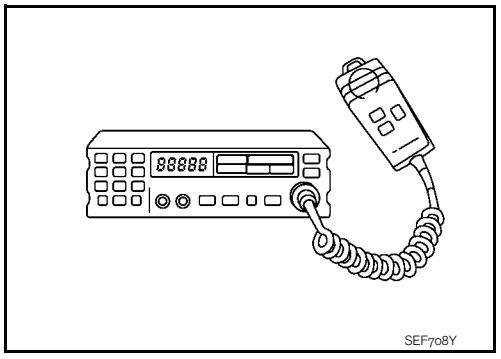


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



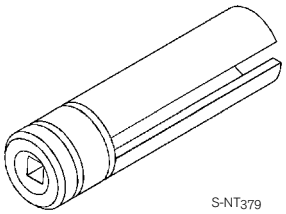
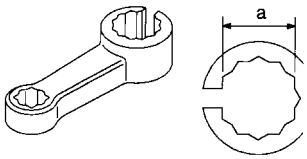
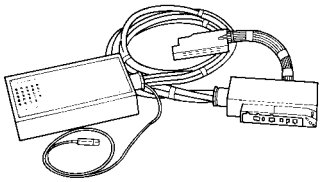
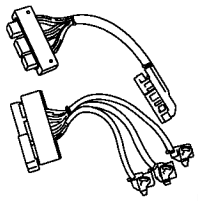
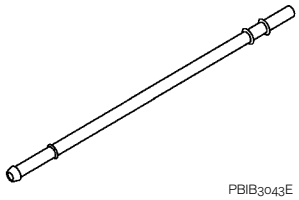
cardiagn.com

PREPARATION

PREPARATION

Special Service Tools

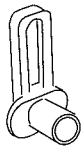
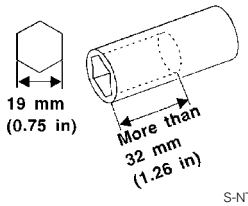
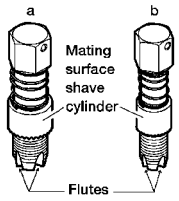
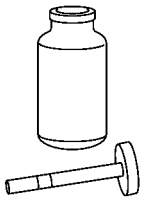
INFOID:0000000001056543

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
EG17550000 Break-out box  ZZA1194D	Measuring ECM signals with a circuit tester
EG17680000 Y-cable adapter  PBIA9379J	Measuring ECM signals with a circuit tester
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001056544

cardiagn.com

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

cardiagn.com

ON-VEHICLE MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000001077006

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

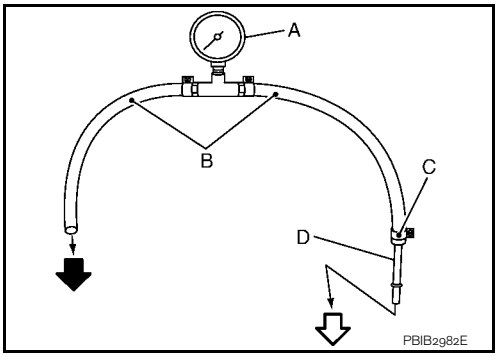
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

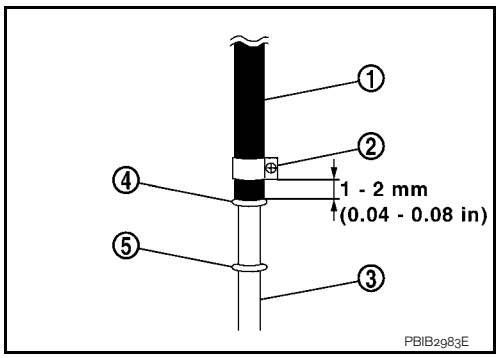
1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

cardiagn.com

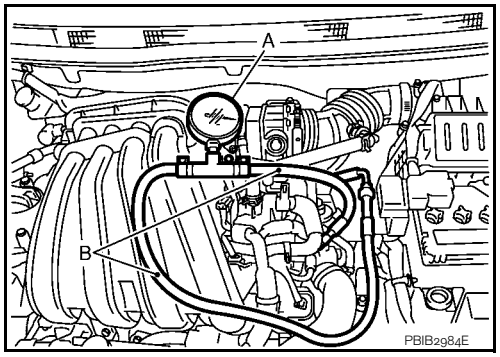
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

cardiagn.com

EVAPORATIVE EMISSION SYSTEM

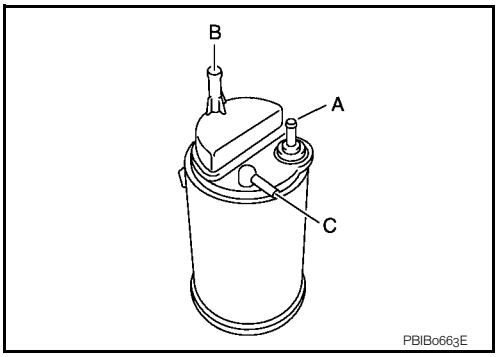
Inspection

INFOID:0000000001077700

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).

b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

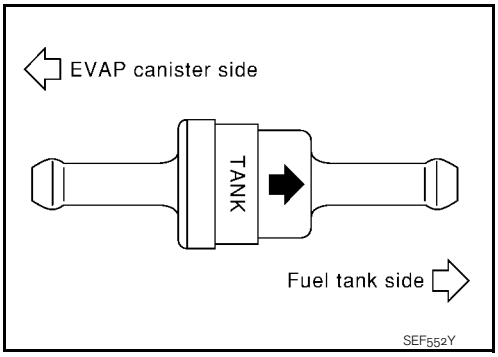


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

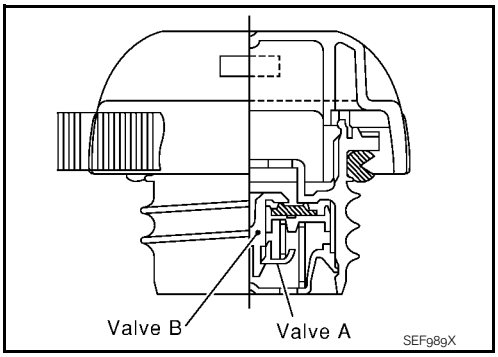
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

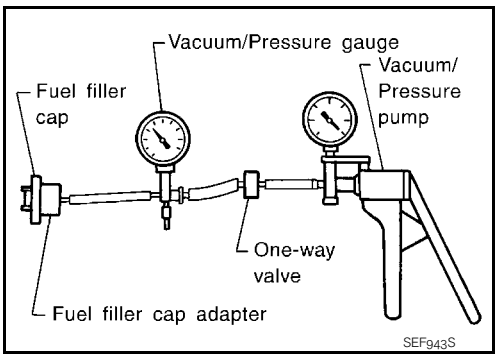
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



cardiagn.com

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001059496

Transmission	Condition	Specification
M/T	No load* (in Neutral position)	650 ±50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001059497

Transmission	Condition	Specification
M/T	No load* (in Neutral position)	15 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000001059498

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000001059499

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.3V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

cardiagn.com

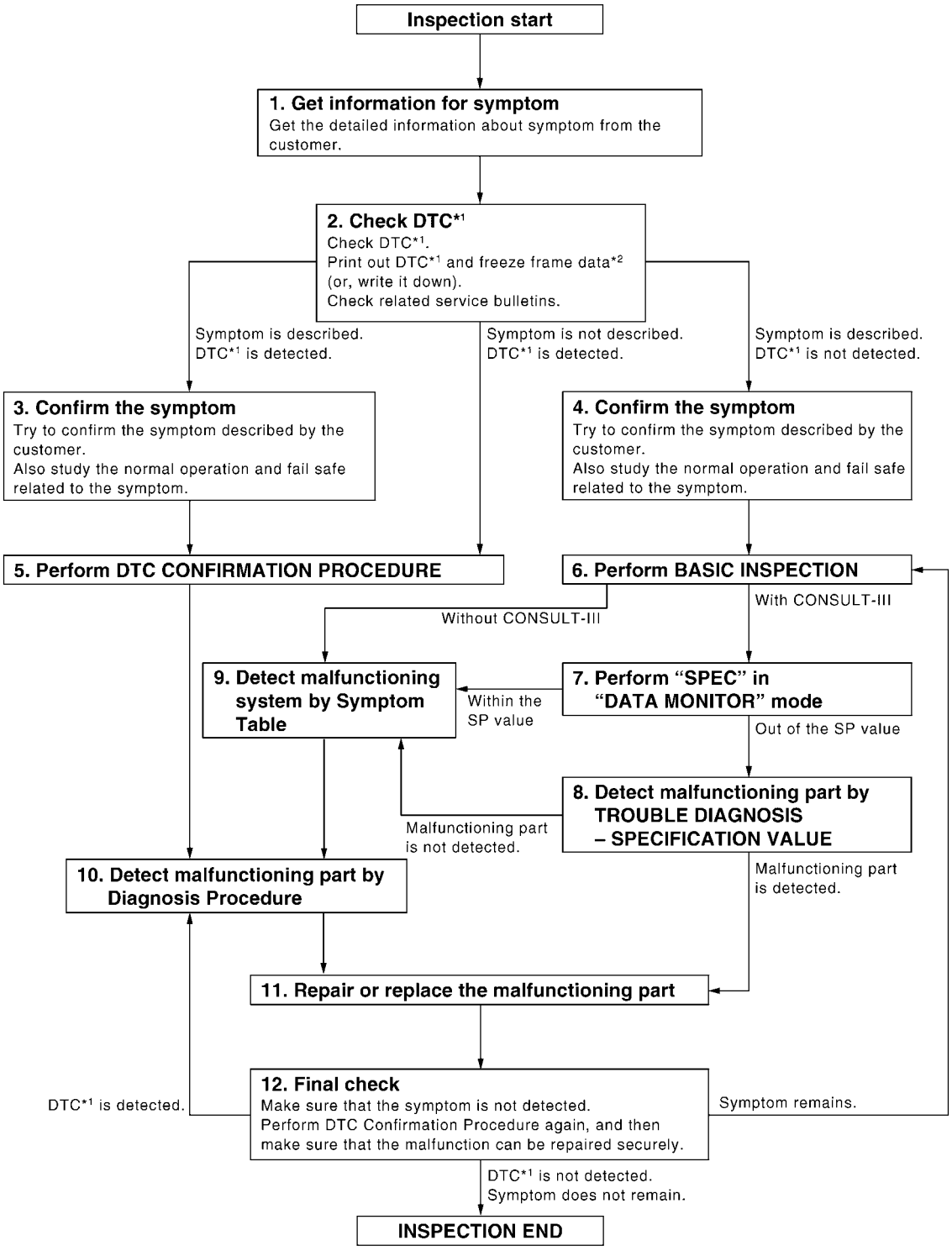
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001096723

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

JMBIA0078GB

DETAILED FLOW

cardiagn.com

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-363, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III.)
- Erase DTC. (Refer to EC-426, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-623, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-627, "Description" and EC-618, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-627, "Description" and EC-618, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-620, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to EC-620, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-365, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 7.
NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to EC-438, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-438, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-623, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-598, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to EC-426, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to EC-426, "Diagnosis Description".)

Diagnostic Work Sheet

INFOID:0000000001096724

DESCRIPTION

cardiagn.com

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

MTBL0017

cardiagn.com

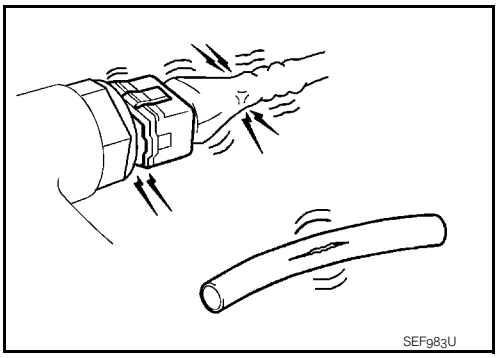
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

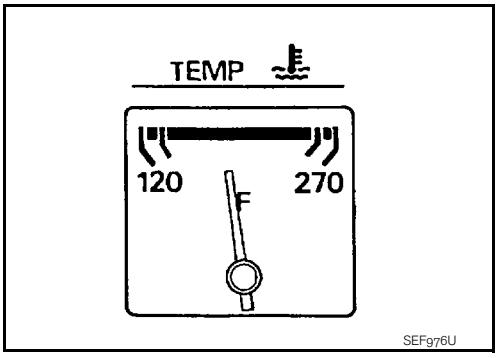
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001096725

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.


SEF983U

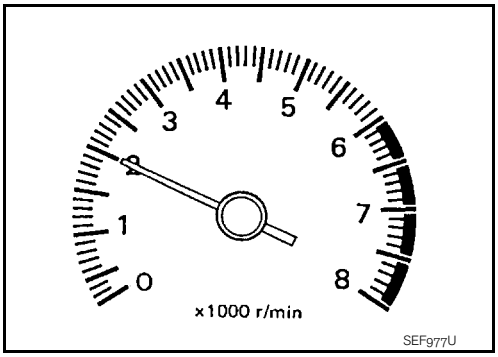


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III.

Is any DTC detected?

YES >> GO TO 2.
NO >> GO TO 3.



SEF977U

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

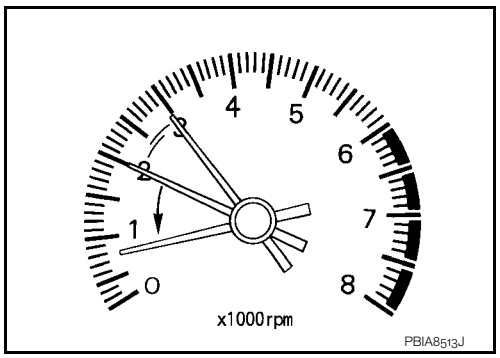
>> GO TO 3

3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

cardiagn.com

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-369, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-637, "Idle Speed".



Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-369, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-637, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-489, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-485, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

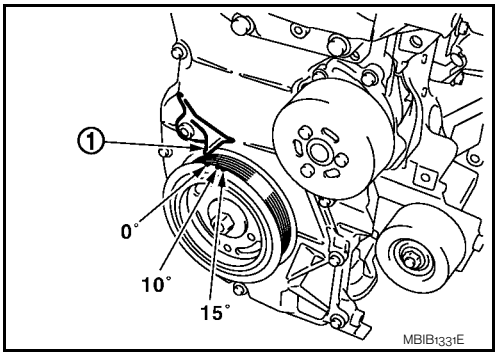
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

cardiagn.com

2. Check ignition timing with a timing light.
For procedure, refer to EC-369, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-637, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

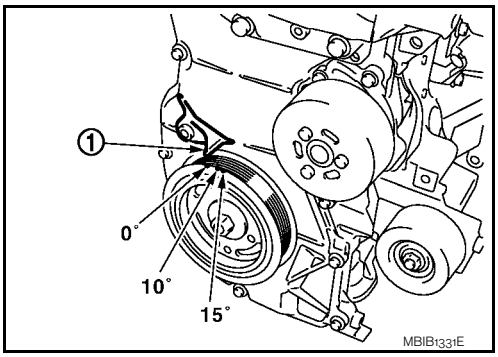
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-369, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-637, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-369, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-637, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-46, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

cardiagn.com

17.DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-489, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-485, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4.

18.CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001096726

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001096727

1.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-31, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001096728

cardiagn.com

This describes how to check the idle speed. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

IDLE SPEED : Special Repair Requirement

INFOID:0000000001096729

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

Without CONSULT-III
Check the idle speed by installing the pulse type tachometer clamp on No.4 ignition coil harness.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001096730

This describes how to check the ignition timing. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

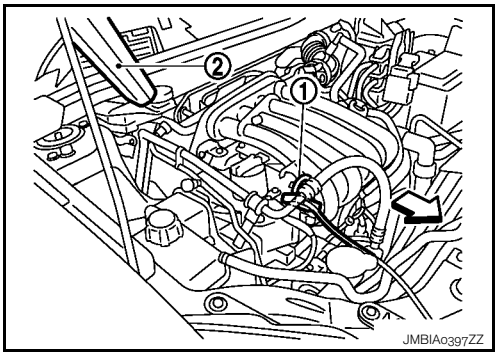
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001096731

1.CHECK IGNITION TIMING

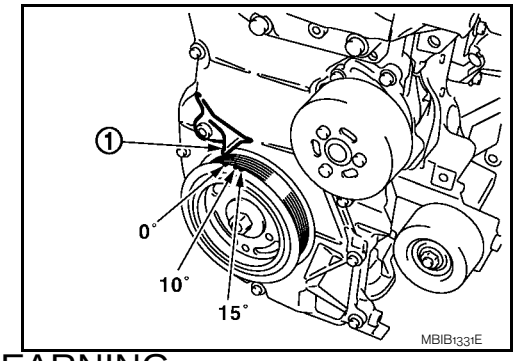
1. Attach timing light to No.1 ignition coil wire harness (1) as shown.

2 : Timing light
⇦ : Vehicle front



2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001096732

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001096733

1.START

1. Make sure that accelerator pedal is fully released.

cardiagn.com

2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001096734

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001096735

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001096736

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001096737

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/neutral position switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Drive vehicle for 10 minutes

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.IDLE AIR VOLUME LEARNING

With CONSULT-III
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

cardiagn.com

3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

YES >> GO TO 4.
NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

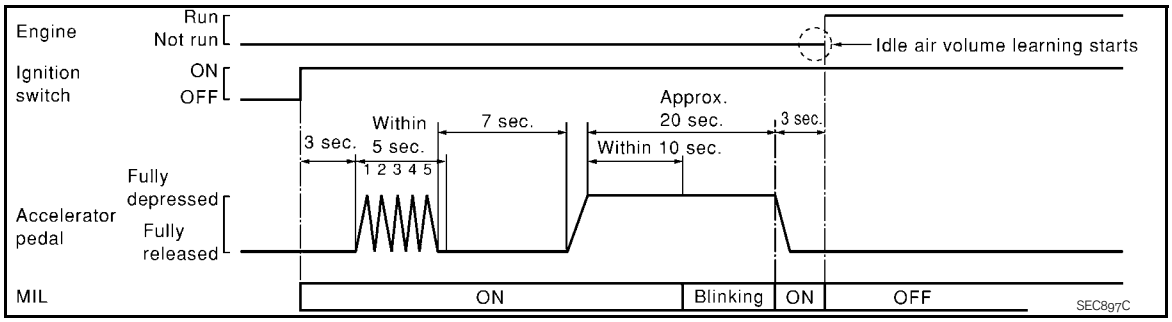
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

For specification, refer to EC-637, "Idle Speed" and EC-637, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

cardiagn.com

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-438, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001096738

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:0000000001096739

1. START

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear mixture ratio self-learning value by touching “CLEAR”.

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-426, "Diagnosis Description".
7. Make sure that DTC P0000 is displayed.

>> END

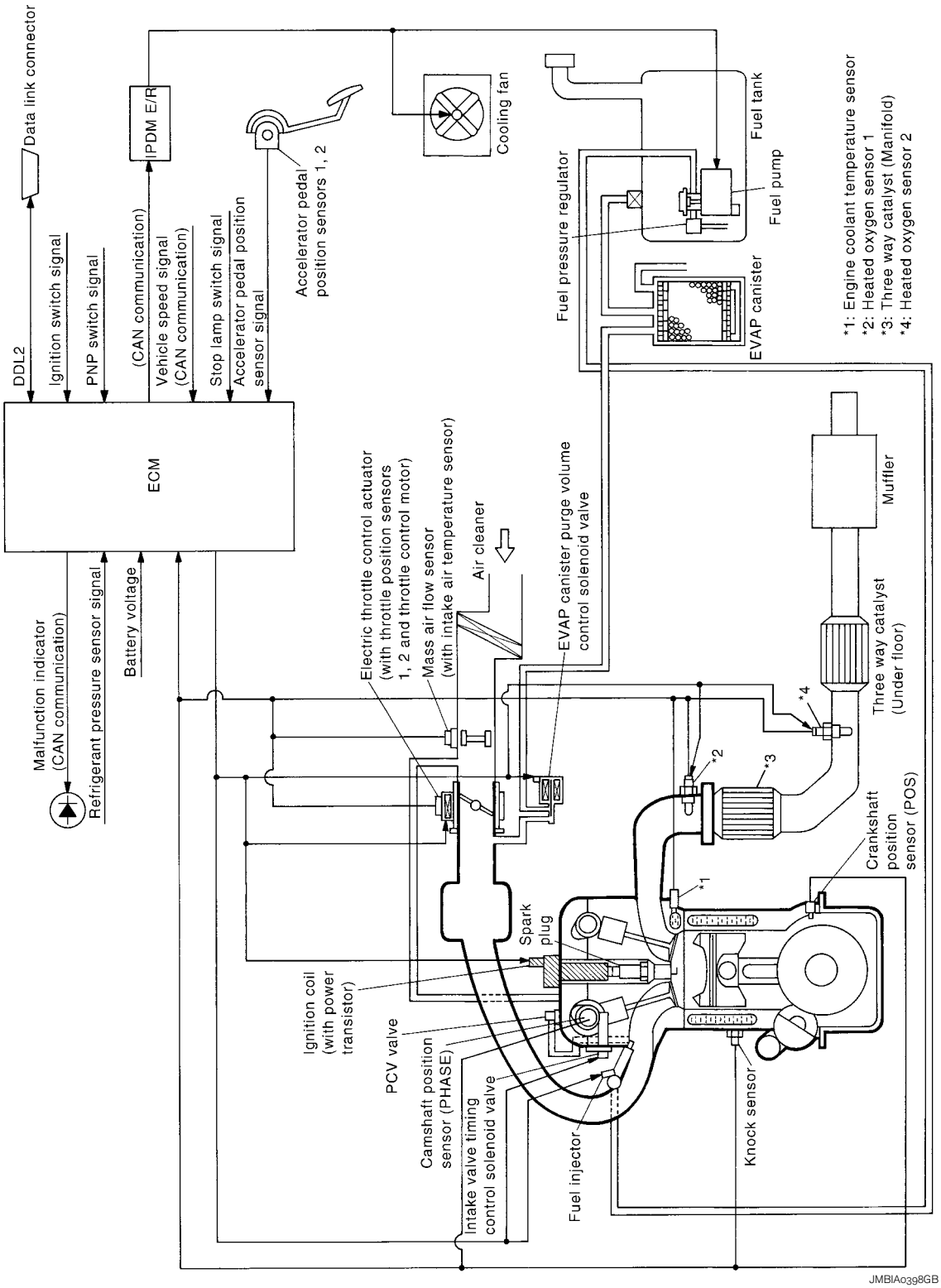
cardiagn.com

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001096740



System Description

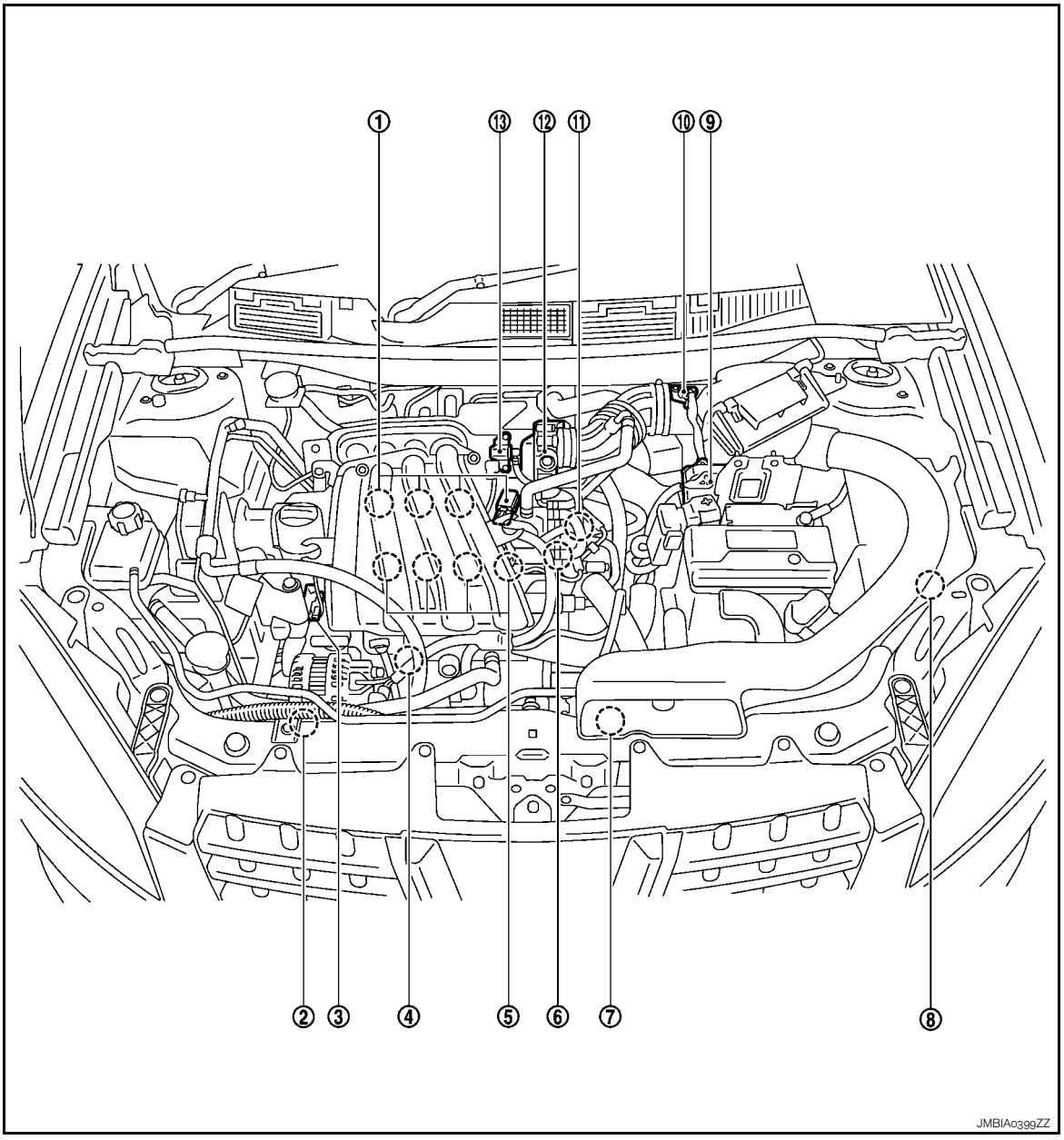
INFOID:0000000001096741

cardiagn.com

ECM performs various controls such as fuel injection control and ignition timing control.

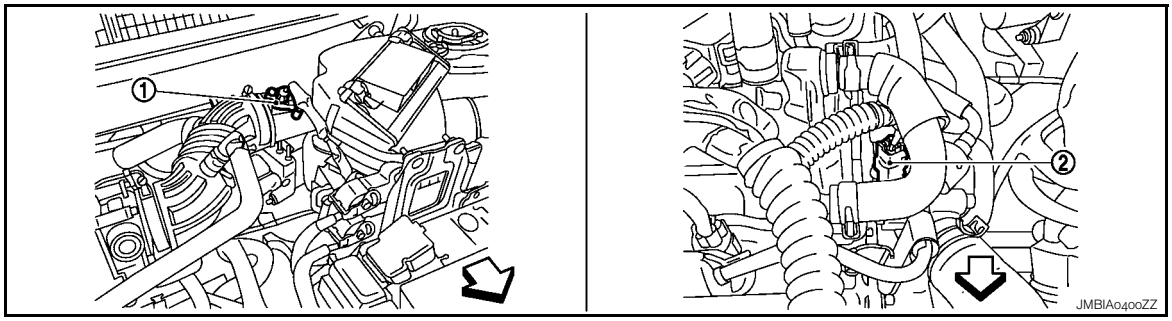
Component Parts Location

INFOID:0000000001096742



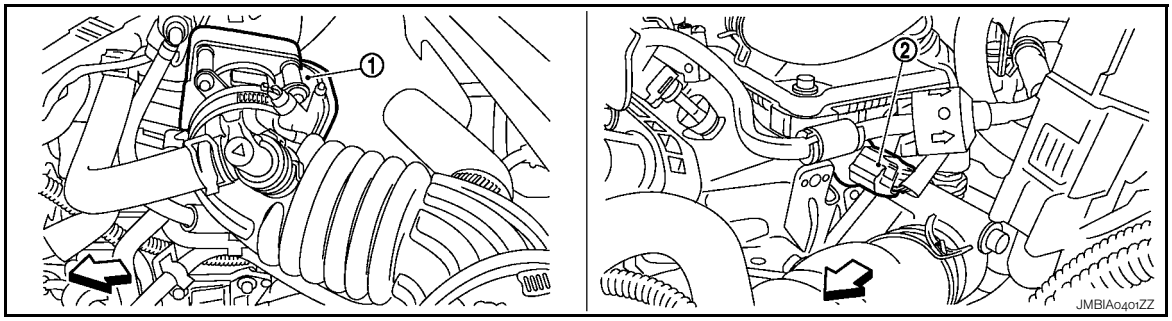
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



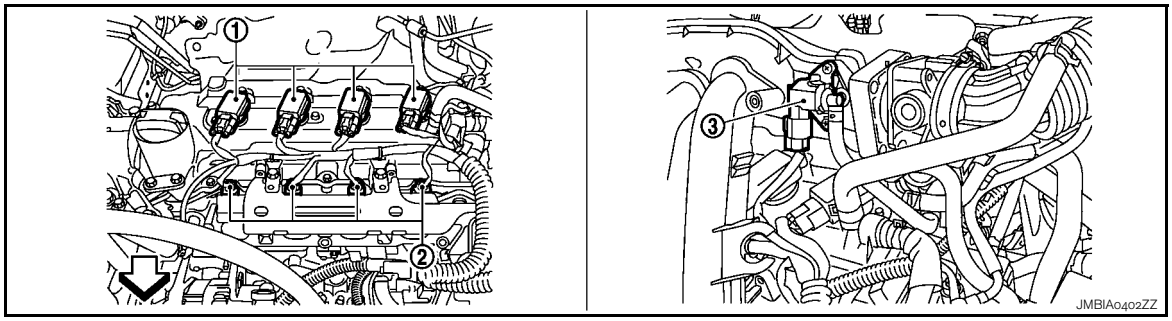
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



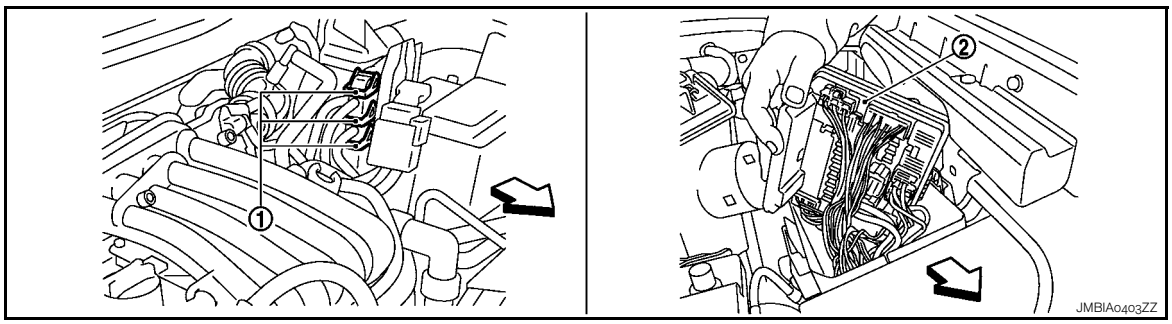
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

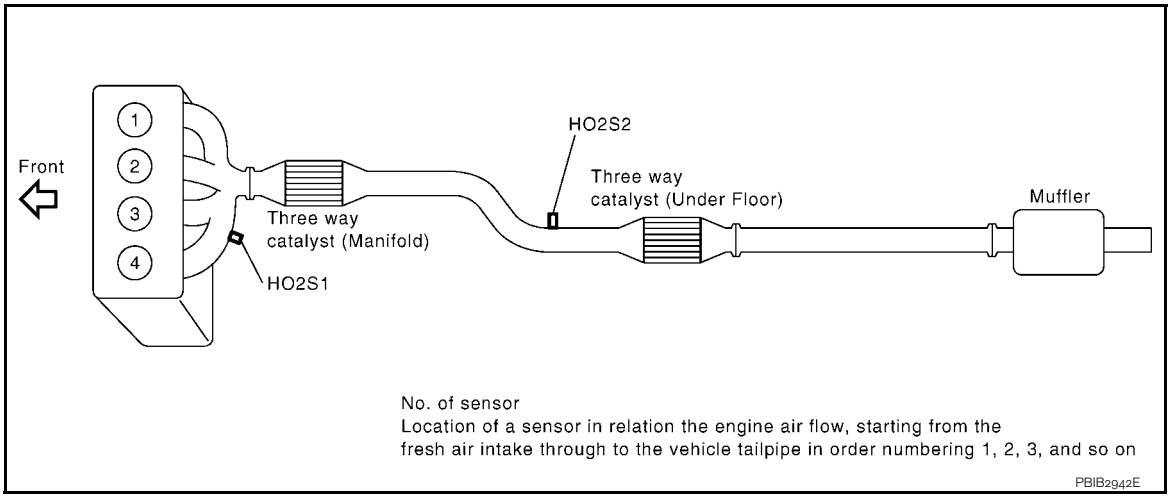
⇦ Vehicle front

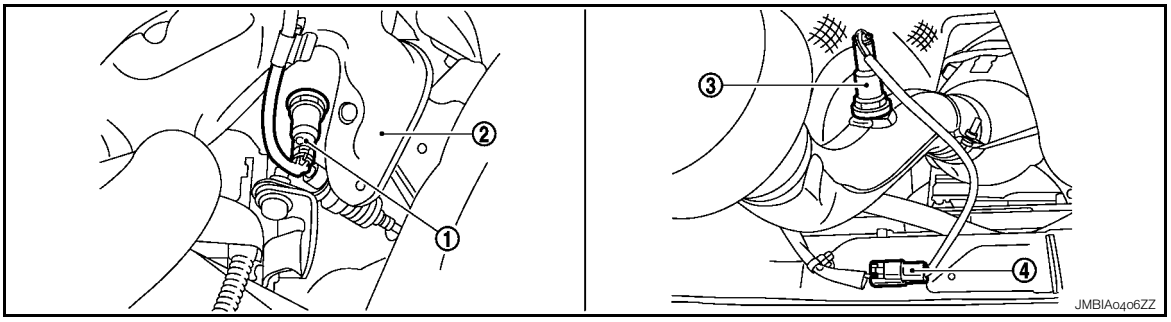


1. ECM harness connector
2. IPDM E/R

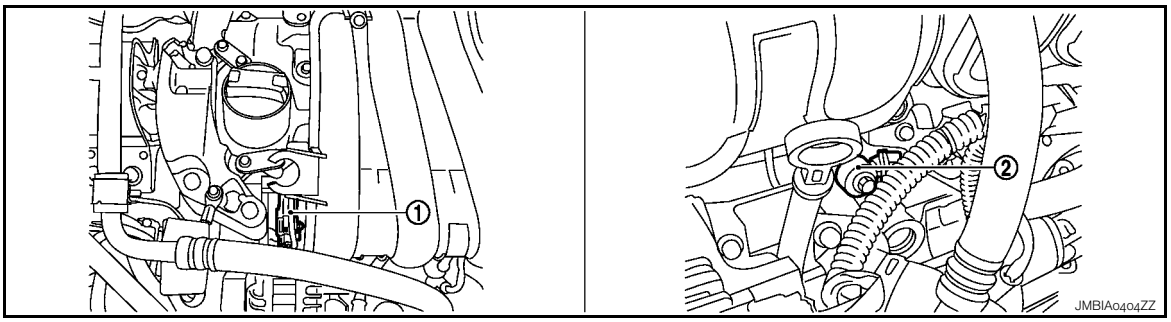
⇦ Vehicle front

cardiagn.com

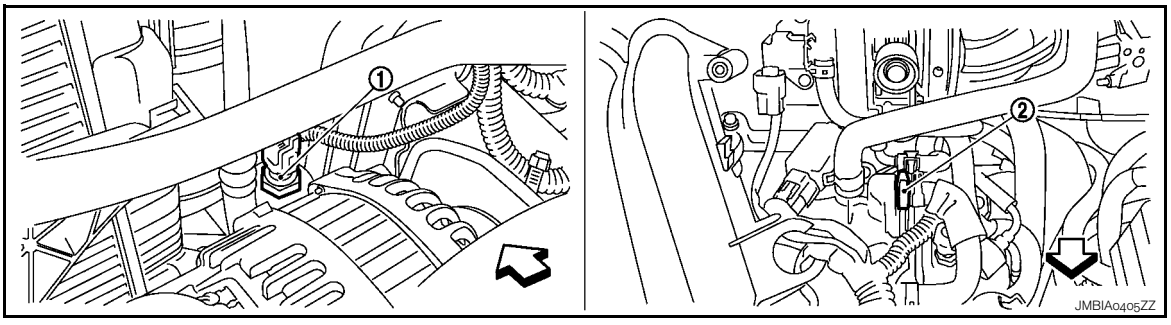




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



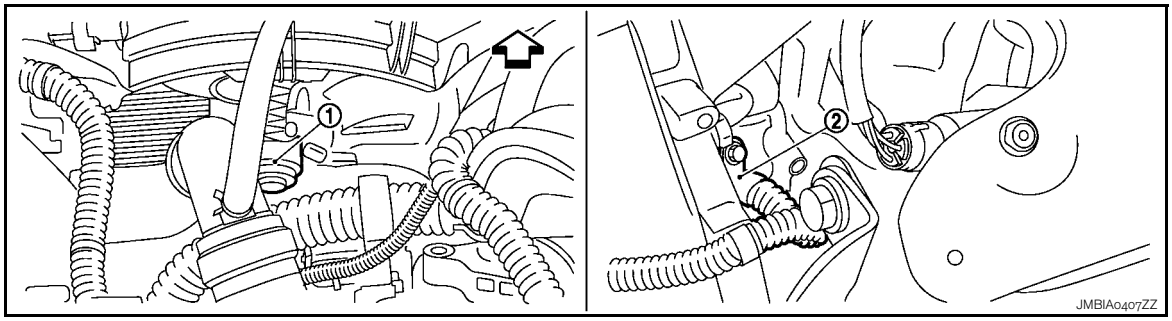
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

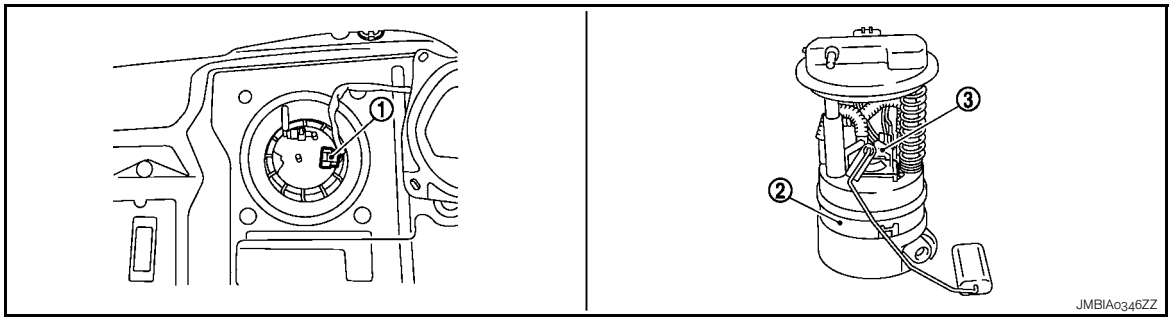
⇦ Vehicle front

cardiagn.com

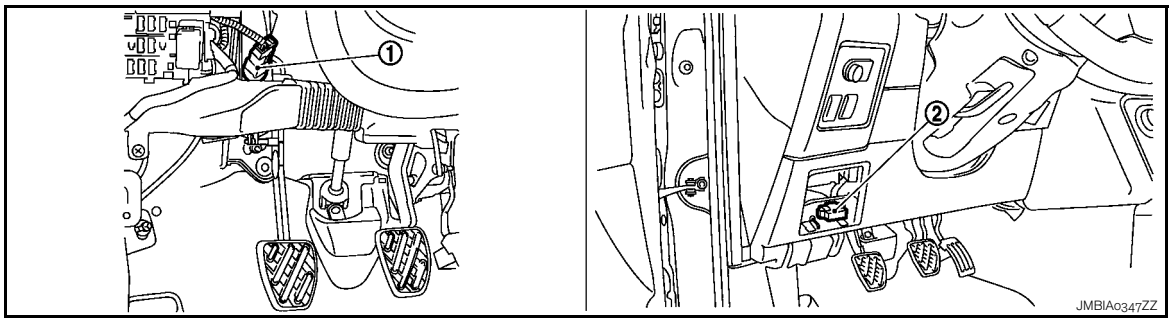


1. Cooling fan motor
2. Crankshaft position sensor (POS)

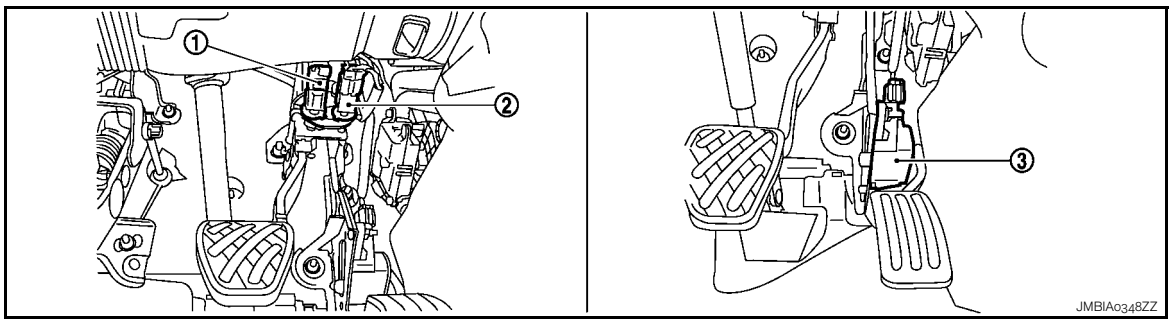
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

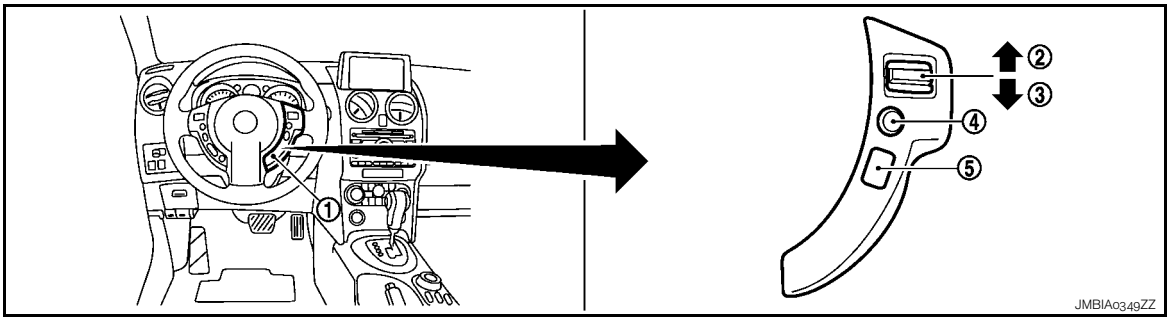


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096743

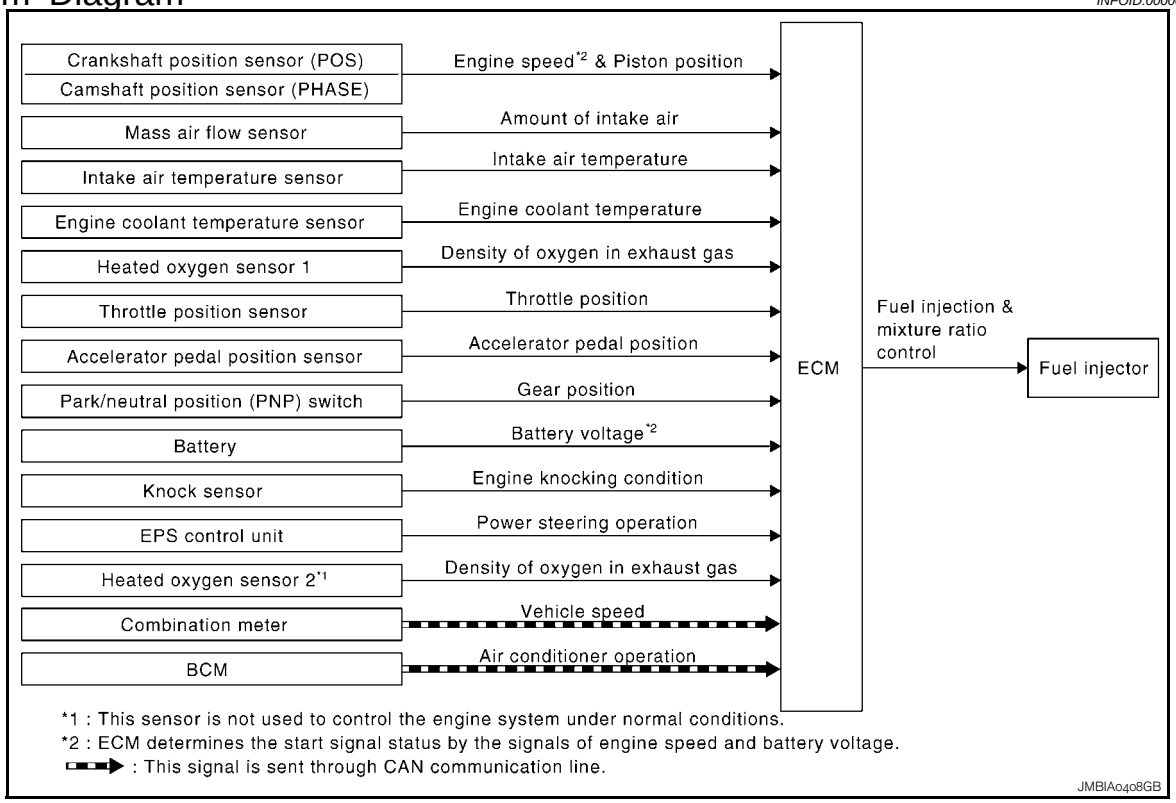
Component	Reference
Accelerator pedal position sensor	EC-539, "Description"
ASCD brake switch	EC-553, "Description"
ASCD steering switch	EC-263, "Description"
ASCD vehicle speed sensor	EC-272, "Description"
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Cooling fan motor	EC-558, "Description"
Electric throttle control actuator	EC-499, "Description"
Engine coolant temperature sensor	EC-461, "Description"
Fuel injector	EC-565, "Description"
Fuel pump	EC-568, "Description"
Heated oxygen sensor 1	EC-141, "Description"
Heated oxygen sensor 1 heater	EC-576, "Description"
Heated oxygen sensor 2	EC-475, "Description"
Heated oxygen sensor 2 heater	EC-583, "Description"
Ignition signal	EC-588, "Description"
Intake air temperature sensor	EC-586, "Description"
Intake valve timing control solenoid valve	EC-497, "Description"
Knock sensor	EC-483, "Description"
Mass air flow sensor	EC-456, "Description"
Park/neutral position switch	EC-533, "Description"
PCV valve	EC-594, "Description"
Refrigerant pressure sensor	EC-595, "Description"
Stop lamp switch	EC-536, "Description"
Throttle control motor	EC-508, "Description"
Throttle control motor relay	EC-505, "Description"
Throttle position sensor	EC-464, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001096744



System Description

INFOID:0000000001096745

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
BCM*2	Air conditioner operation		
Combination meter*2	Vehicle speed		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

cardiagn.com

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

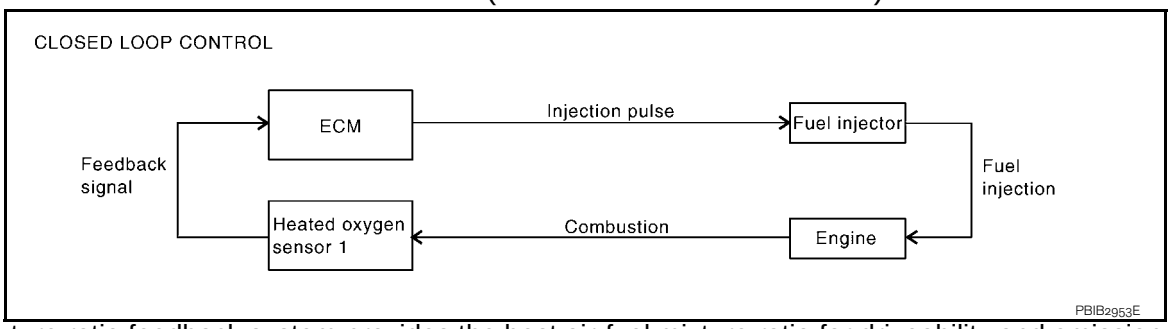
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-141, "DTC Logic". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

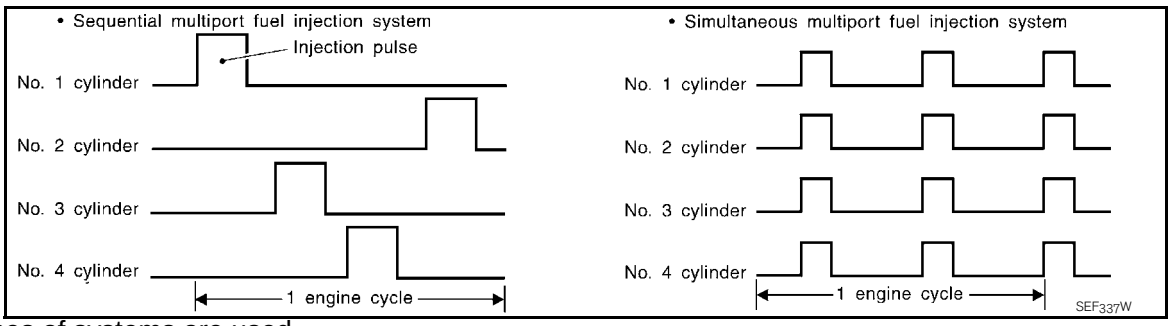
MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

cardiagn.com

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

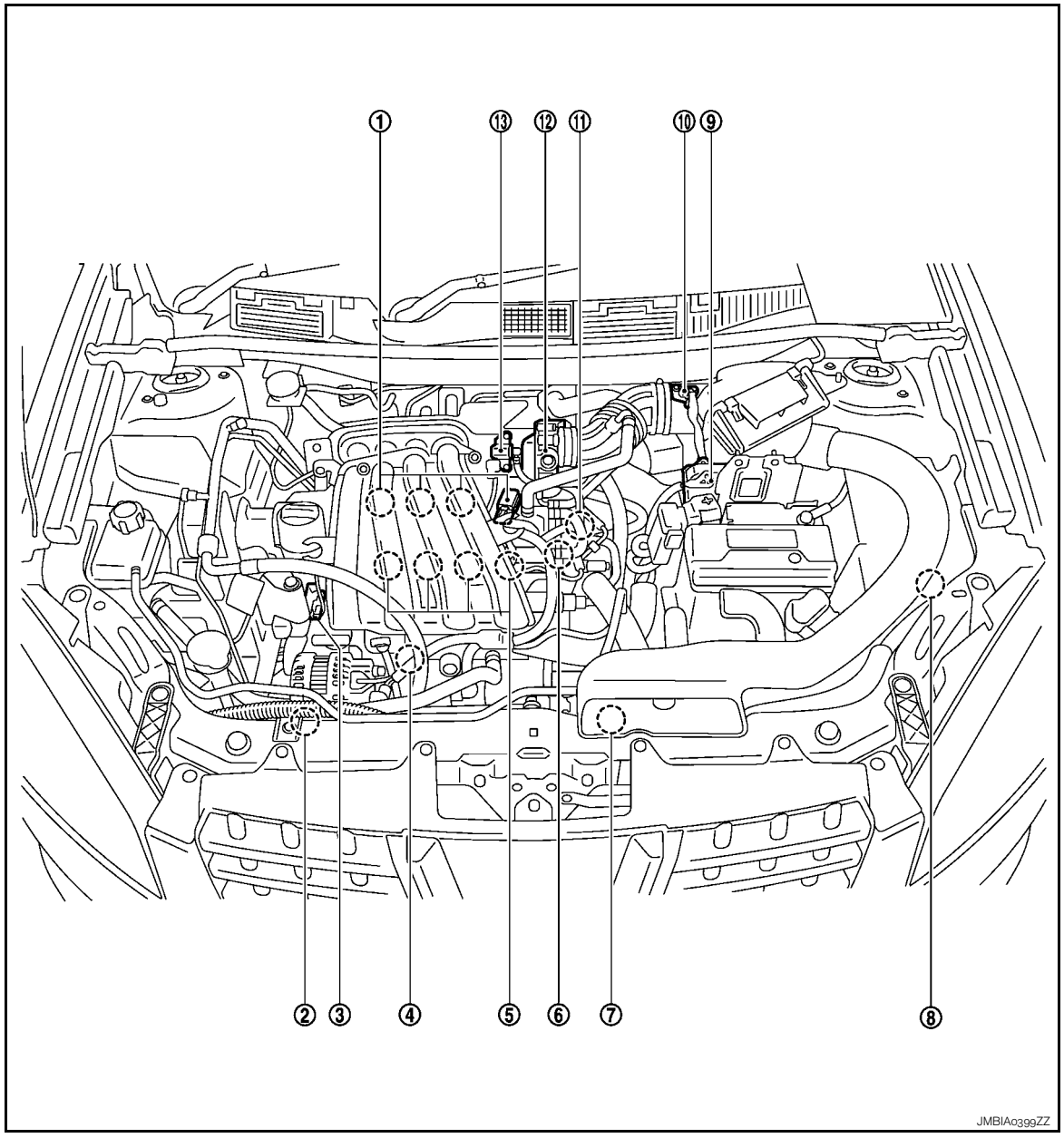
FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Component Parts Location

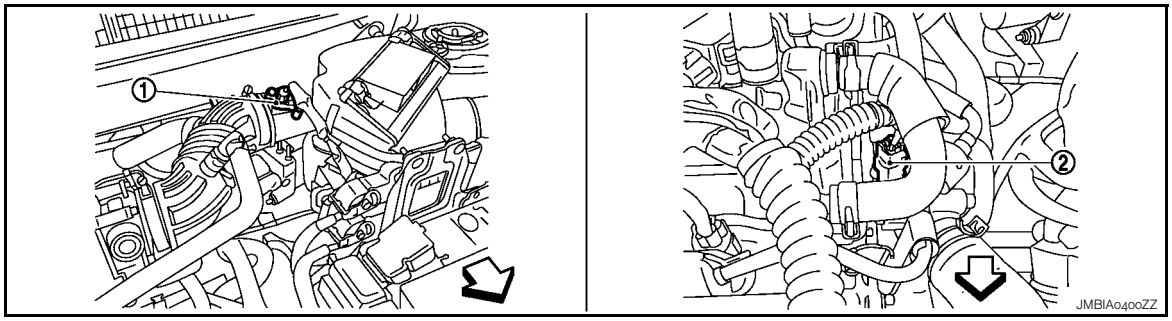
INFOID:0000000001096746

cardiagn.com



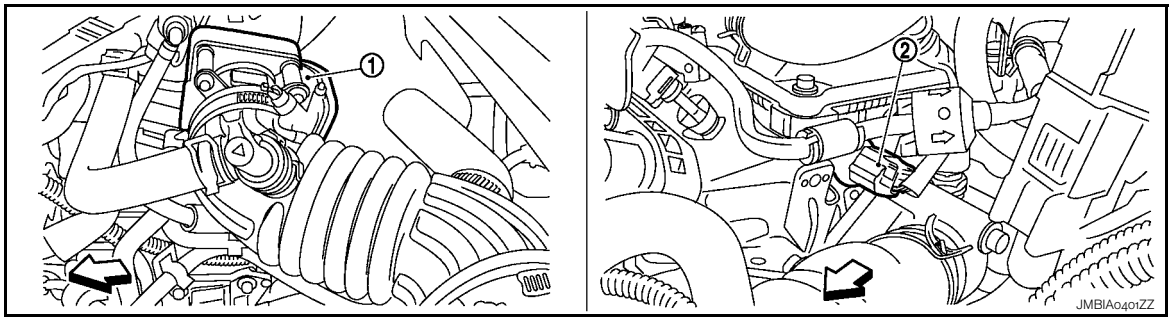
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



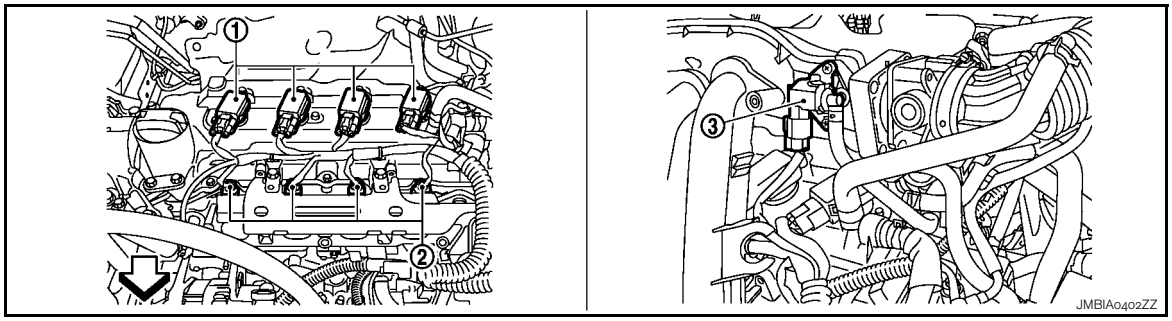
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



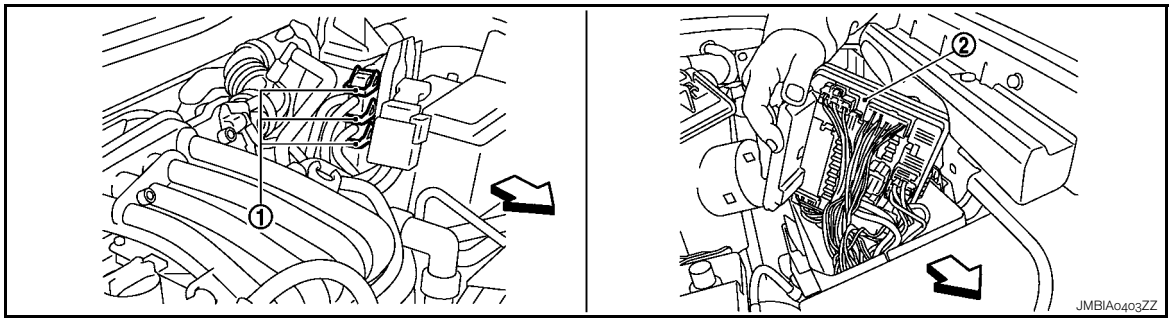
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

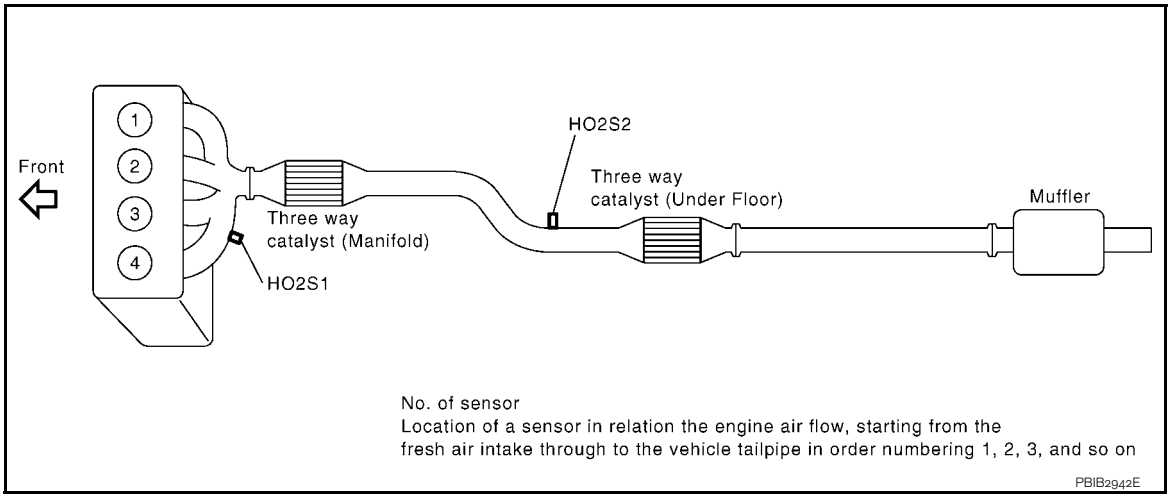
⇦ Vehicle front

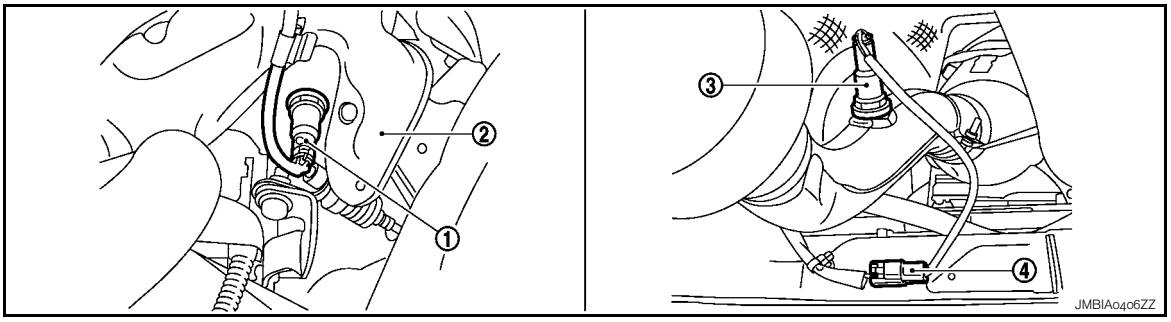


1. ECM harness connector
2. IPDM E/R

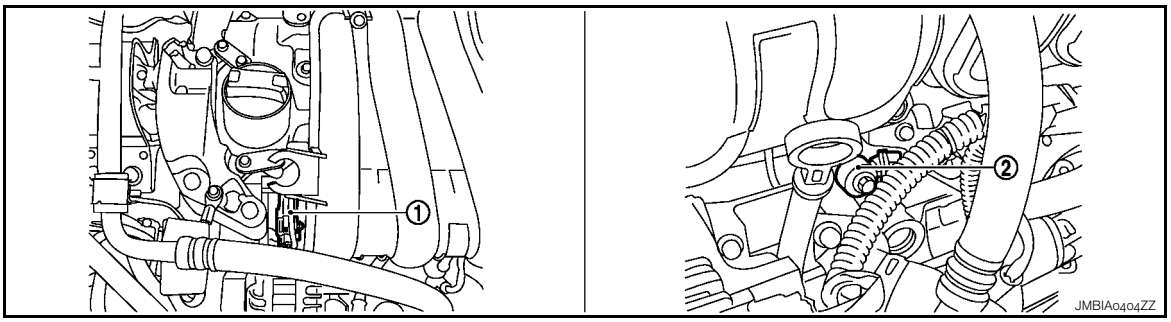
⇦ Vehicle front

cardiagn.com

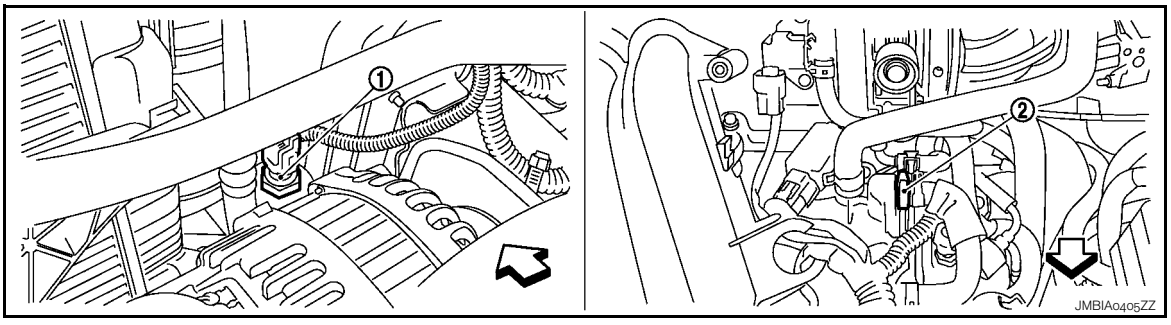




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



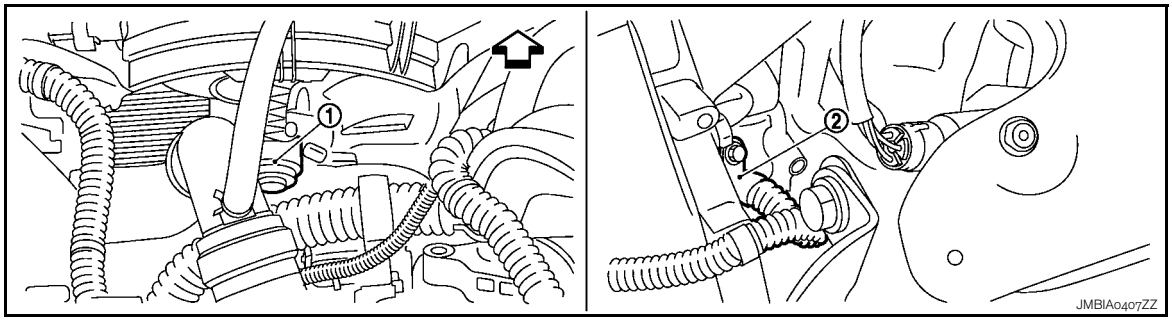
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

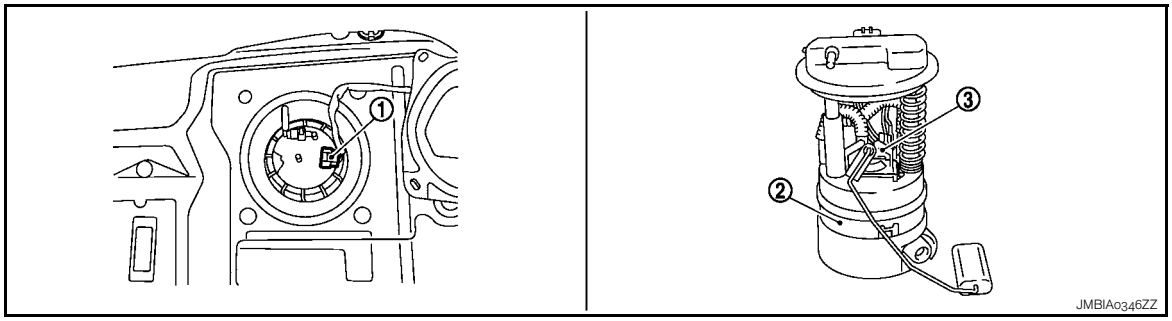
⇦ Vehicle front

cardiagn.com

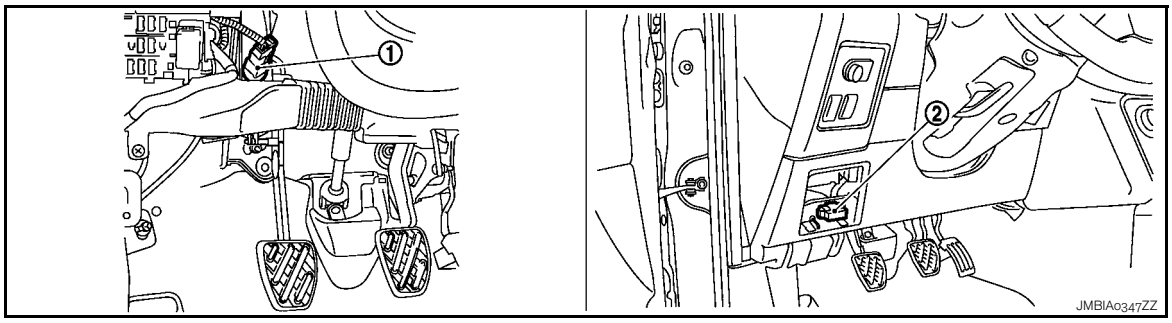


1. Cooling fan motor
2. Crankshaft position sensor (POS)

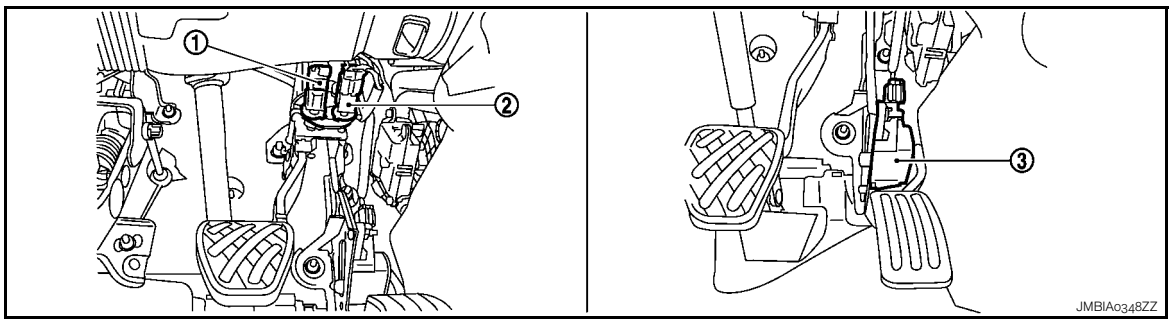
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

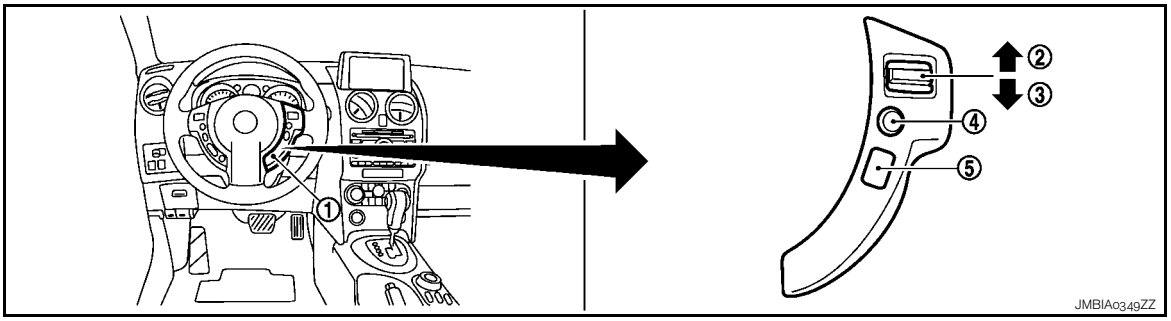


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096747

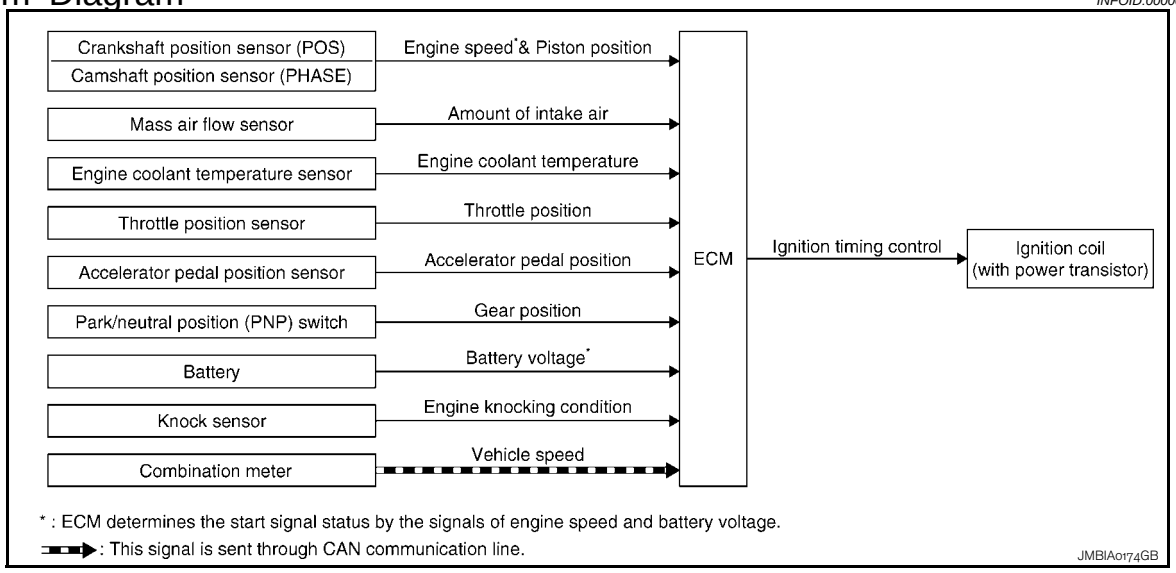
Component	Reference
Accelerator pedal position sensor	EC-539, "Description"
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Engine coolant temperature sensor	EC-461, "Description"
Fuel injector	EC-565, "Description"
Heated oxygen sensor 1	EC-141, "Description"
Heated oxygen sensor 2	EC-583, "Description"
Intake air temperature sensor	EC-586, "Description"
Knock sensor	EC-483, "Description"
Mass air flow sensor	EC-456, "Description"
Park/neutral position (PNP) switch	EC-533, "Description"
Throttle position sensor	EC-464, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001096748



System Description

INFOID:0000000001096749

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

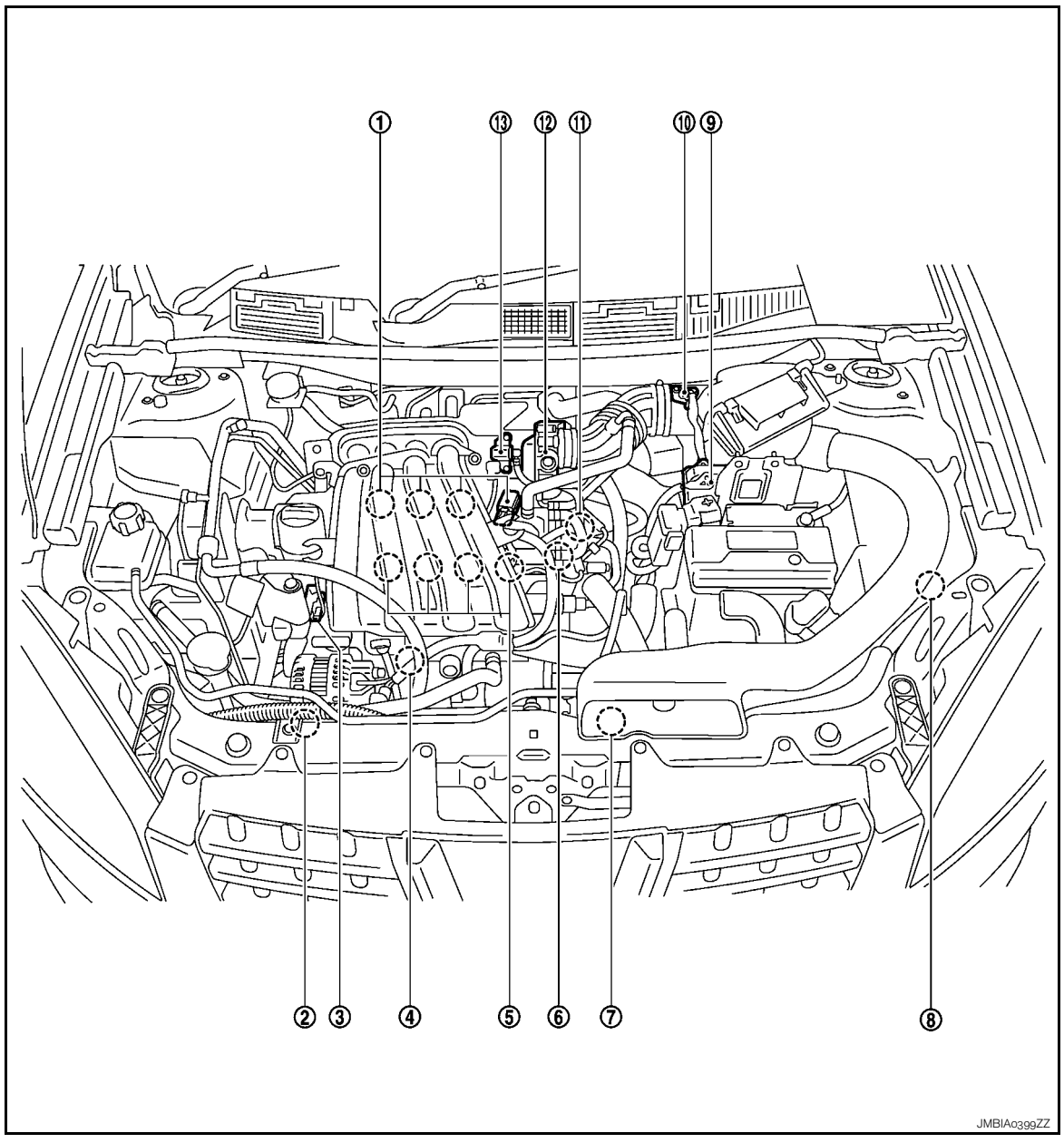
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

cardiagn.com

operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

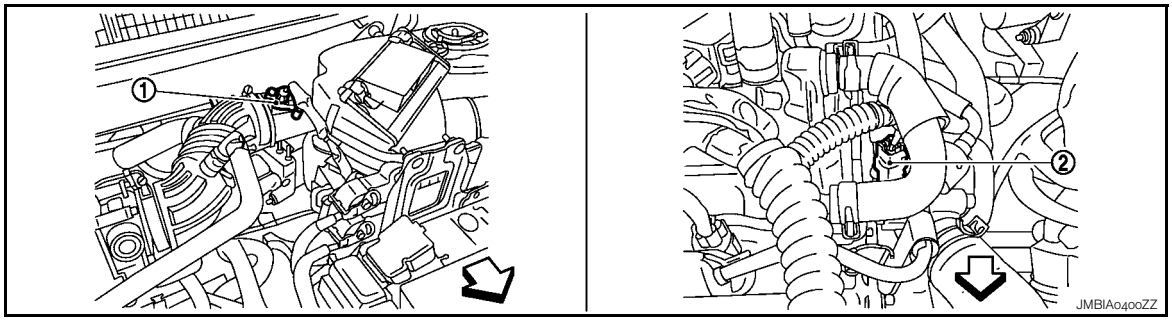
Component Parts Location

INFOID:0000000001096750



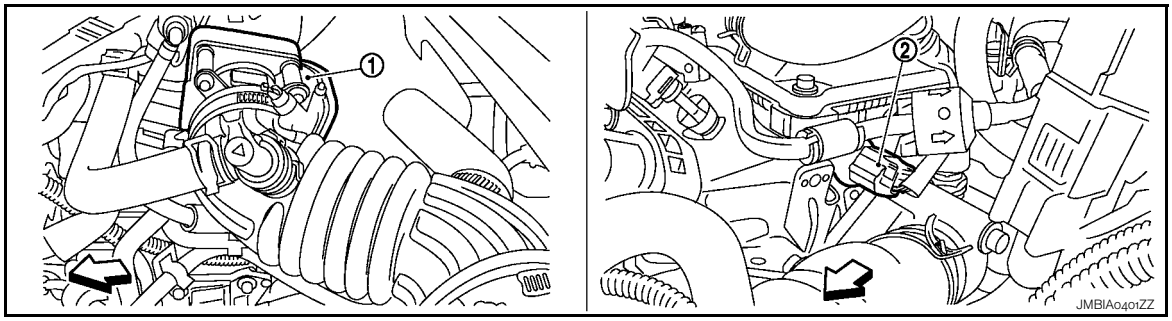
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



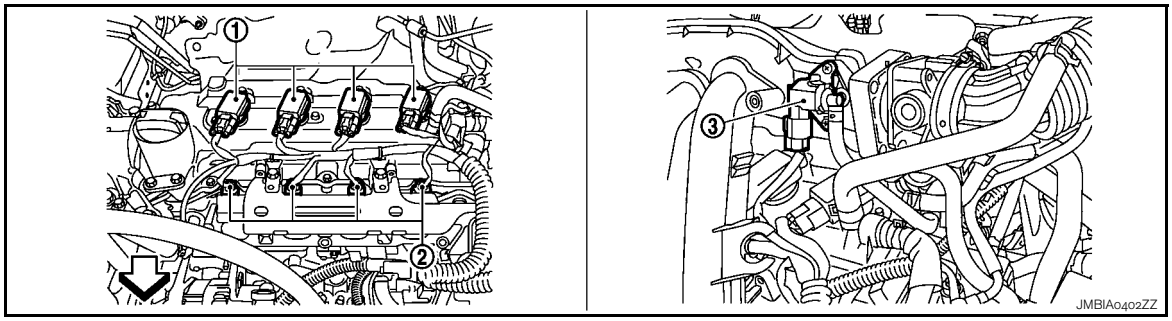
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



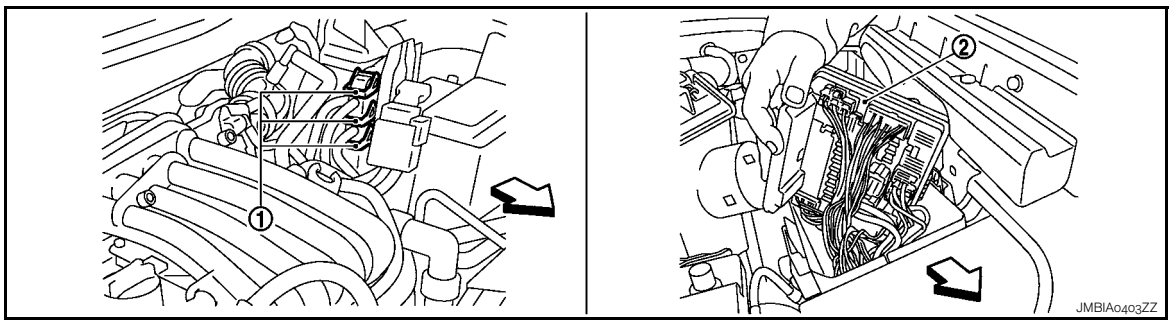
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

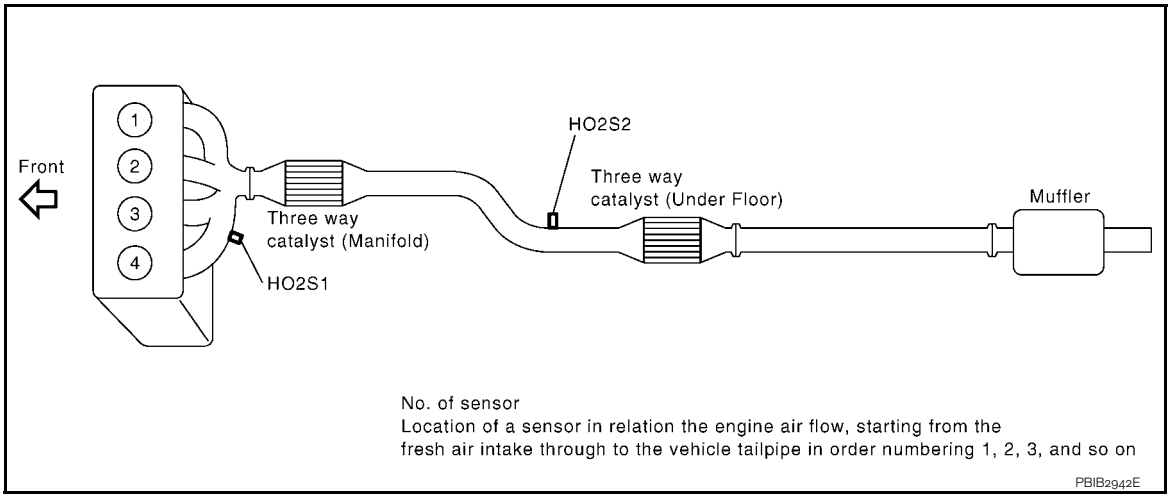
⇦ Vehicle front

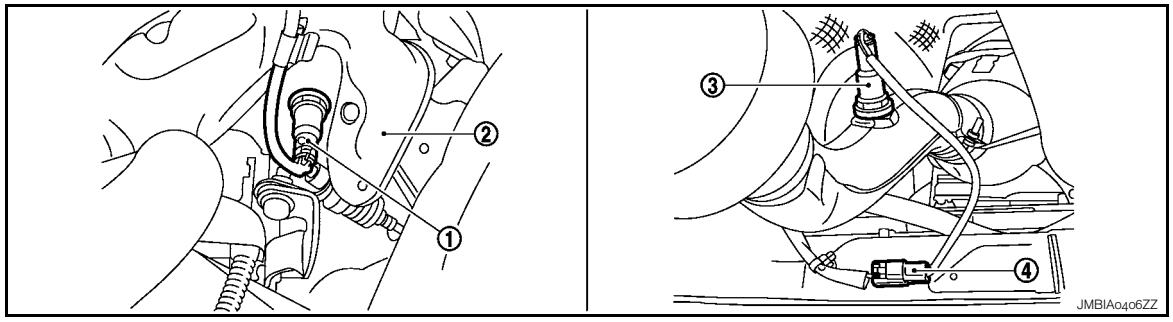


1. ECM harness connector
2. IPDM E/R

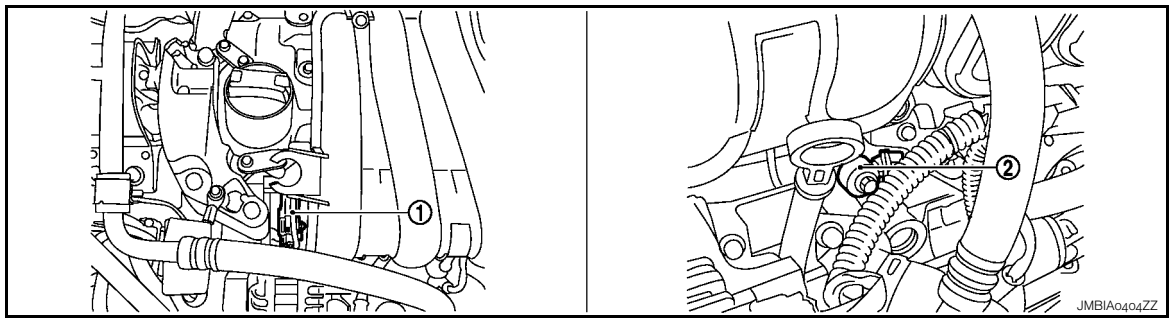
⇦ Vehicle front

cardiagn.com

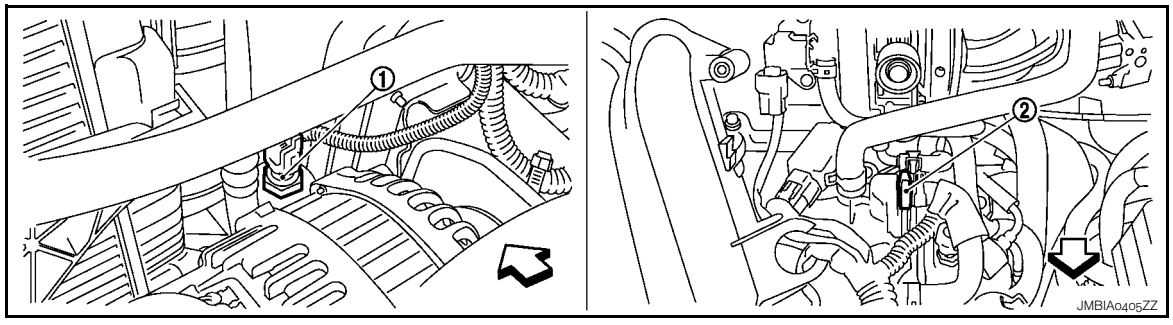




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



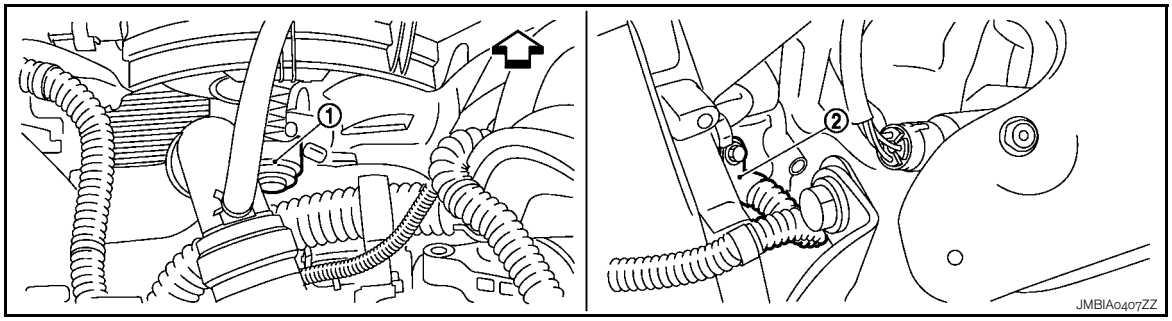
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

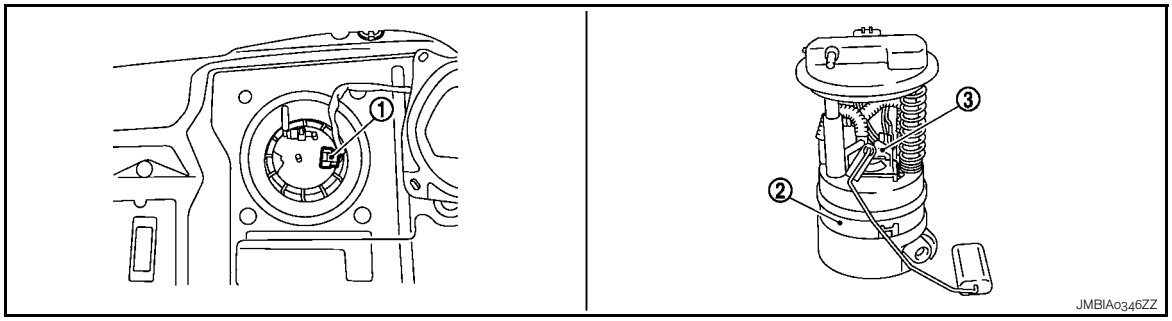
⇦ Vehicle front

cardiagn.com

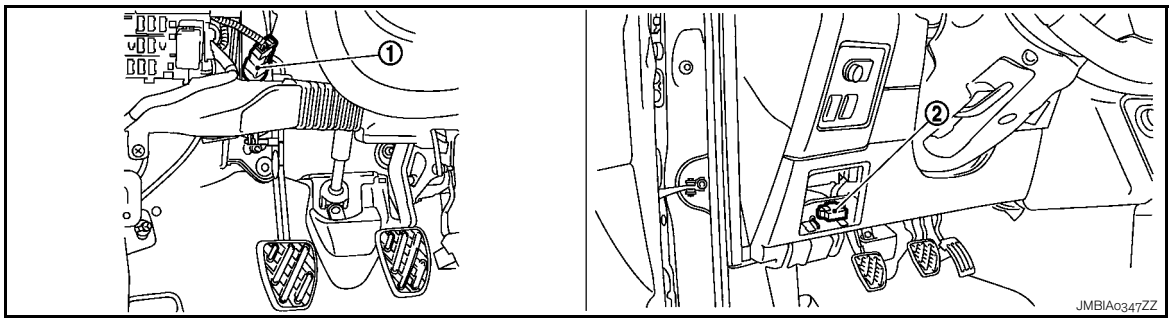


1. Cooling fan motor
2. Crankshaft position sensor (POS)

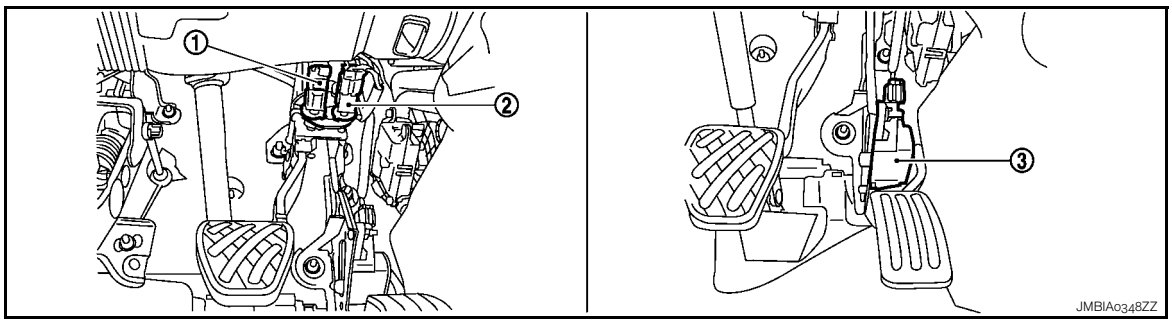
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

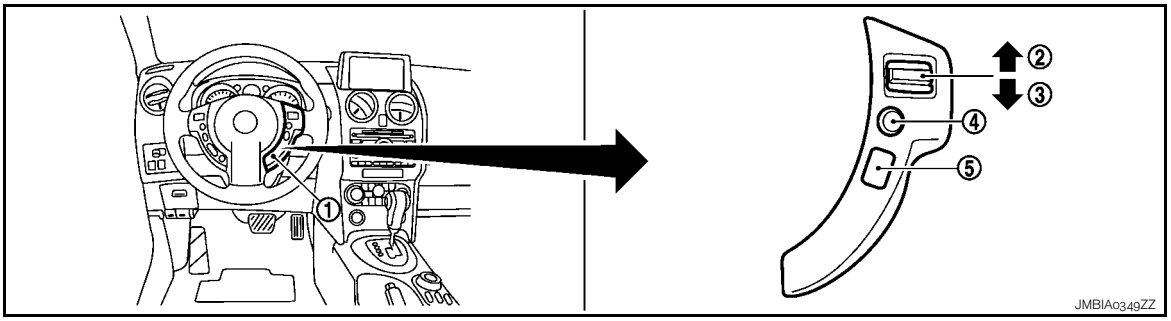


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096751

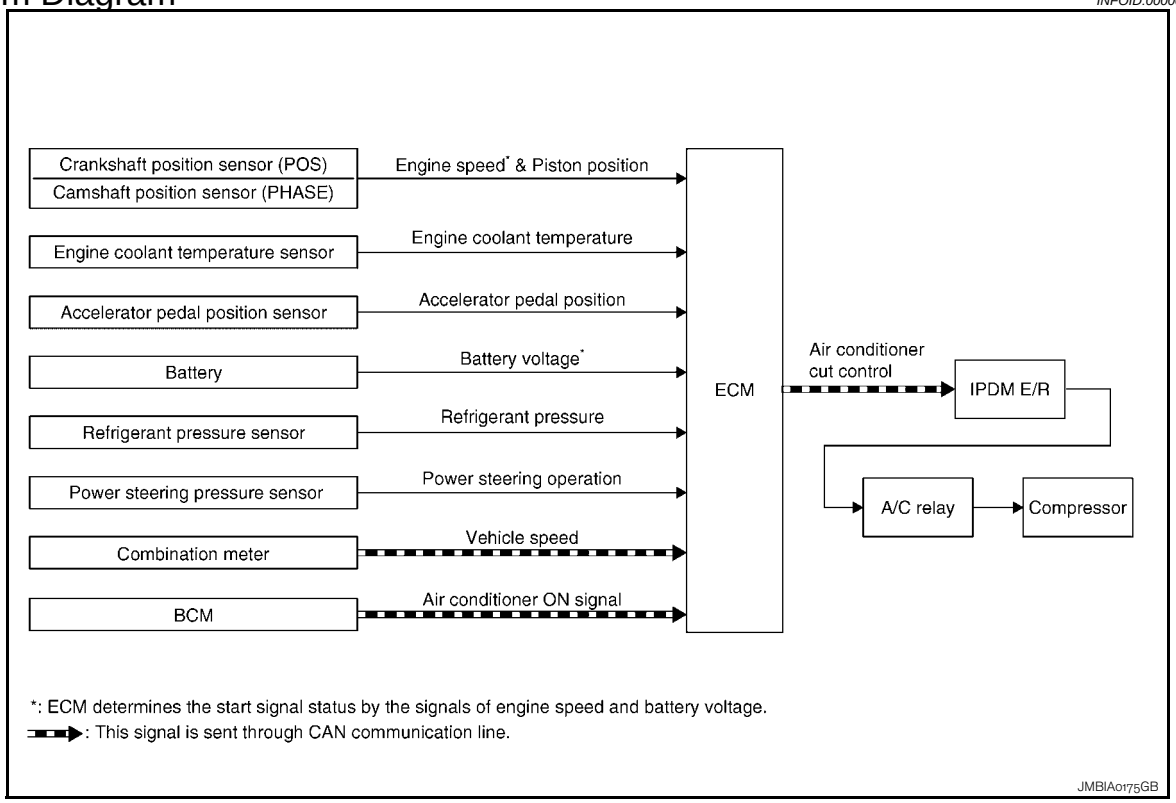
Component	Reference
Accelerator pedal position sensor	EC-539, "Description"
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Engine coolant temperature sensor	EC-461, "Description"
Ignition signal	EC-588, "Description"
Knock sensor	EC-483, "Description"
Mass air flow sensor	EC-127, "Description"
Park/neutral position (PNP) switch	EC-274, "Description"
Throttle position sensor	EC-464, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001096752



System Description

INFOID:0000000001096753

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
BCM*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

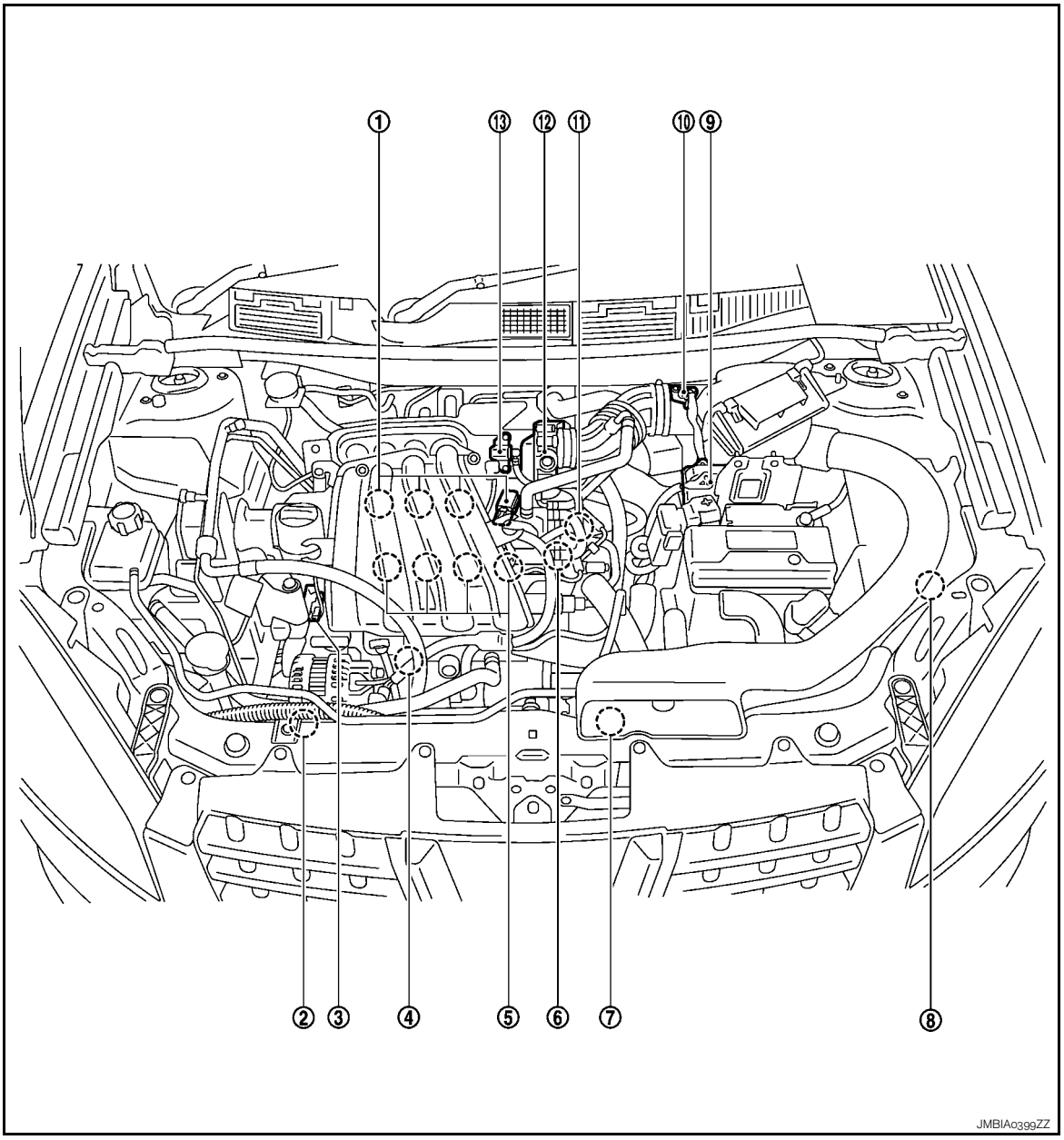
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

cardiagn.com

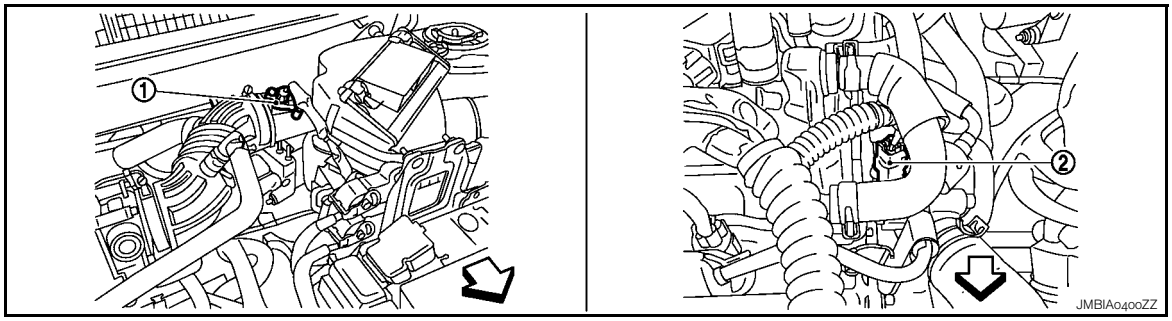
Component Parts Location

INFOID:0000000001096754



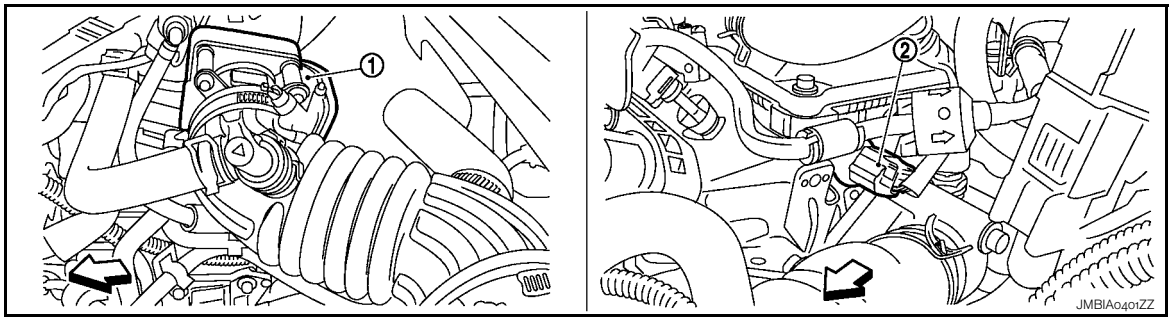
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



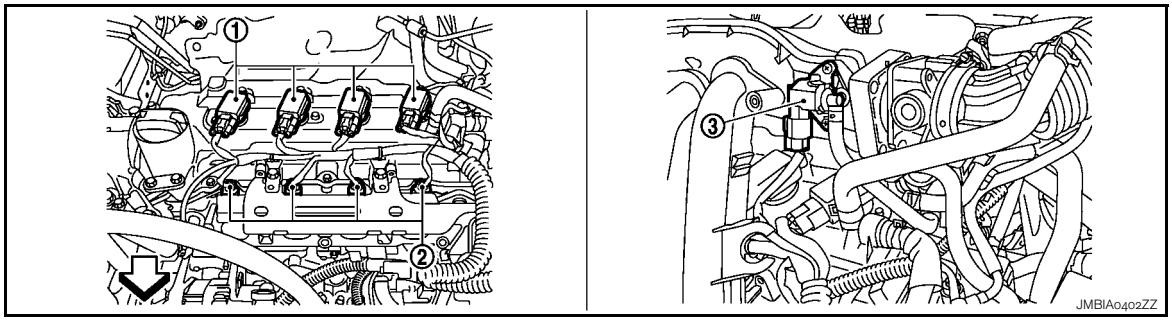
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



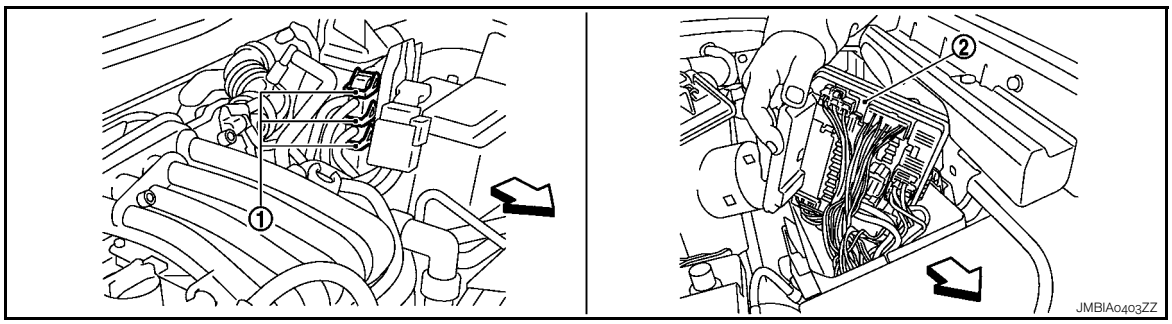
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

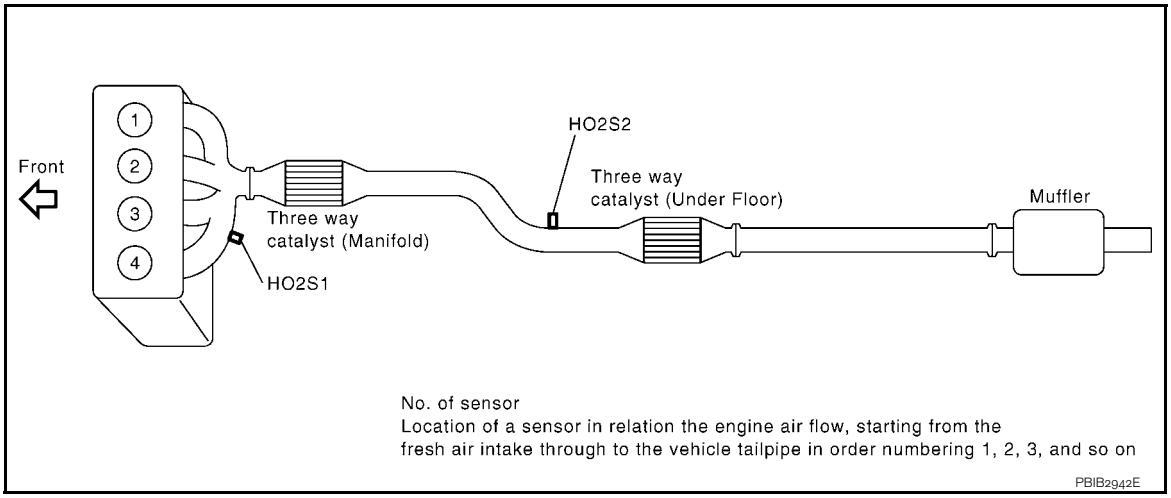
⇦ Vehicle front

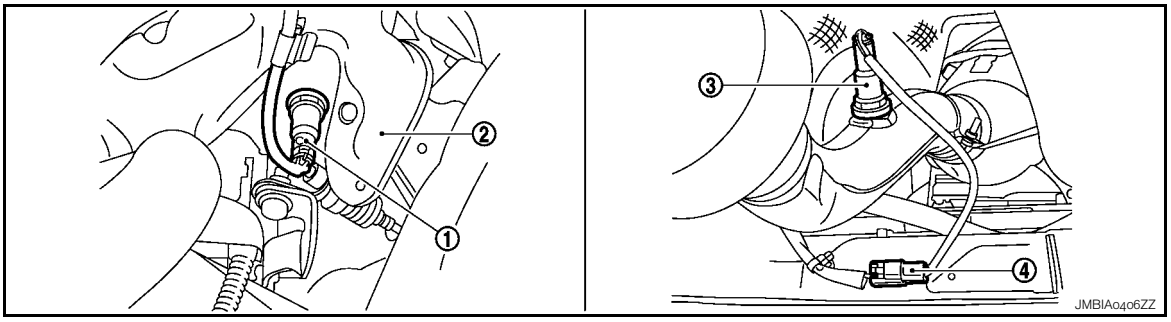


1. ECM harness connector
2. IPDM E/R

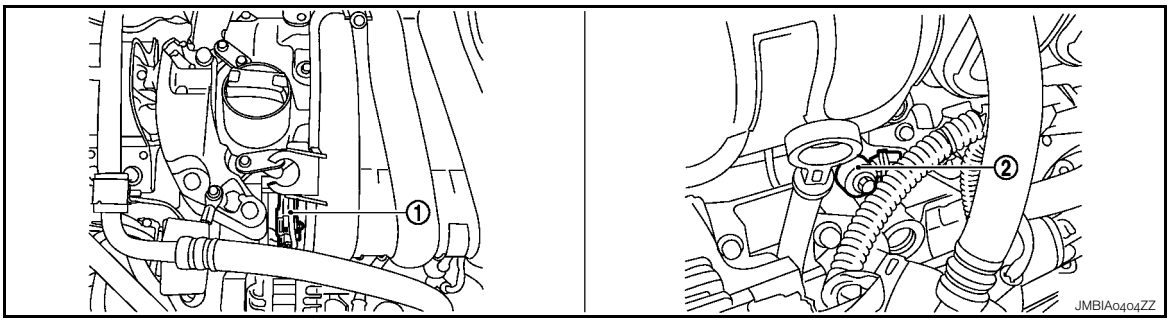
⇦ Vehicle front

cardiagn.com

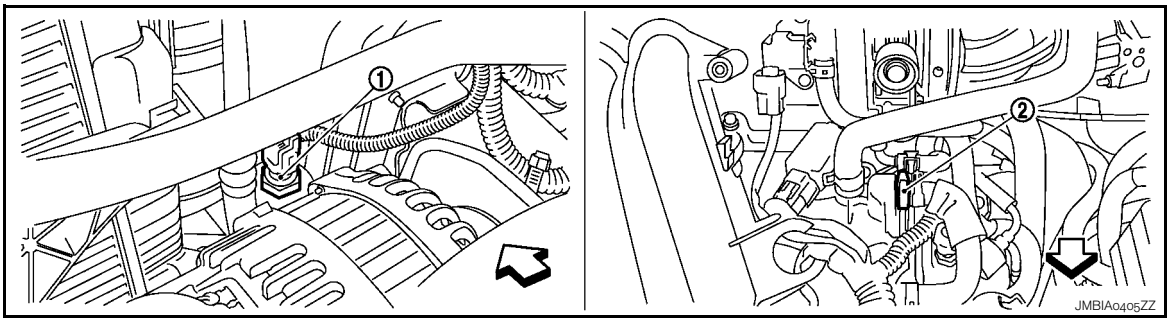




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



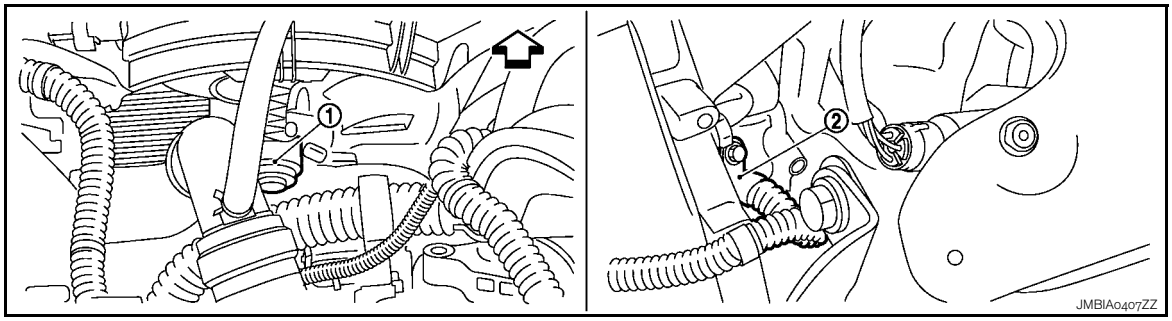
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

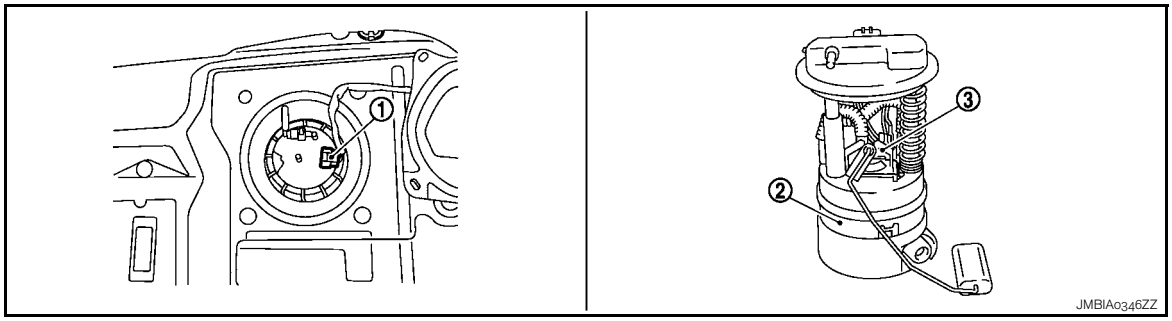
⇦ Vehicle front

cardiagn.com

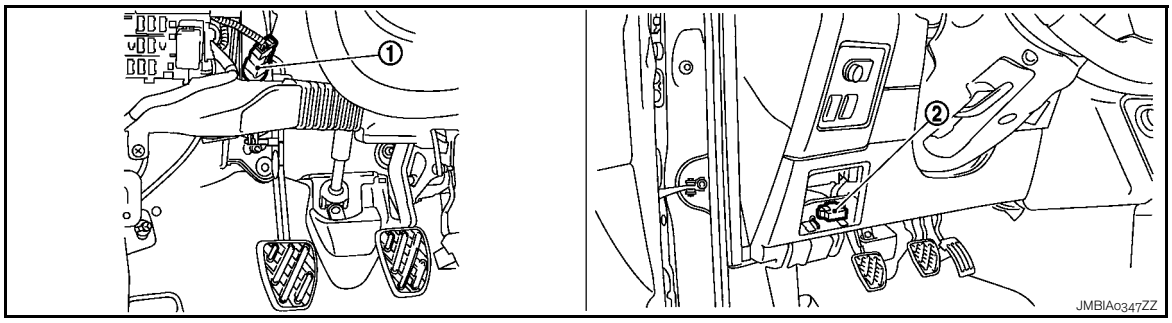


1. Cooling fan motor
2. Crankshaft position sensor (POS)

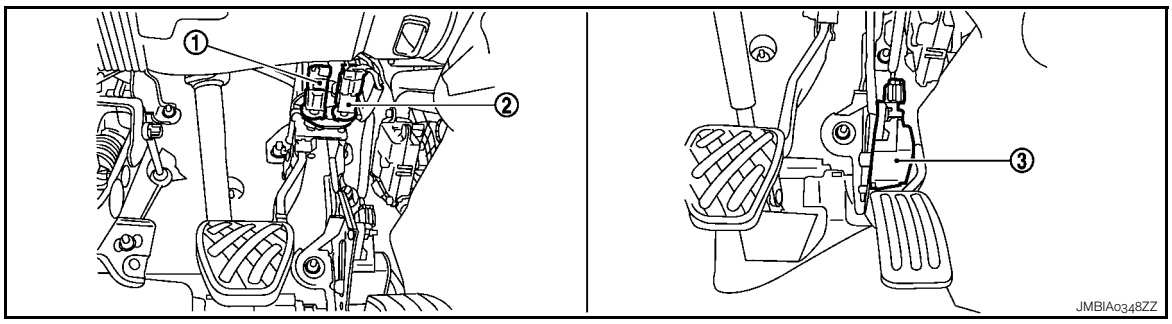
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

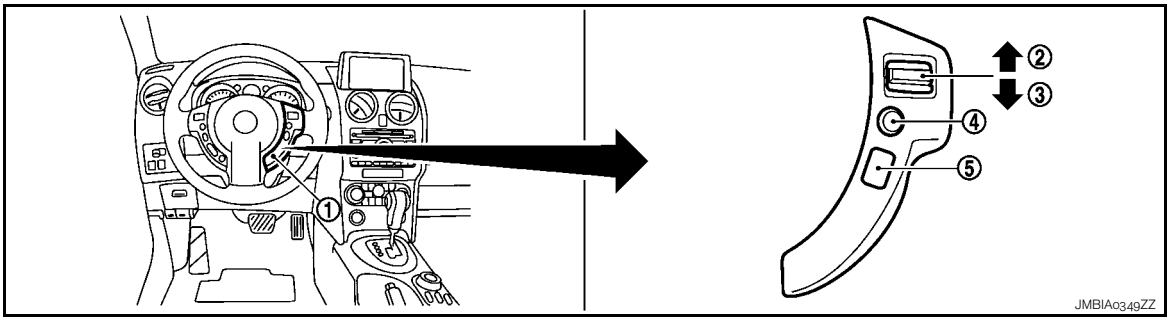


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096755

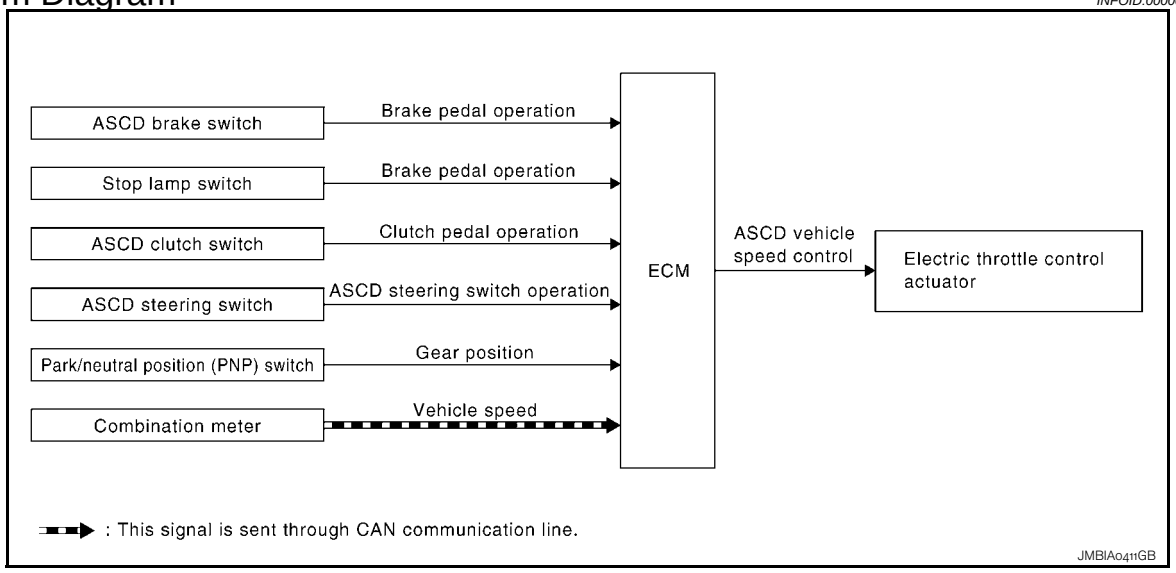
Component	Reference
Accelerator pedal position sensor	EC-539, "Description"
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Engine coolant temperature sensor	EC-461, "Description"
EPS contro unit	STC-4, "System Description"
Refrigerant pressure sensor	EC-595, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001096756



System Description

INFOID:0000000001096757

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch			
ASCD clutch switch	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position switch	Gear position		
Combination meter*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed

cardiagn.com

- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position.
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

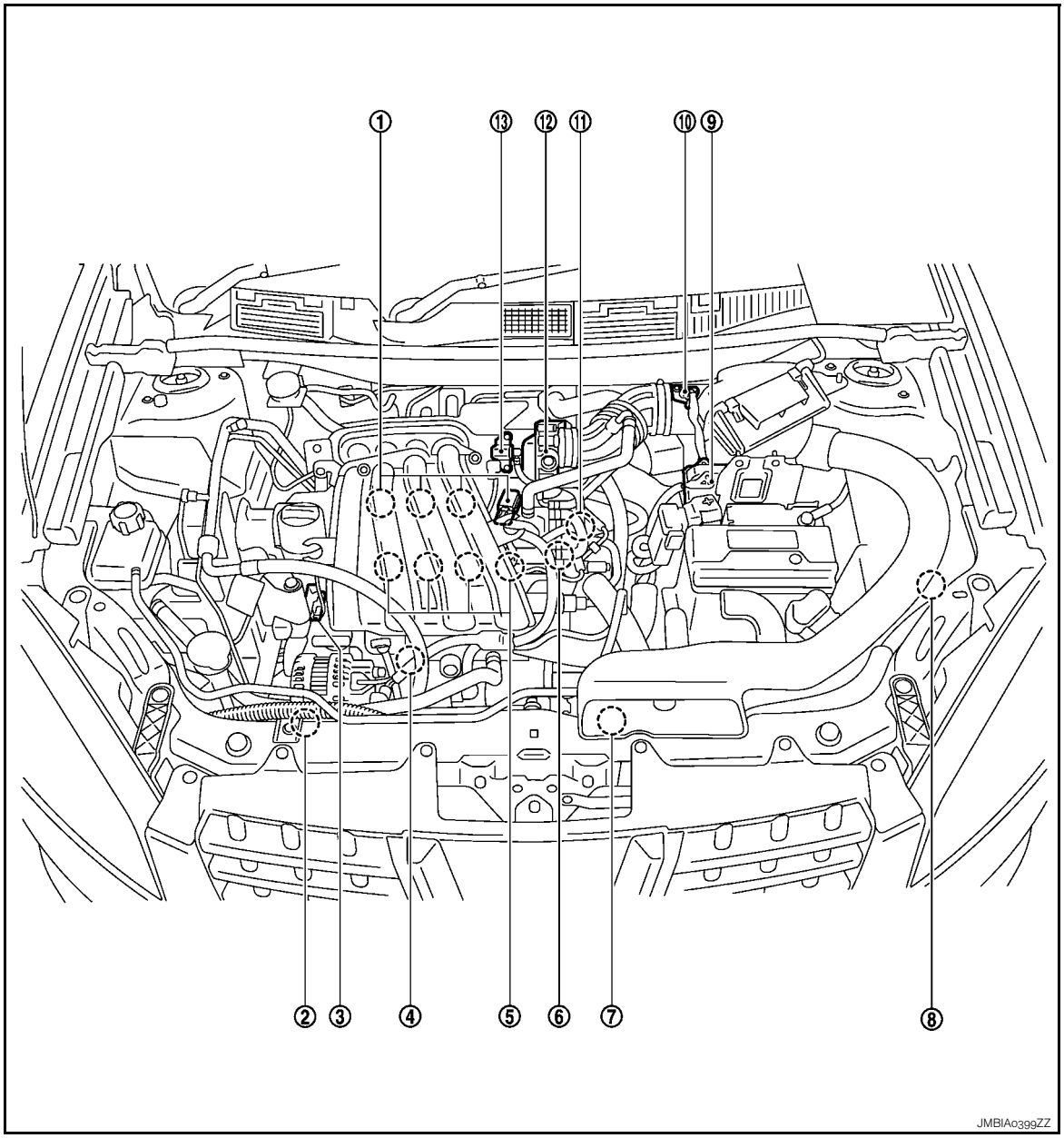
When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180km/h (112 MPH)

Component Parts Location

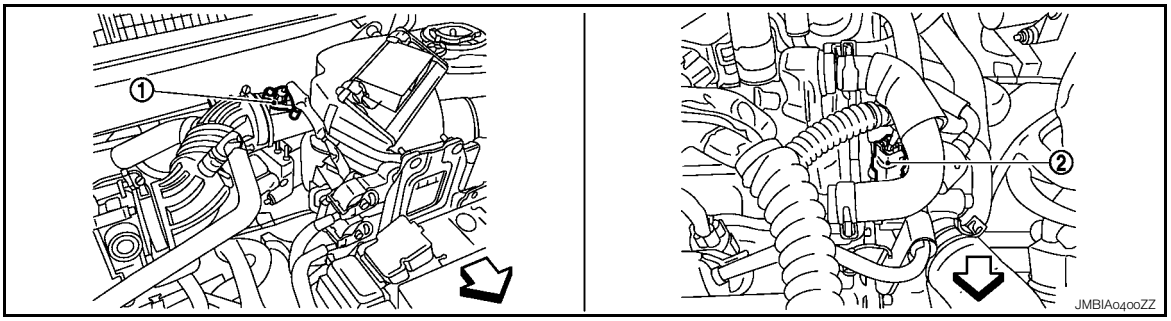
INFOID:0000000001096758

cardiagn.com



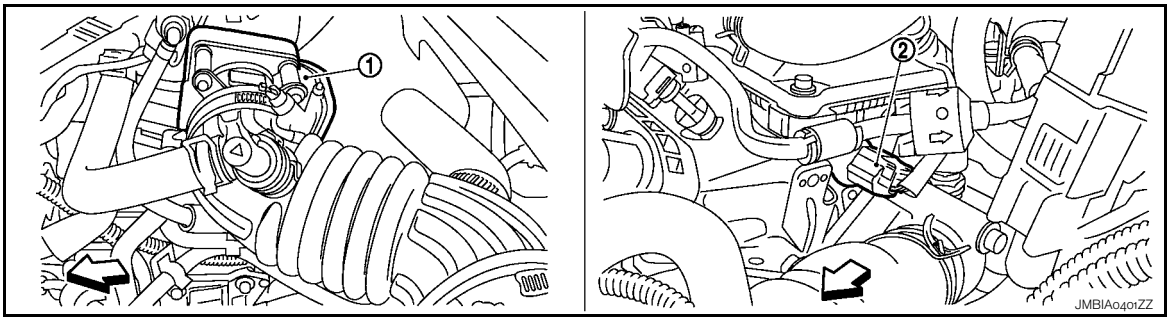
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



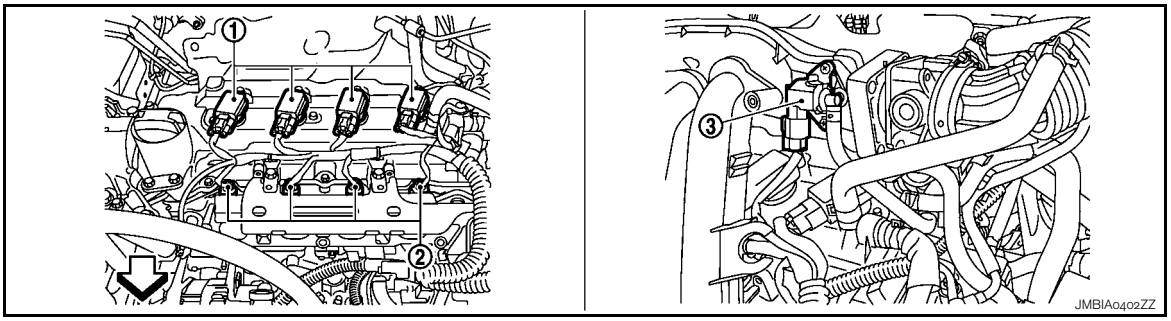
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



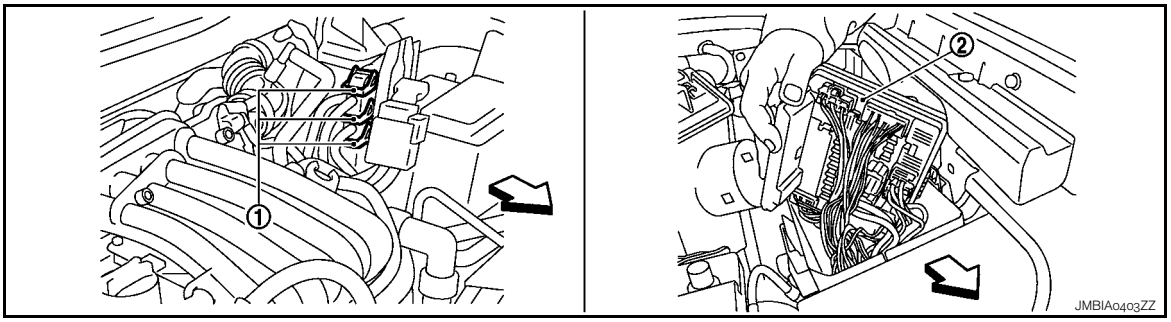
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

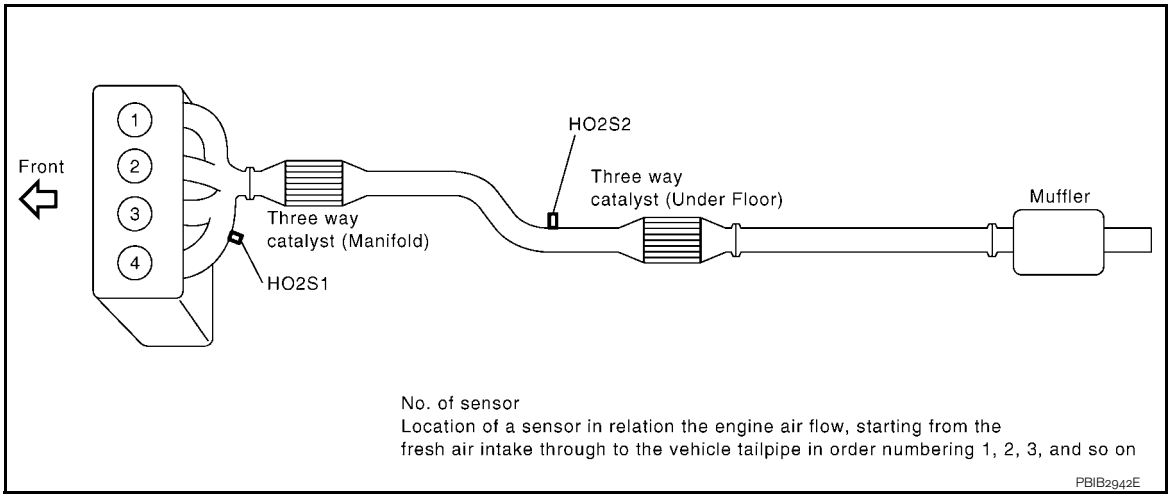
⇦ Vehicle front

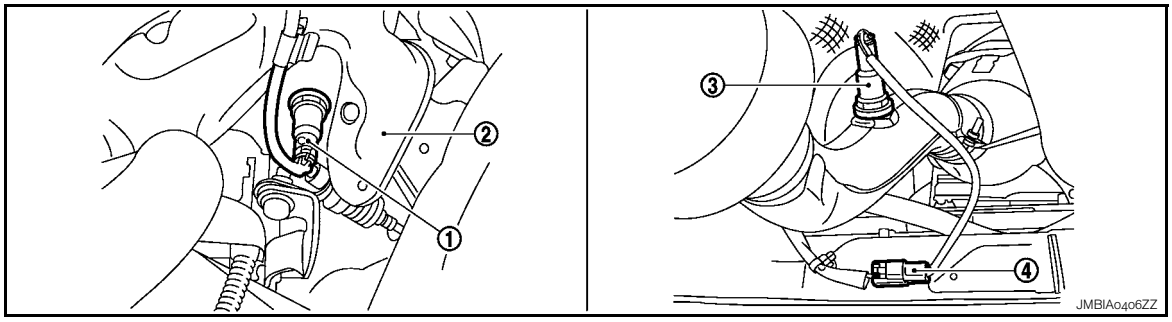


1. ECM harness connector
2. IPDM E/R

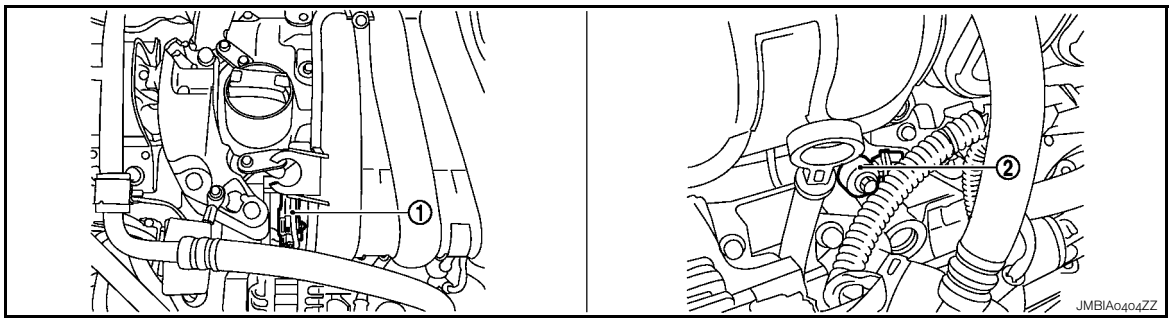
⇦ Vehicle front

cardiagn.com

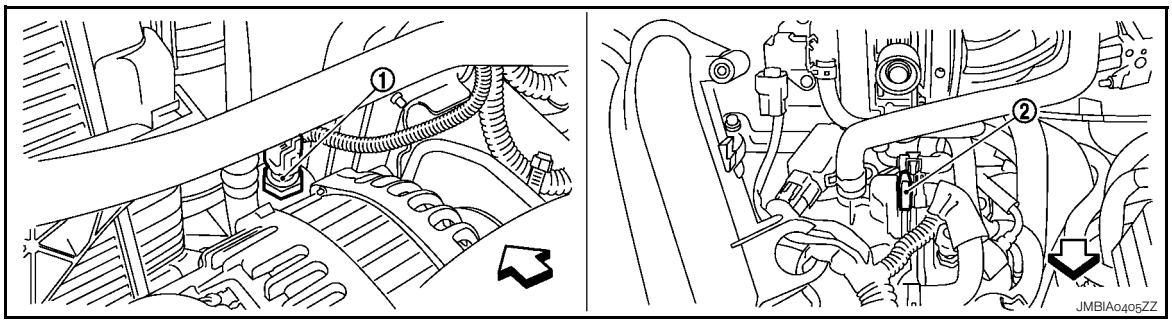




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



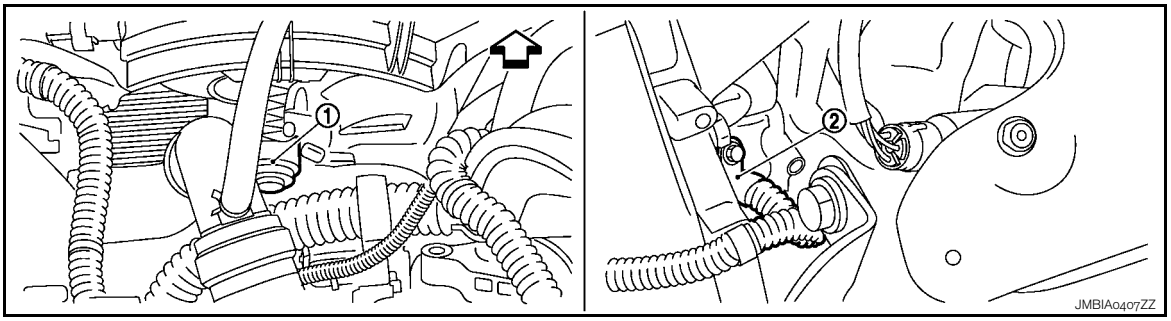
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

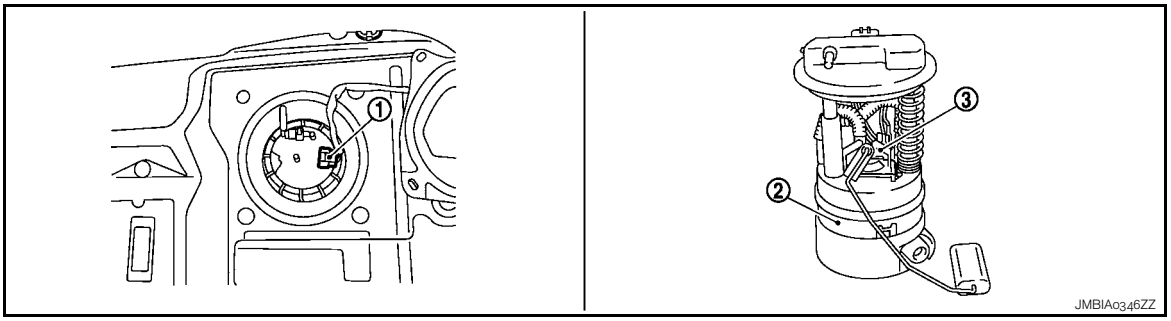
⇦ Vehicle front

cardiagn.com

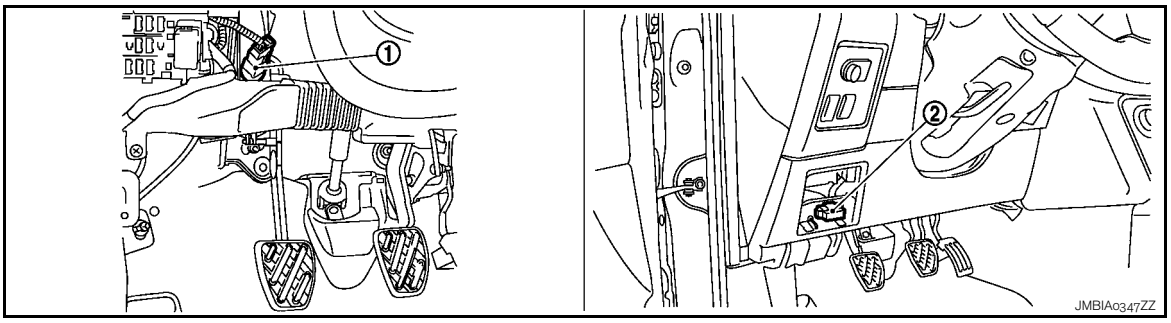


1. Cooling fan motor
2. Crankshaft position sensor (POS)

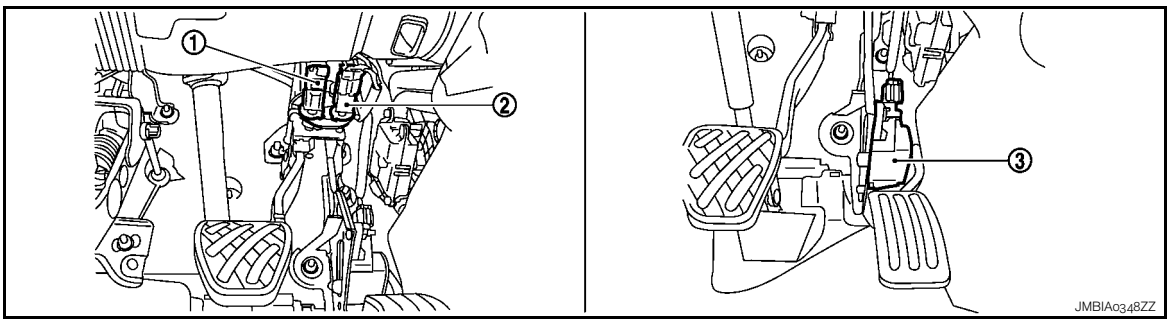
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

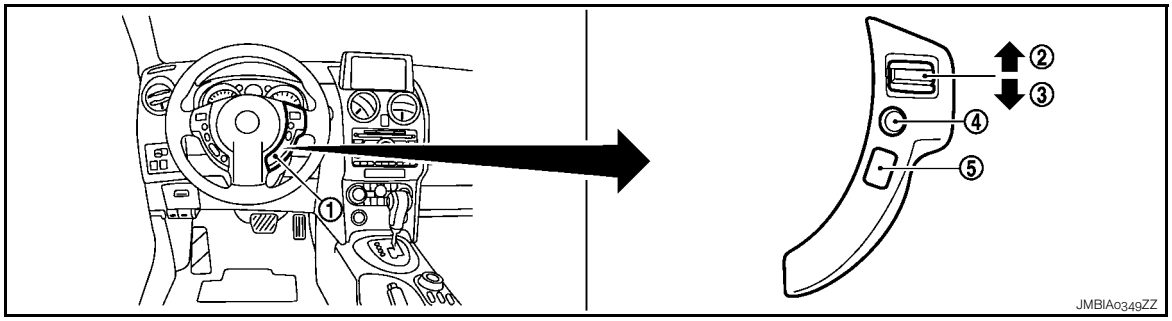


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096759

Component	Reference
ASCD steering switch	EC-263, "Description"
ASCD clutch switch	EC-553, "Description"
ASCD brake switch	EC-294, "Description"
ASCD indicator	EC-557, "Description"
Stop lamp switch	EC-536, "Description"
Electric throttle control actuator	EC-499, "Description"

cardiagn.com

CAN COMMUNICATION

System Description

INFOID:0000000001096760

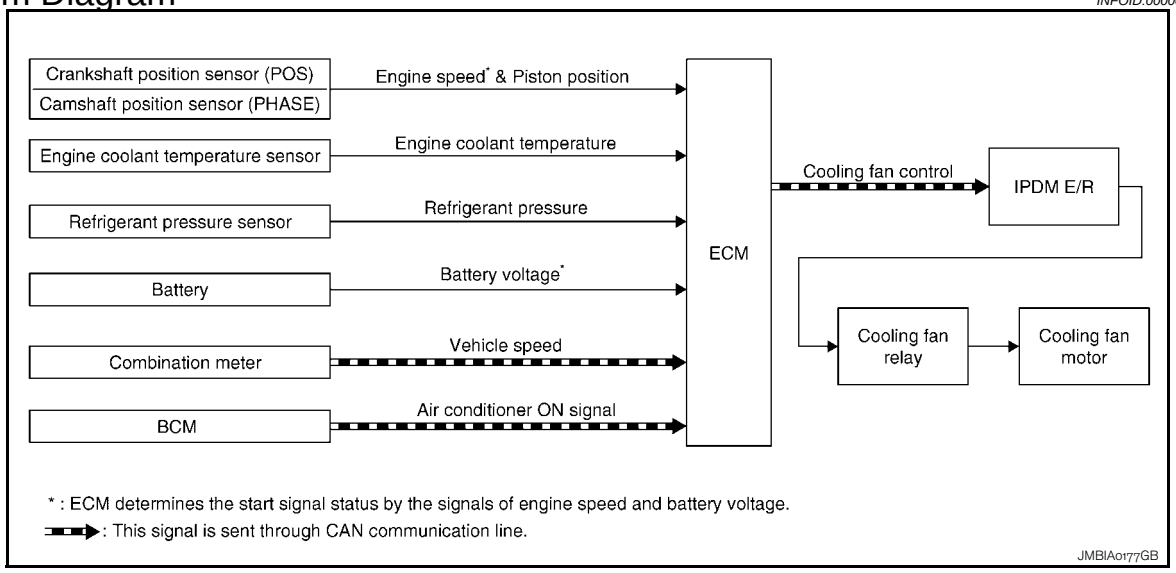
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-59, "CAN Communication Signal Chart", about CAN communication for detail.

cardiagn.com

COOLING FAN CONTROL

System Diagram

INFOID:0000000001096761



System Description

INFOID:0000000001096762

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

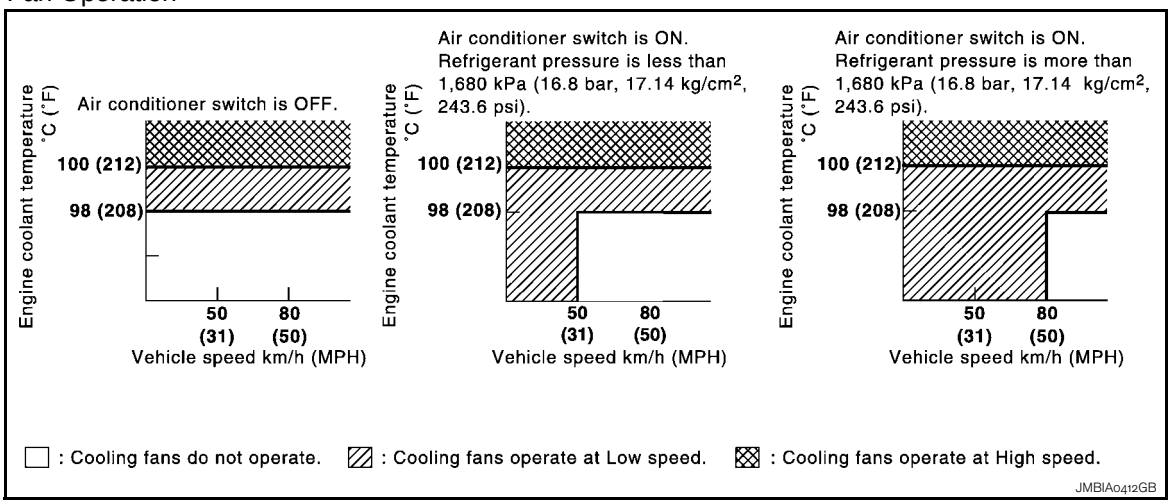
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation



cardiagn.com

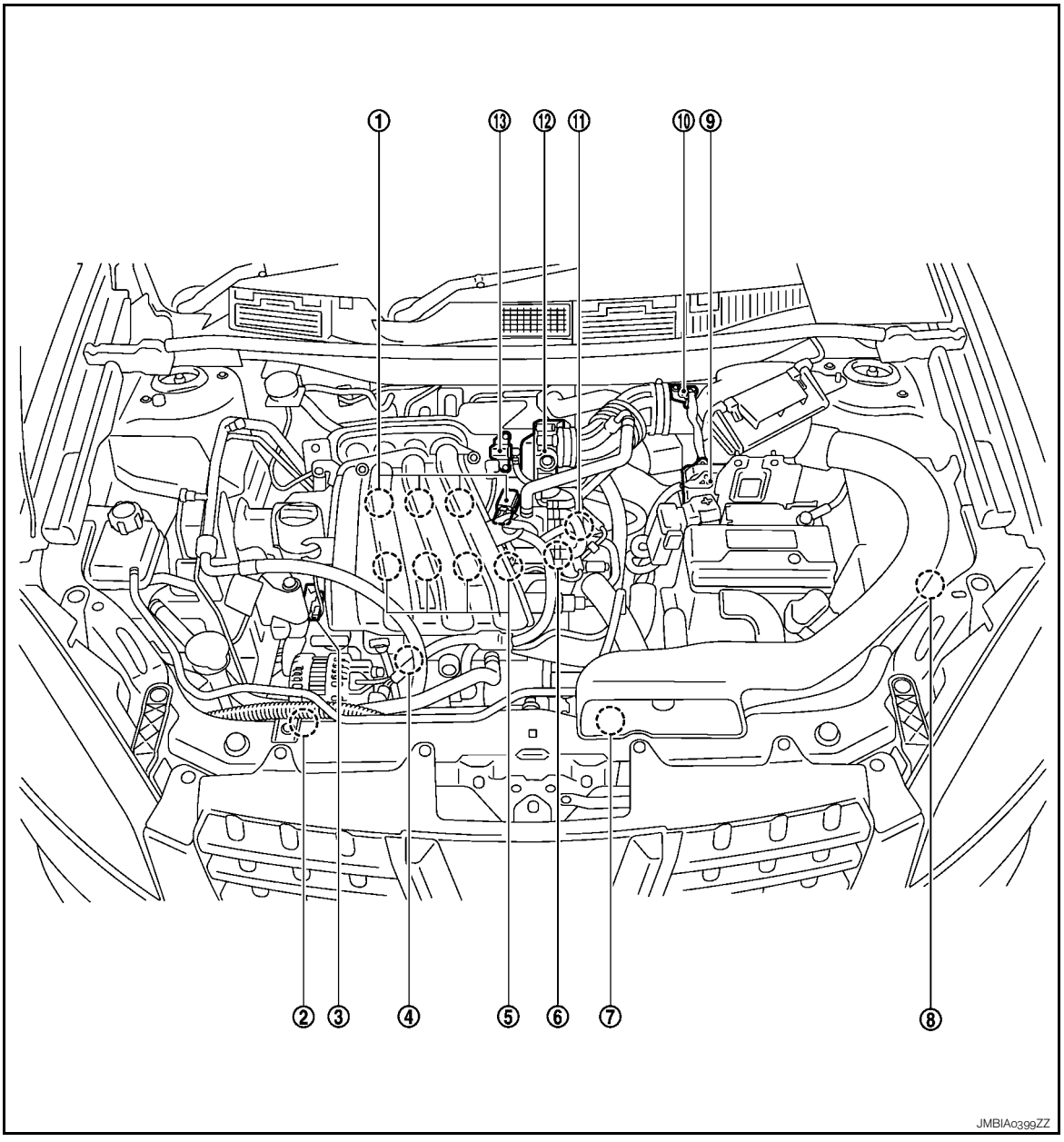
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	3
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

Component Parts Location

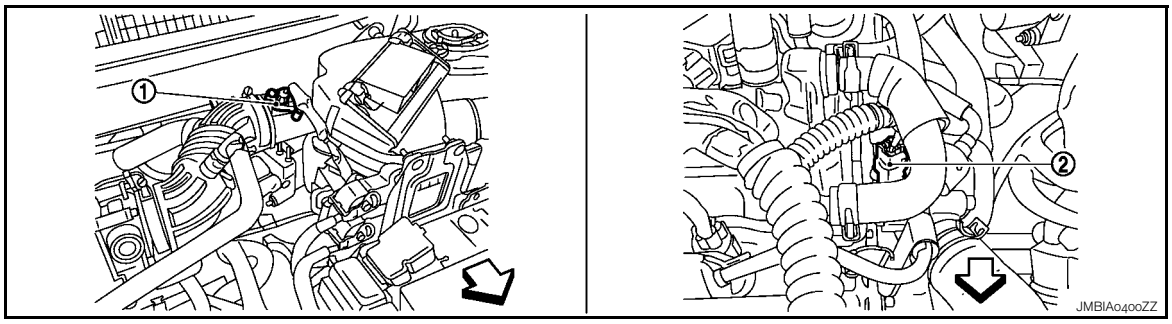
INFOID:0000000001096763



1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM

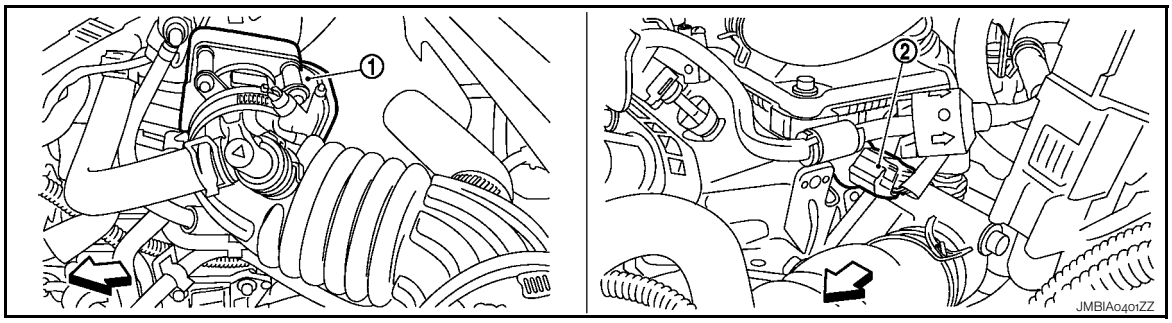
cardiagn.com

10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve



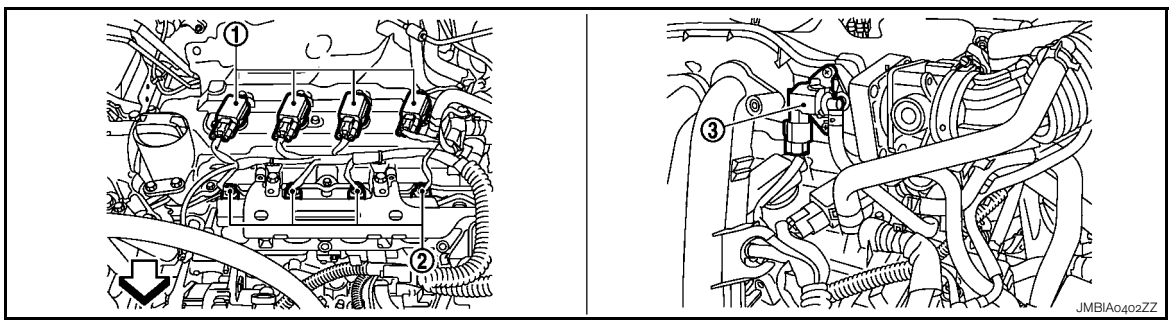
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

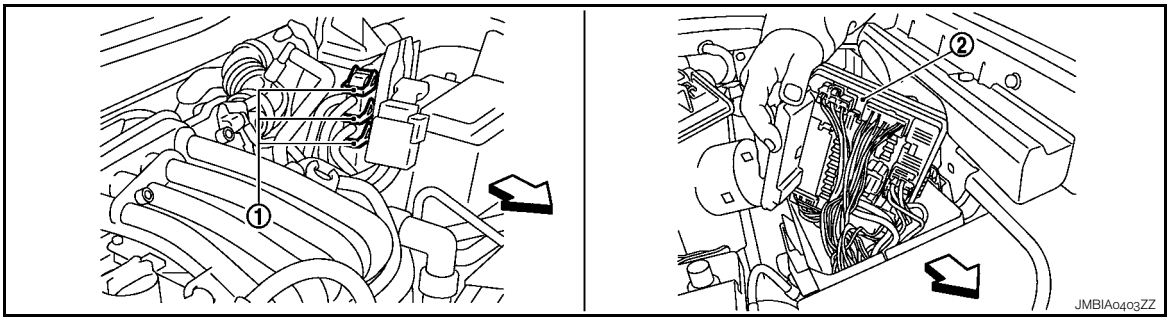
⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

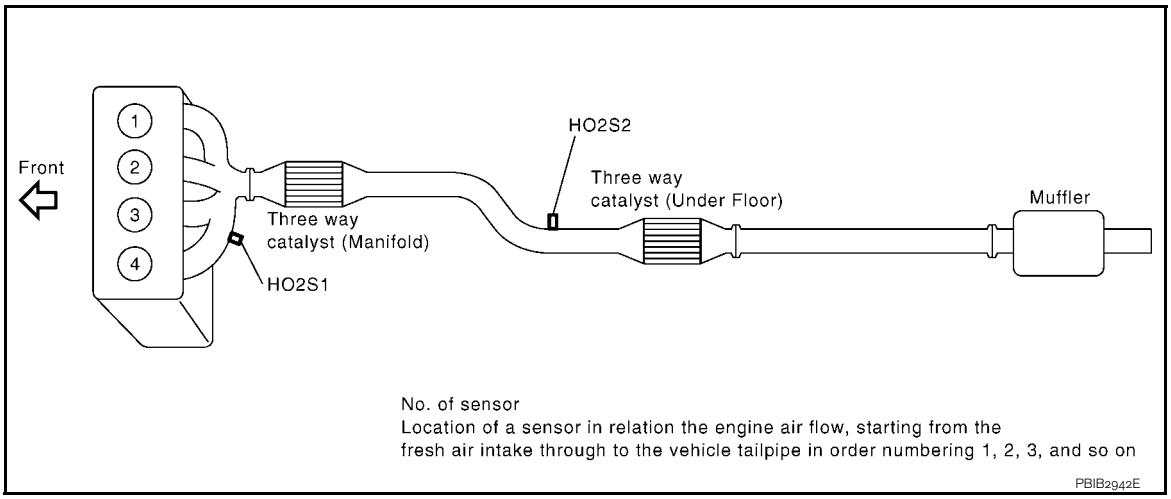
⇦ Vehicle front

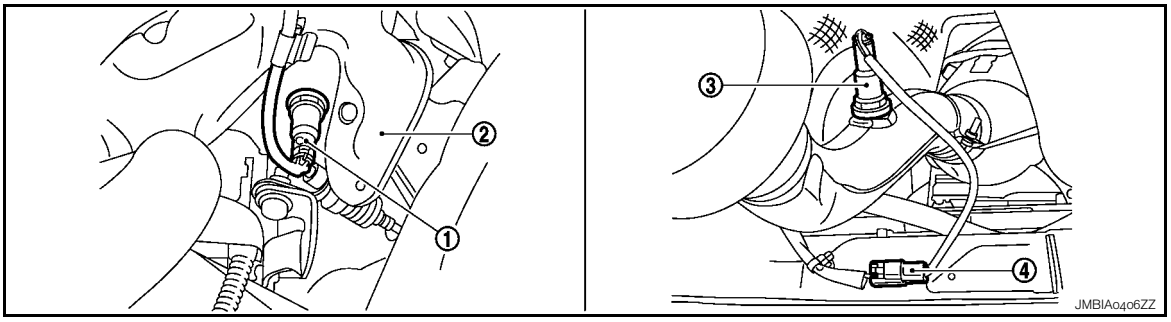
cardiagn.com



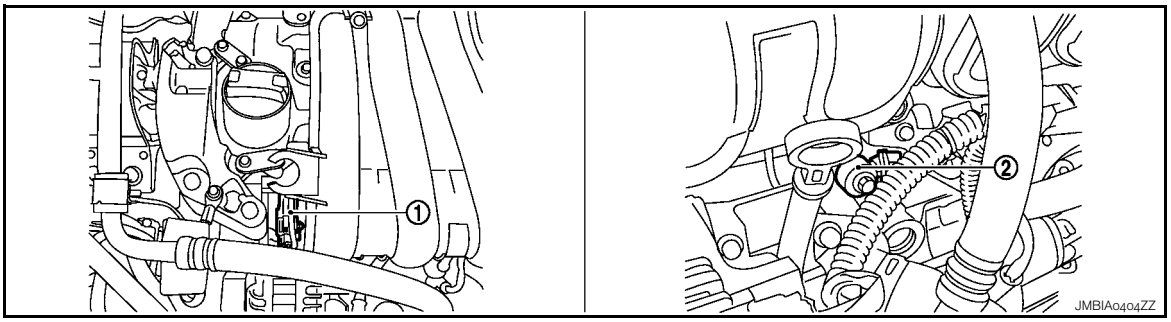
1. ECM harness connector
2. IPDM E/R

⇦ Vehicle front



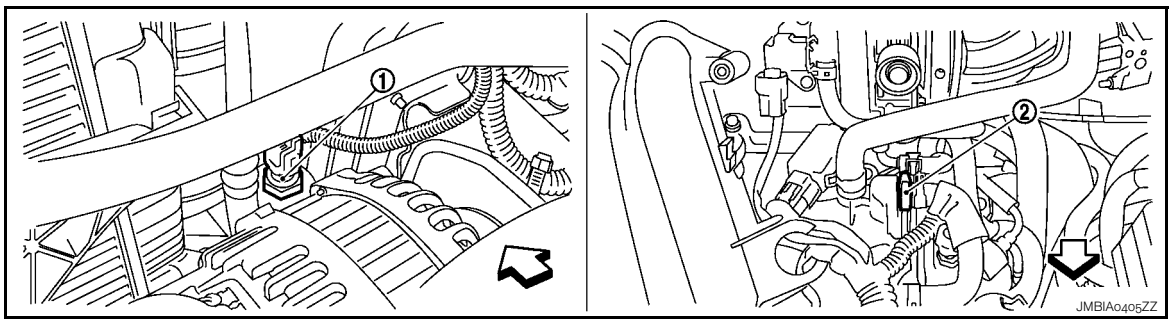


1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



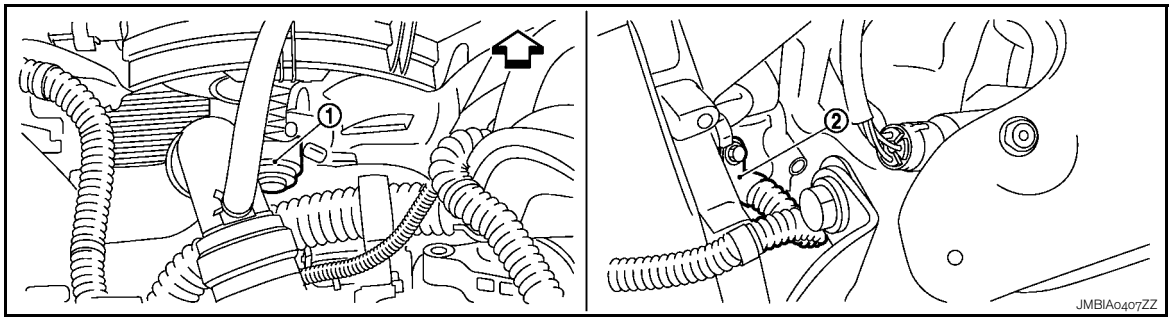
1. Intake valve timing control solenoid valve
2. Knock sensor

cardiagn.com



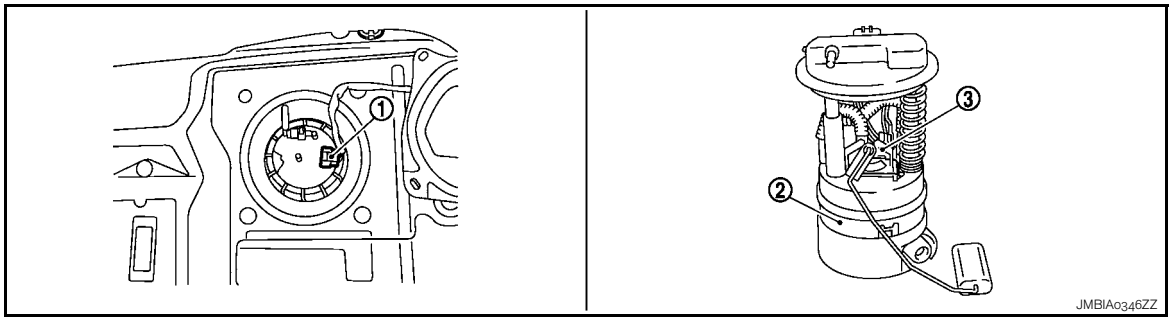
1. Refrigerant pressure sensor
2. PCV valve

⇦ Vehicle front

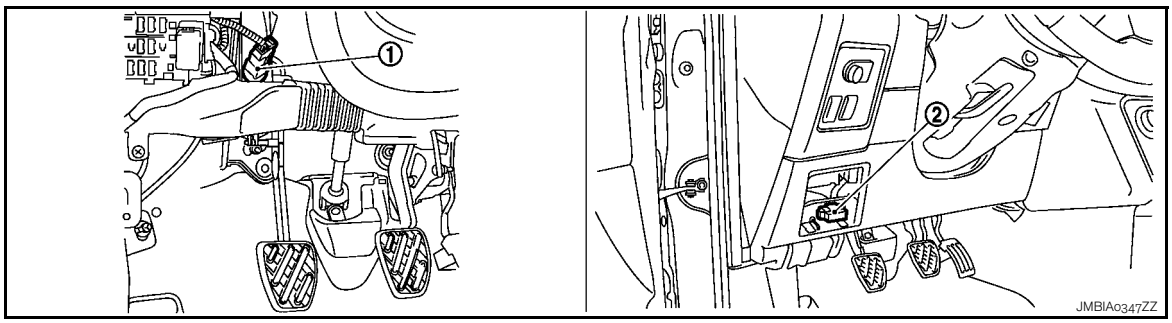


1. Cooling fan motor
2. Crankshaft position sensor (POS)

⇦ Vehicle front

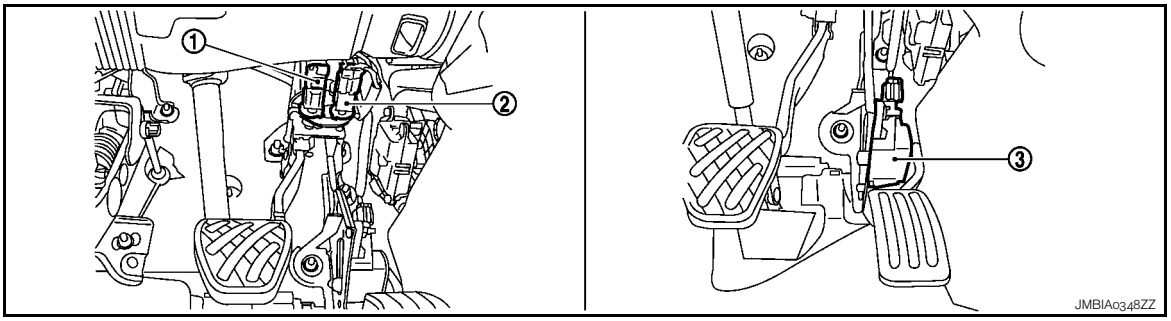


1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

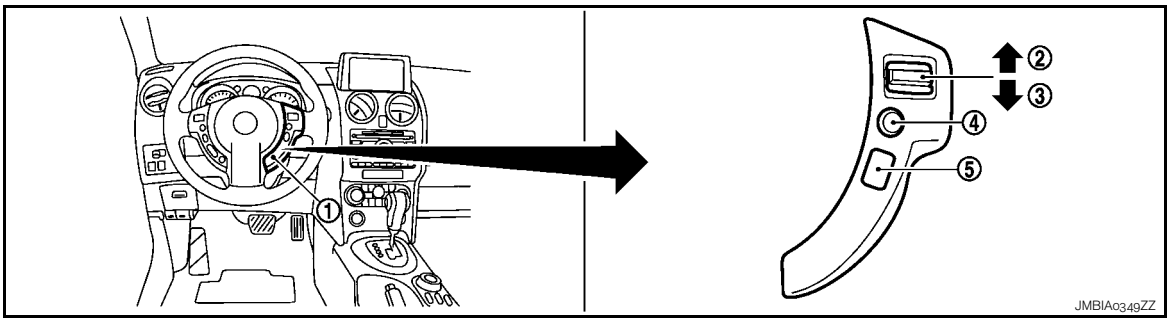


1. ASCD clutch switch
2. Data link connector

cardiagn.com



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096764

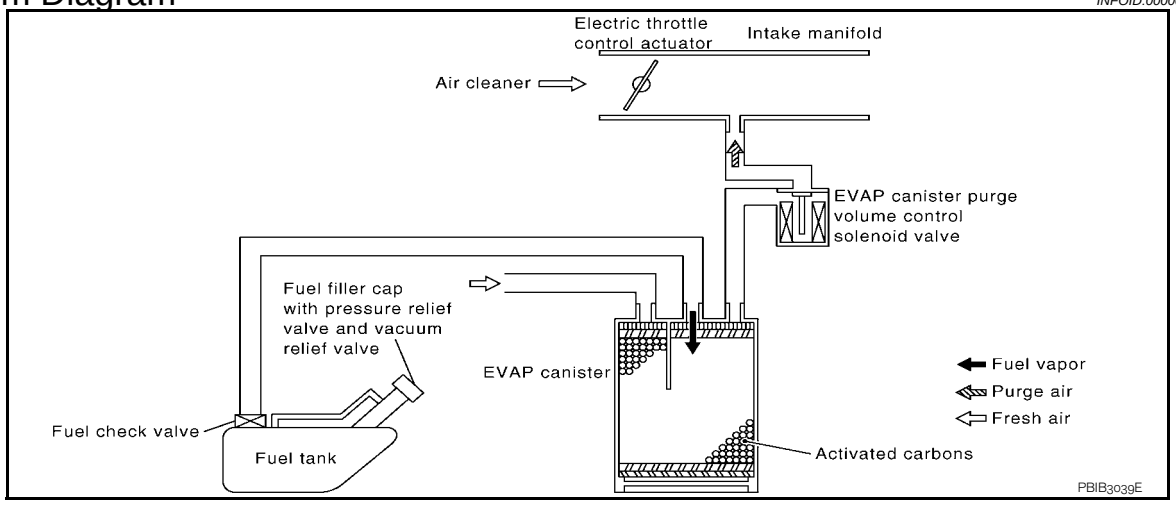
Component	Reference
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Cooling fan motor	EC-407, "System Description"
Engine coolant temperature sensor	EC-461, "Description"
Refrigerant pressure sensor	EC-595, "Description"

cardiagn.com

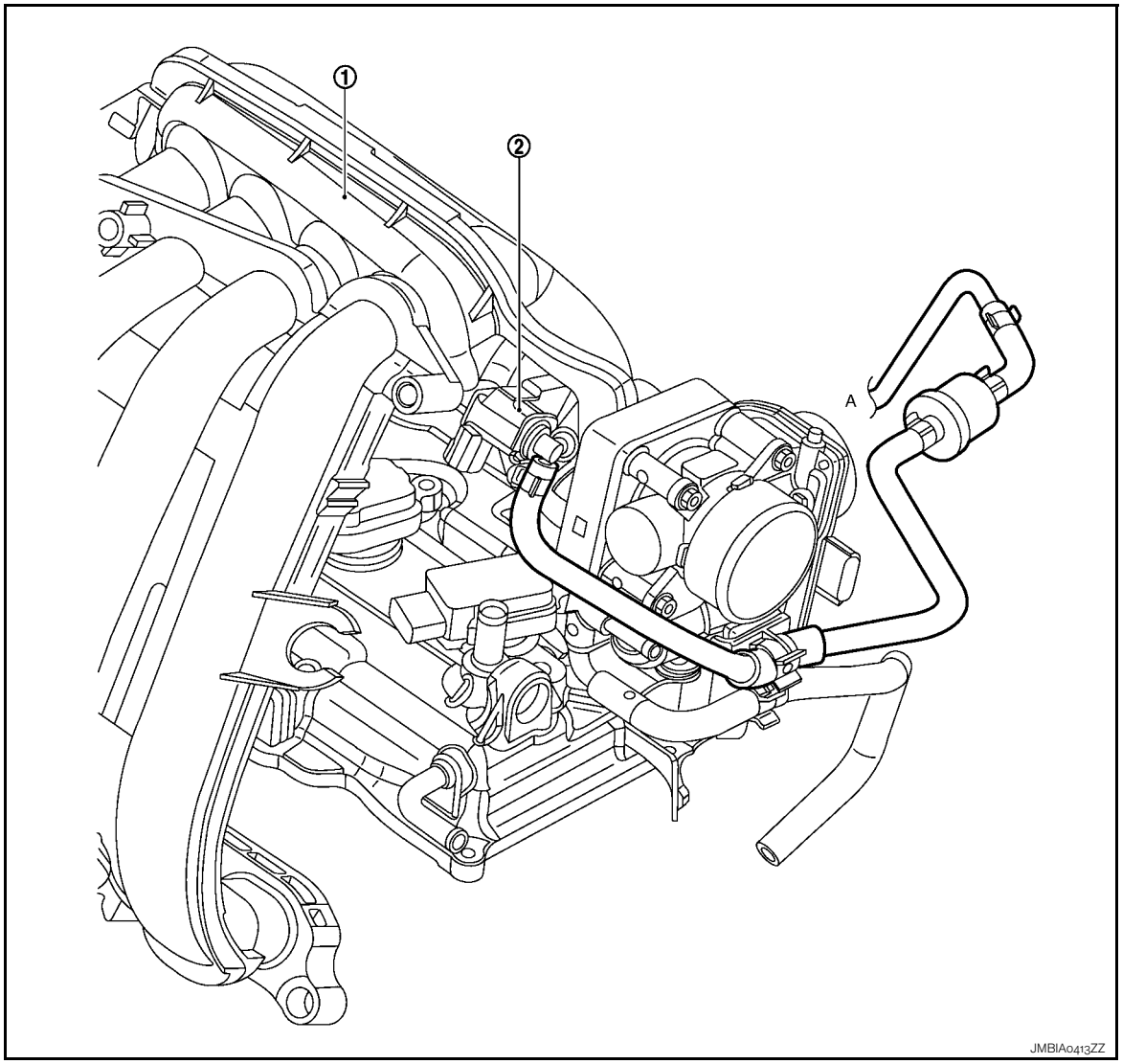
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001096765



EVAPORATIVE EMISSION LINE DRAWING



cardiagn.com

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve

A. To EVAP canister

NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

System Description

INFOID:0000000001096766

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter*2	Vehicle speed		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

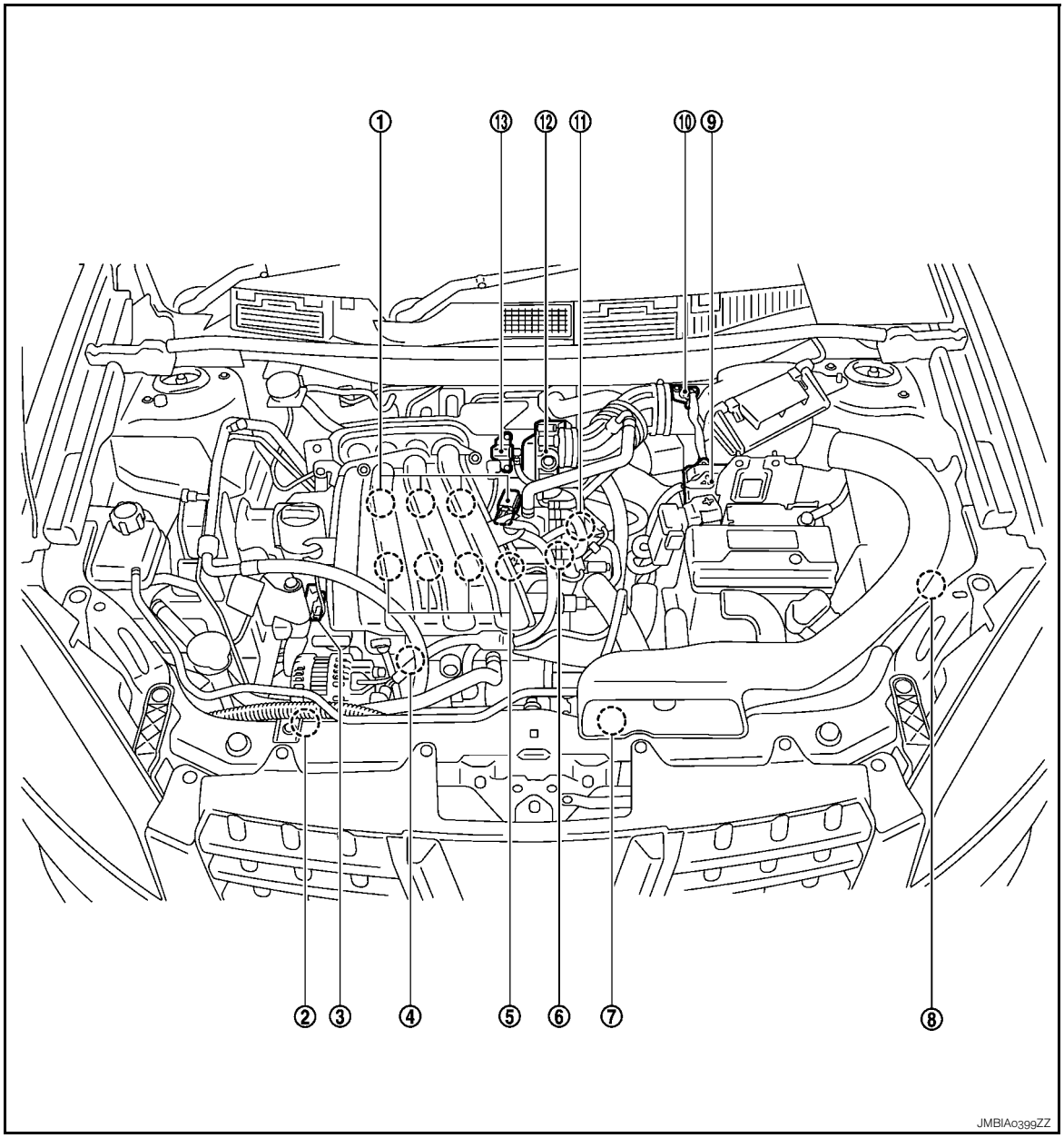
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

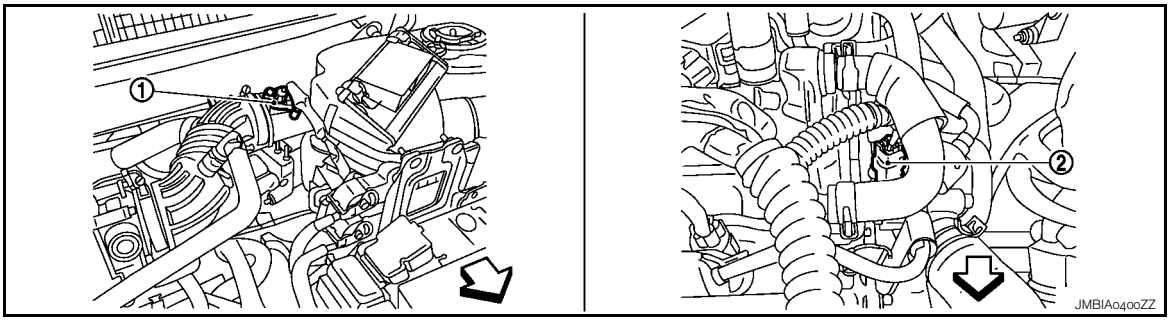
Component Parts Location

INFOID:0000000001096767



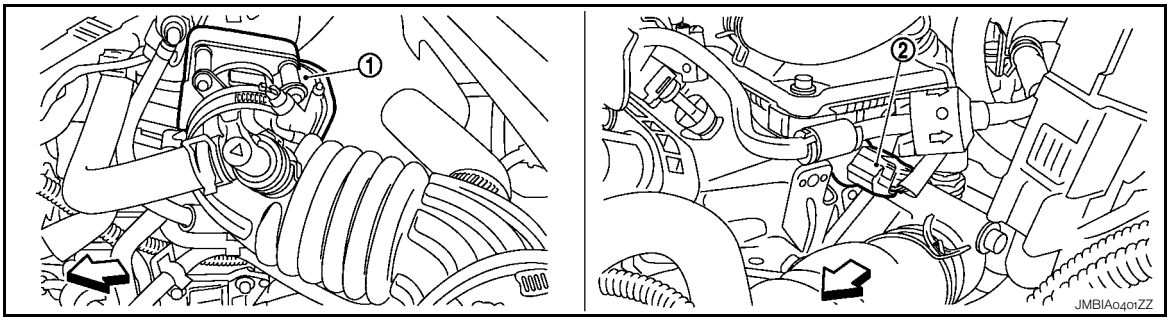
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



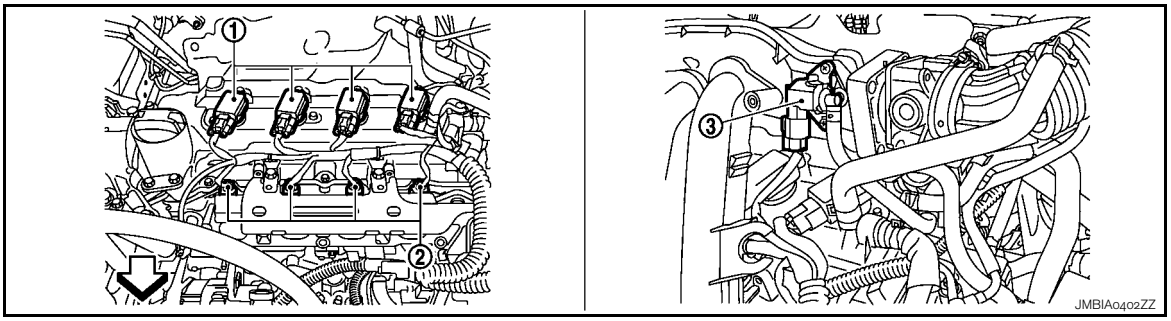
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



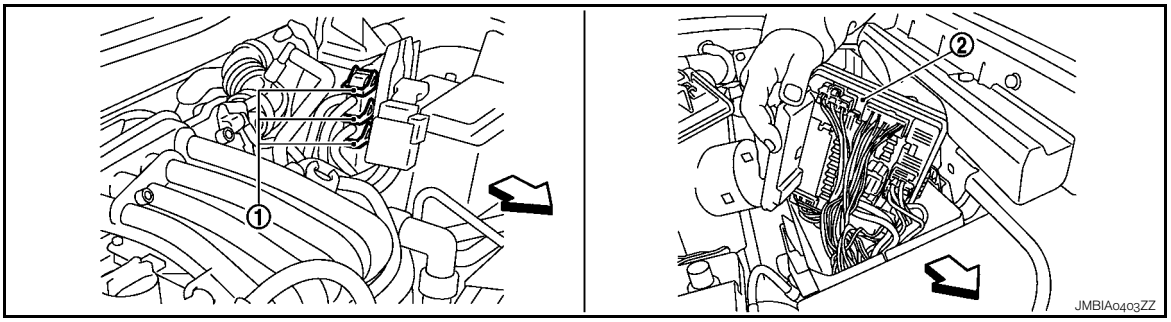
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

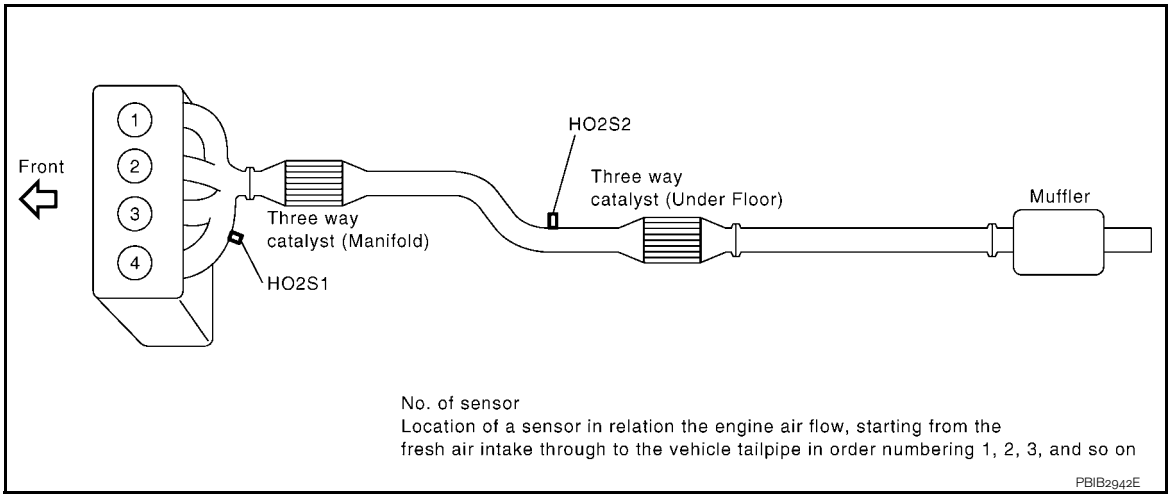
⇦ Vehicle front

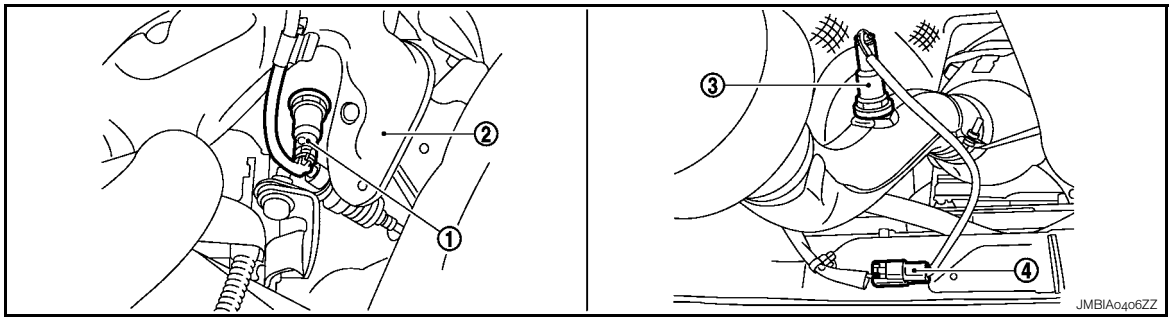


1. ECM harness connector
2. IPDM E/R

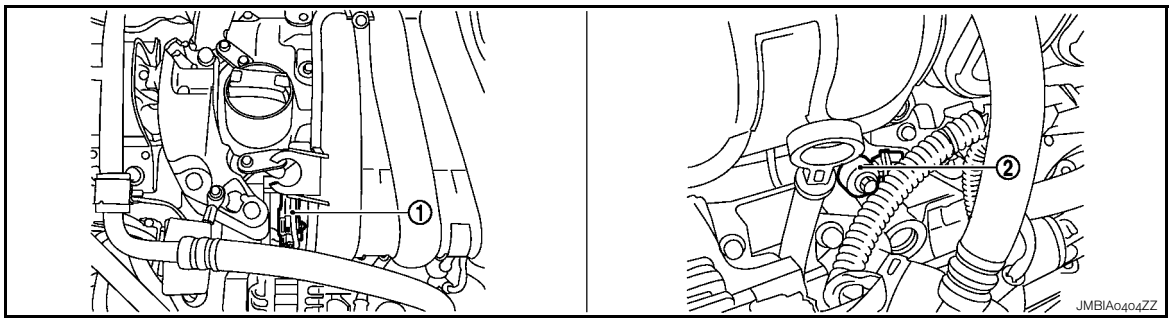
⇦ Vehicle front

cardiagn.com

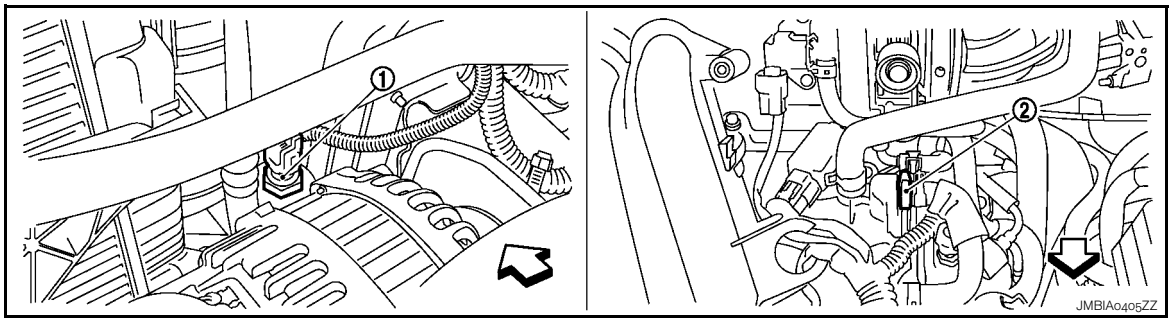




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



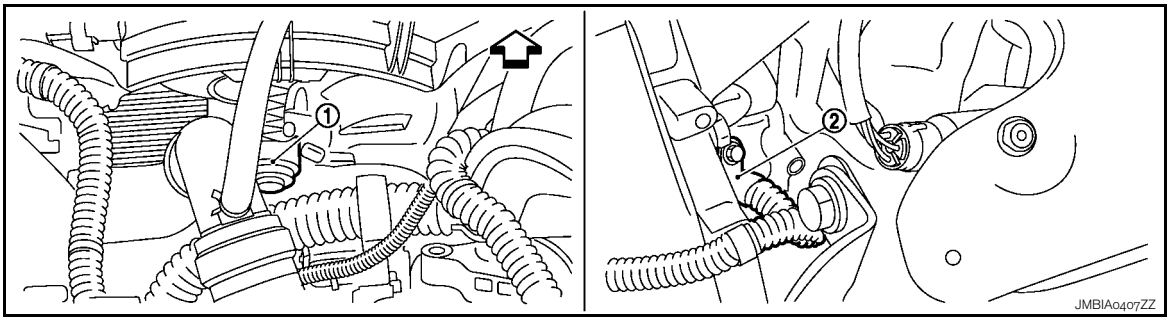
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

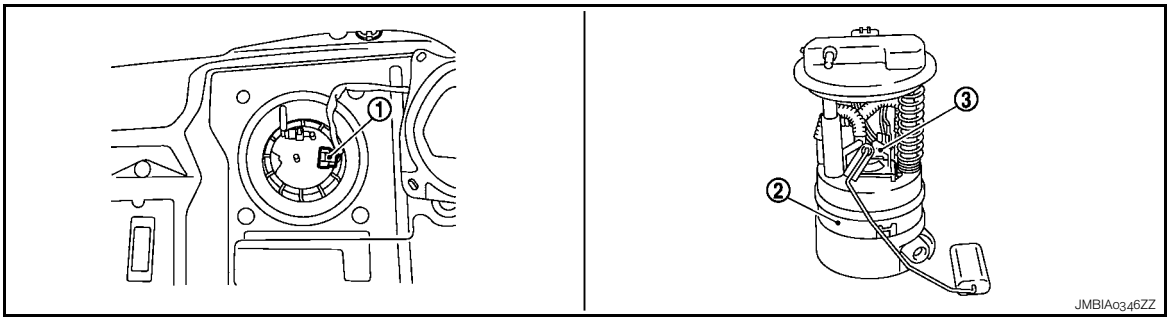
⇦ Vehicle front

cardiagn.com

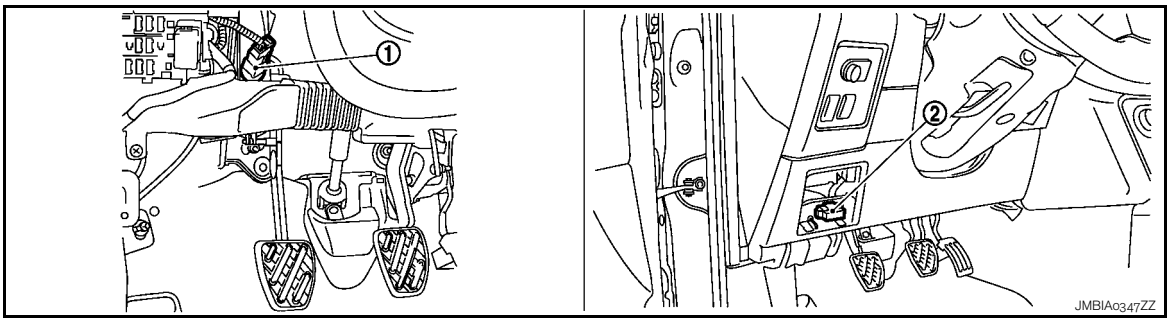


1. Cooling fan motor
2. Crankshaft position sensor (POS)

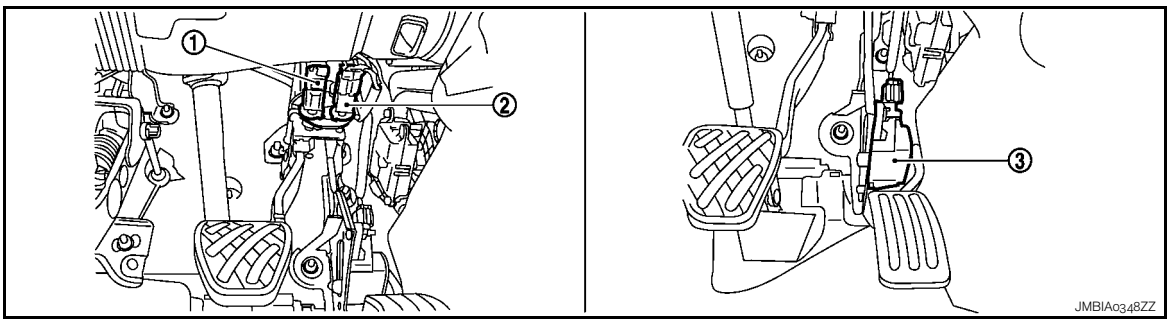
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

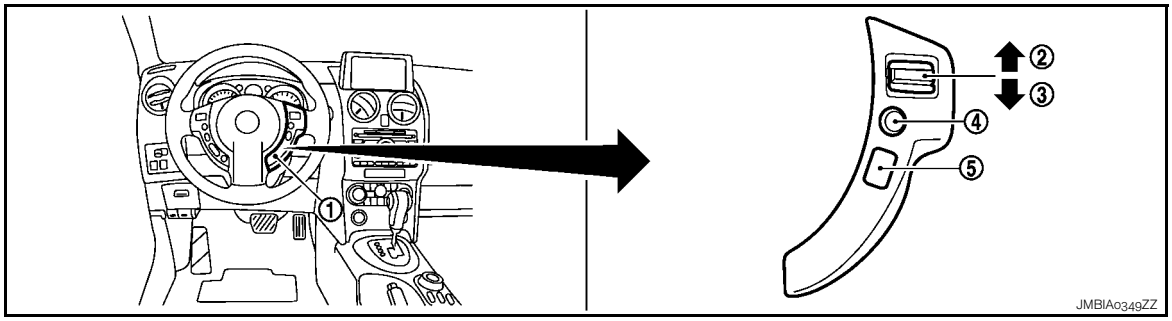


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096768

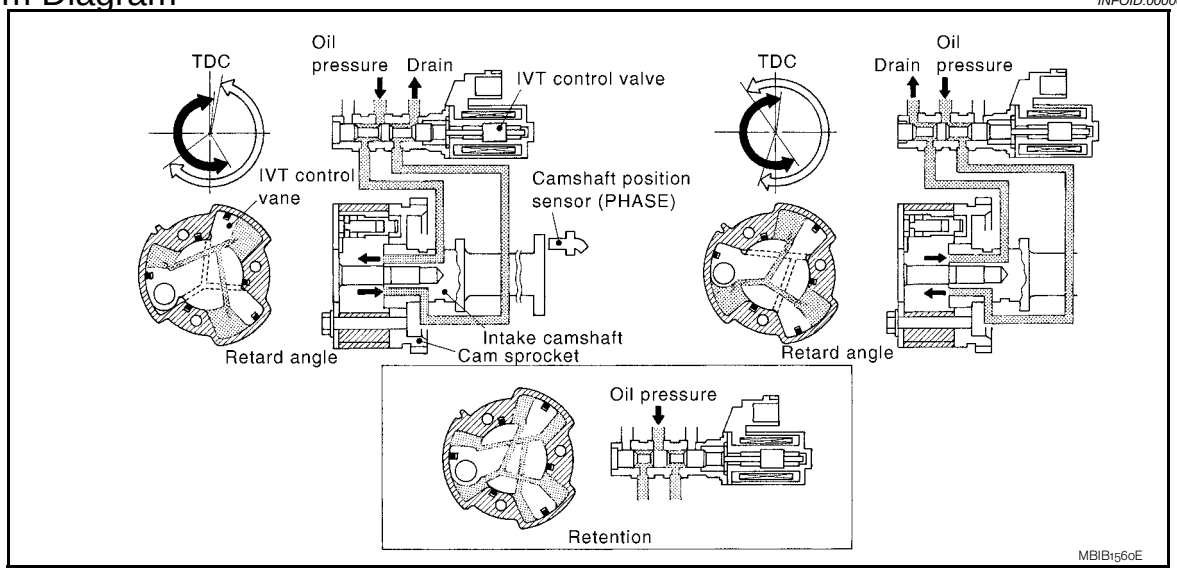
Component	Reference
Accelerator pedal position sensor	EC-539, "Description"
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Engine coolant temperature sensor	EC-461, "Description"
EVAP canister purge volume control solenoid valve	EC-562, "Description"
Heated oxygen sensor 1	EC-467, "Description"
Mass air flow sensor	EC-456, "Description"
Throttle position sensor	EC-464, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001096769



System Description

INFOID:0000000001096770

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Combination meter*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

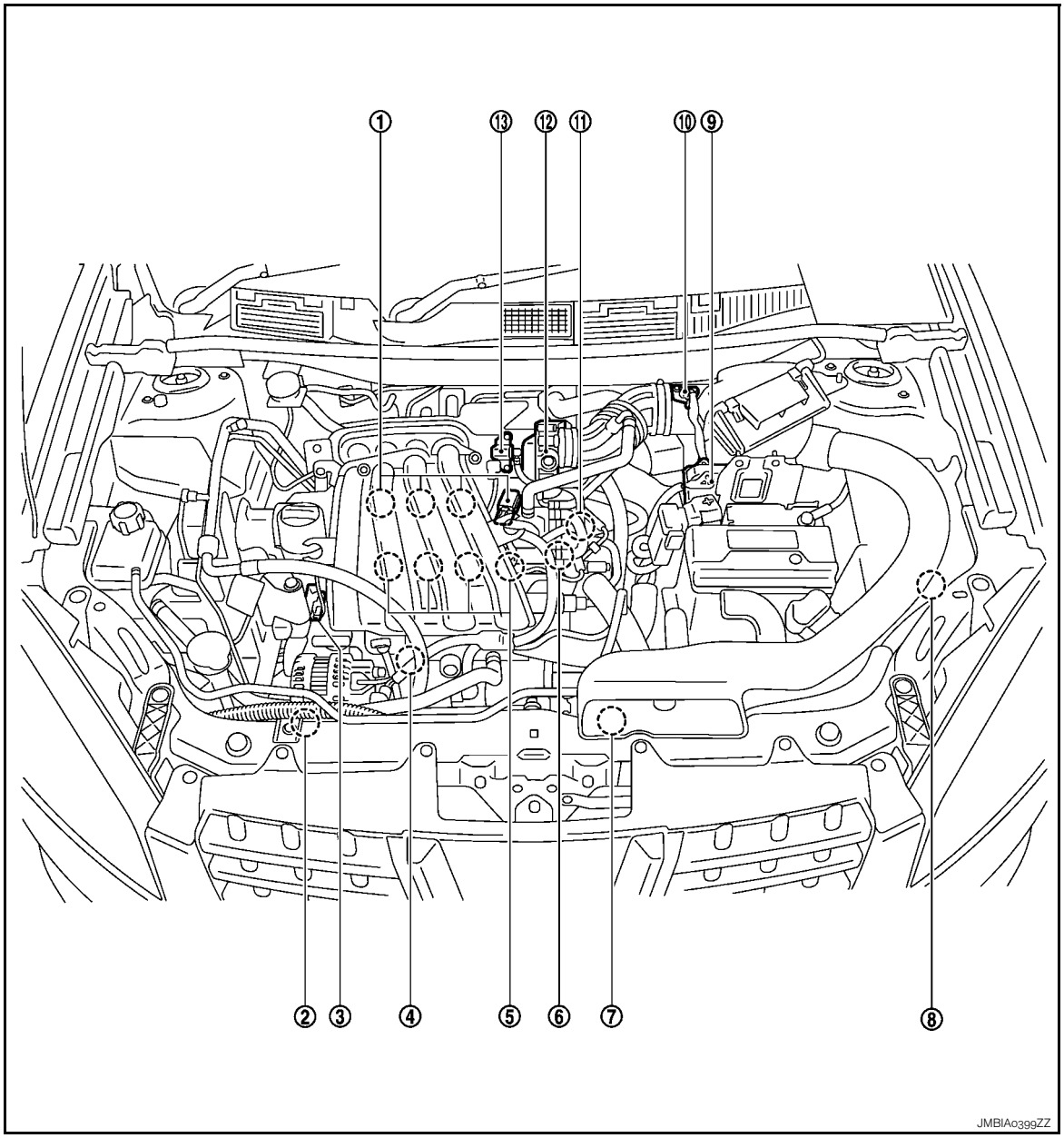
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

Component Parts Location

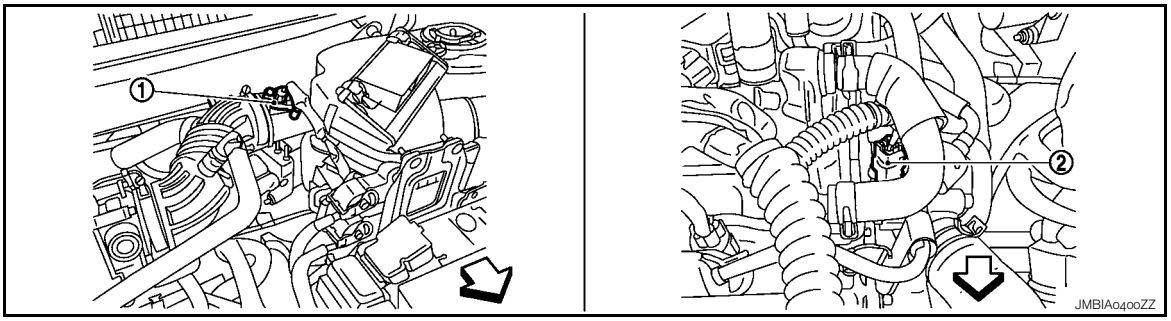
INFOID:0000000001096771

cardiagn.com



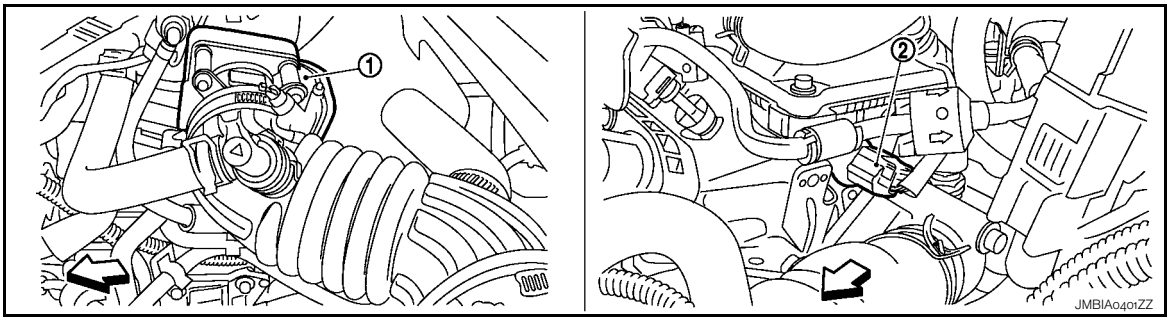
1. Ignition coil (with power transistor) and spark plug
2. Refrigerant pressure sensor
3. Intake valve timing control solenoid valve
4. Knock sensor, Crankshaft position sensor (POS)
5. Fuel injector
6. Camshaft position sensor (PHASE)
7. Cooling fan motor
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

cardiagn.com



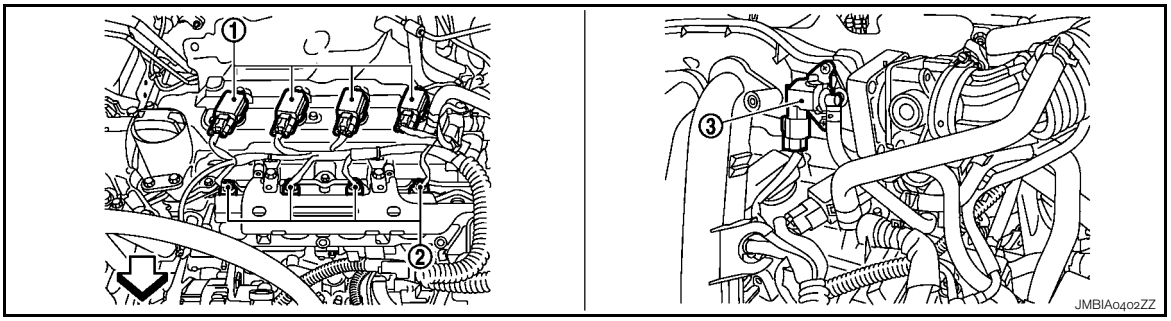
1. Mass air flow sensor
2. Engine coolant temperature sensor

⇦ Vehicle front



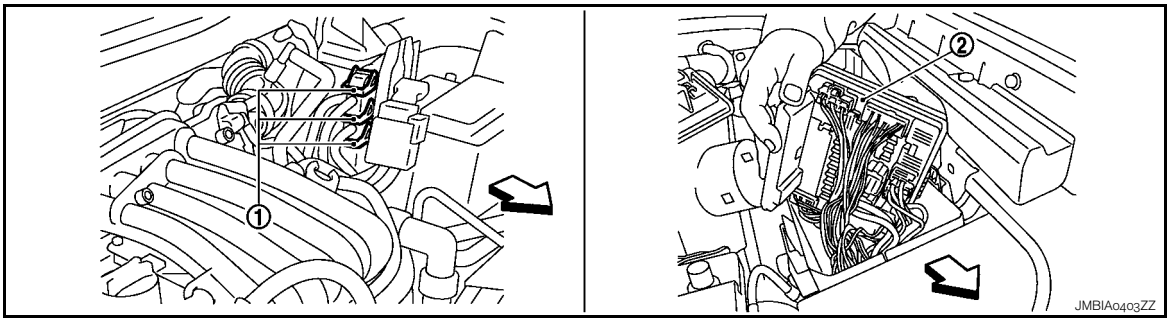
1. Electric throttle control actuator
2. Camshaft position sensor (PHASE)

⇦ Vehicle front



1. Ignition coil (with power transistor) and spark plug
2. Fuel injector
3. EVAP canister purge volume control solenoid valve

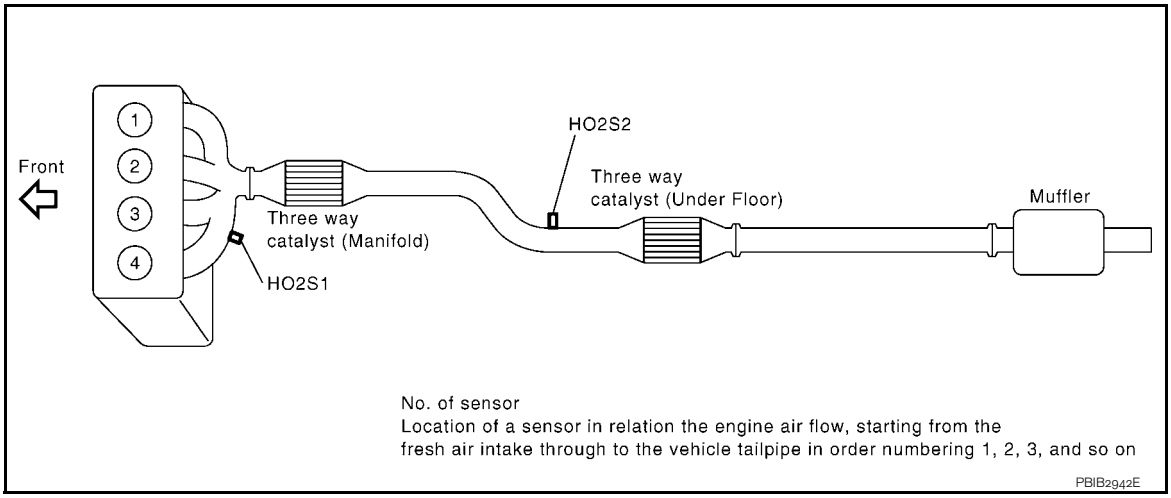
⇦ Vehicle front

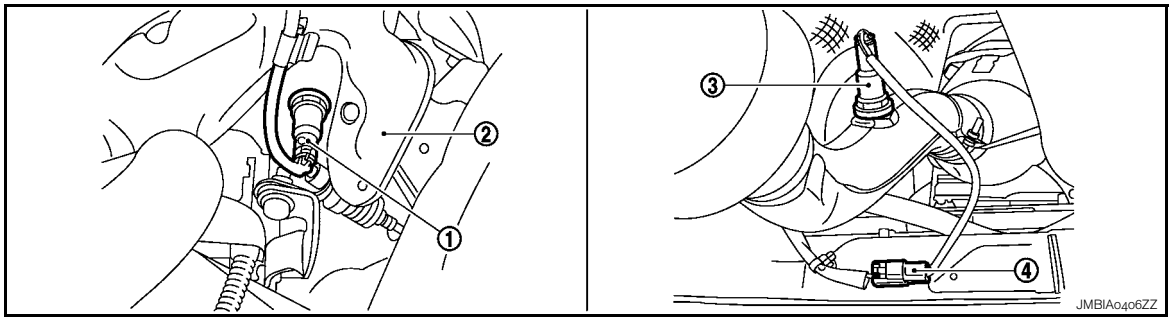


1. ECM harness connector
2. IPDM E/R

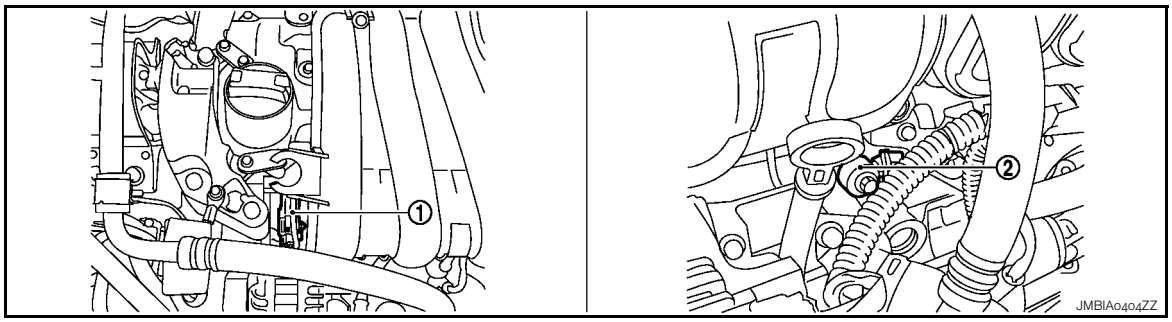
⇦ Vehicle front

cardiagn.com

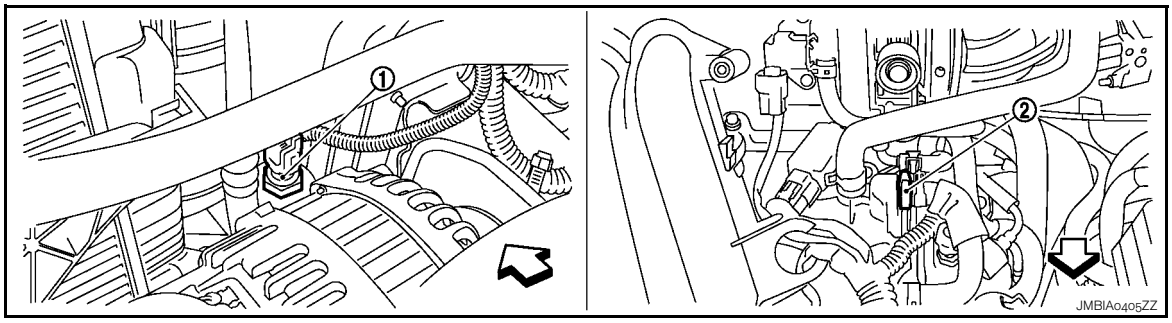




1. Heated oxygen sensor 1
2. Exhaust manifold cover
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector



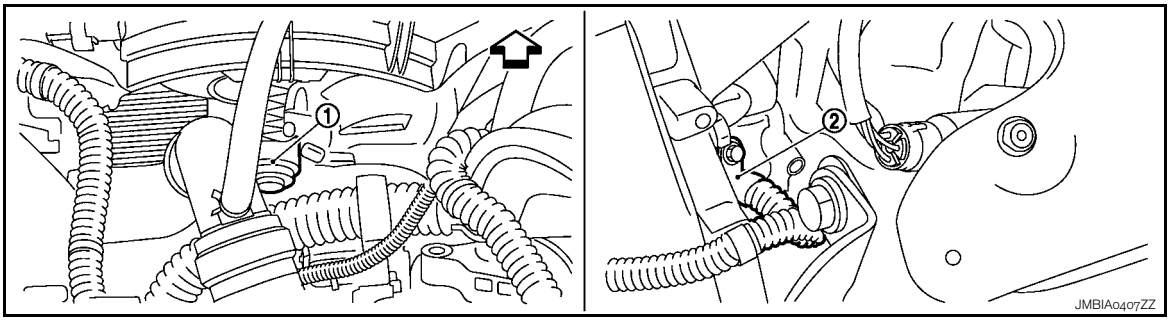
1. Intake valve timing control solenoid valve
2. Knock sensor



1. Refrigerant pressure sensor
2. PCV valve

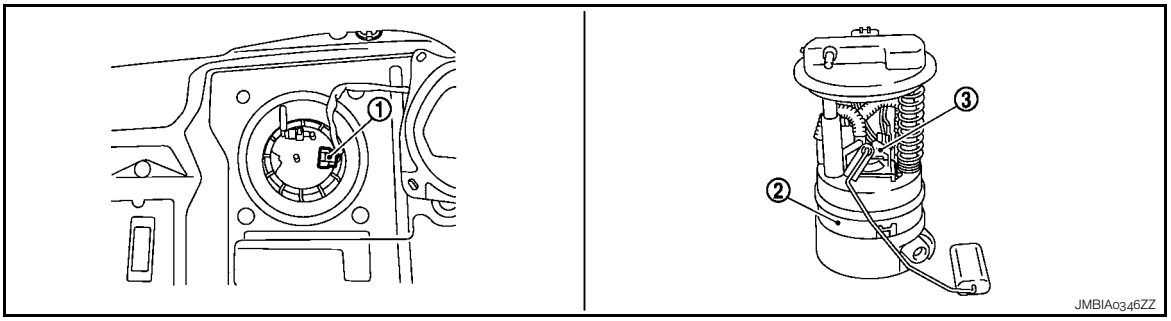
⇦ Vehicle front

cardiagn.com

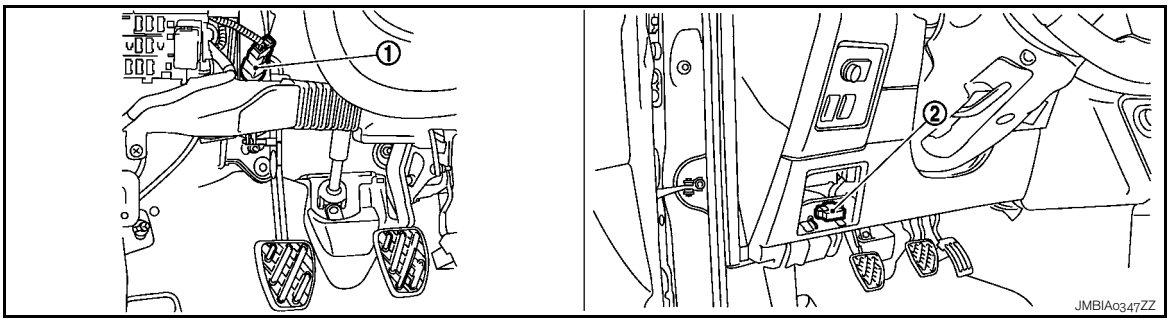


1. Cooling fan motor
2. Crankshaft position sensor (POS)

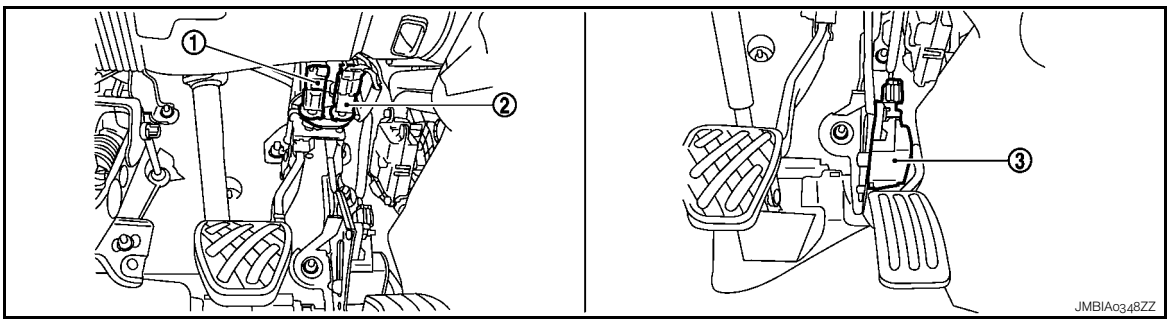
⇦ Vehicle front



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

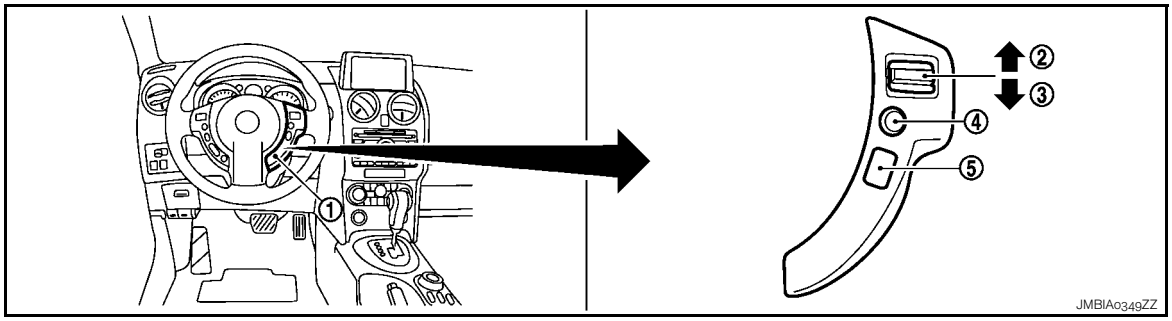


1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake pedal
3. Accelerator pedal position sensor

cardiagn.com



1. ASCD steering switch
2. CANSEL switch
3. RESUME/ACCELERATE switch
4. SET/COAST switch
5. MAIN switch

Component Description

INFOID:0000000001096772

Component	Reference
Camshaft position sensor (PHASE)	EC-489, "Description"
Crankshaft position sensor (POS)	EC-485, "Description"
Engine coolant temperature sensor	EC-461, "Description"
Intake valve timing control solenoid valve	EC-497, "Description"
Vehicle speed sensor	EC-597, "Description"

cardiagn.com

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001098020

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information
Diagnostic Trouble Code (DTC)
Freeze Frame data
1st Trip Diagnostic Trouble Code (1st Trip DTC)
1st Trip Freeze Frame data

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-III	×	×	×	×
ECM	×	×*	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-959, "Fail Safe".)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>
The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-638, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

cardiagn.com

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III
CONSULT-III displays the DTC in ″SELF-DIAG RESULTS″ mode. Examples: P0340, P1148, P1706, etc.
(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III
The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: P0340, P1148, P1706, etc.
These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III
The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

Without CONSULT-III
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform EC-426, "Diagnosis Description".
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

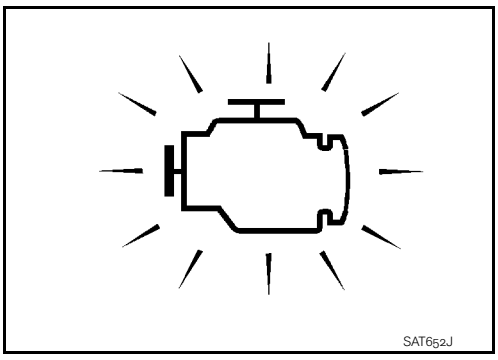
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

MALFUNCTION INDICATOR (MI)

Description
The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, check MI circuit. Refer to EC-593, or see MWI-15.
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

cardiagn.com

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. One trip detection diagnoses will light up the MI in the 1st trip.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MI FLASHING WITHOUT DTC
If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later. Refer to HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
The following emission-related diagnostic information is cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

How to Switch Diagnostic Test Mode
NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.

cardiagn.com

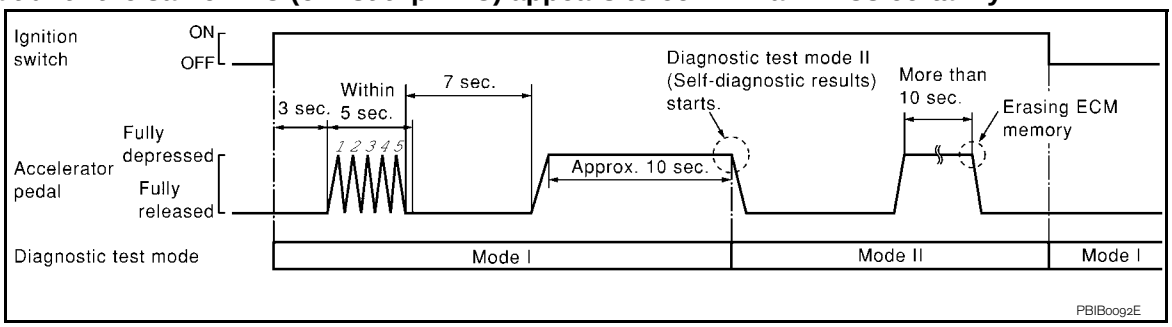
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.

4. Fully release the accelerator pedal.
ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
NOTE:
Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW to SET DIAGNOSTIC TEST MODE II (HEATED OXYGEN SENSOR 1 MONITOR)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
Refer to HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
2. Start Engine.
ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check MI circuit. Refer to EC-593 or see MWI-15.

Diagnostic Test Mode I — Malfunction Warning

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

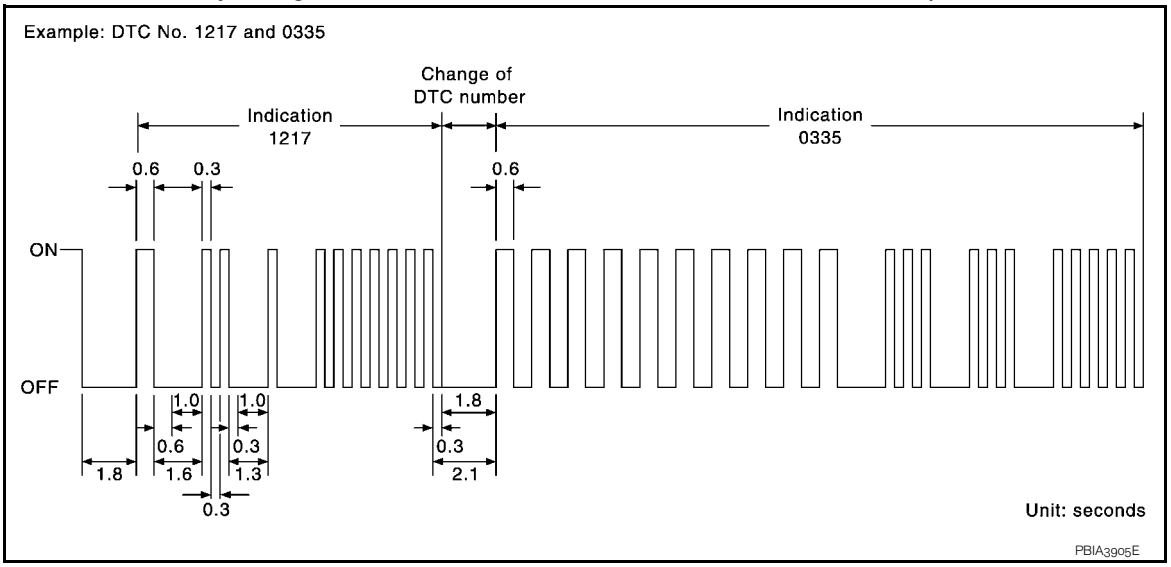
This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are dis-

cardiagn.com

played, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-620.)
HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor
In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.
To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load.

CONSULT-III Function

INFOID:0000000001096774

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*

cardiagn.com

Diagnostic test mode	Function
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE				
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	
		Camshaft position sensor (PHASE)		×	×	×	
		Mass air flow sensor		×		×	
		Engine coolant temperature sensor		×	×	×	×
		Heated oxygen sensor 1		×		×	
		Heated oxygen sensor 2		×		×	
		Vehicle speed sensor		×	×	×	
		Accelerator pedal position sensor		×		×	
		Throttle position sensor		×	×	×	
		Intake air temperature sensor		×	×	×	
		Knock sensor		×			
		Refrigerant pressure sensor				×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	
		Air conditioner switch				×	
		Park/neutral position (PNP) switch		×		×	
		Stop lamp switch		×		×	
		EPS control unit				×	
		Battery voltage				×	
		Load signal				×	
		ASCD steering switch		×		×	
		ASCD brake switch		×		×	

cardiagn.com

Item			DIAGNOSTIC TEST MODE				
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2		
ENGINE COTNROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×
		Power transistor (Ignition timing)				×	×
		Throttle control motor relay		×		×	
		Throttle control motor		×			
		EVAP canister purge volume control solenoid valve		×		×	×
		Air conditioner relay				×	
		Fuel pump relay	×			×	×
		Cooling fan relay		×		×	×
		Heated oxygen sensor 1 heater		×		×	
		Heated oxygen sensor 2 heater		×		×	
		Intake valve timing control solenoid valve		×		×	×

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-426, "Diagnosis Description".

INSPECTION PROCEDURE

Refer to CONSULT-III Operators Manual.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-620, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

cardiagn.com

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-620, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	• Always a certain value is displayed. • This item is not efficient for J10 models.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.

cardiagn.com

Monitored item	Unit	Description	Remarks
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2 SEN1 (B1)	V	• The A/F signal computed from the input signal of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became ″rich″, and control is being affected toward a leaner mixture. LEAN: means the mixture became ″″lean″, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, ″RICH″ is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 1-B2			
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
CLUTCH P/P SW	ON/OFF	• Indicates [ON/OFF] condition from the clutch switch signal.	

cardiagn.com

Monitored item	Unit	Description	Remarks
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• "Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	• Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI is activated.	
O2 SEN HTR DTY	%	• Heated oxygen sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	

cardiagn.com

Monitored item	Unit	Description	Remarks
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only “#” is displayed if item is unable to be measured. • Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

cardiagn.com

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Heated oxygen sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: Neutral • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay “ON” and “OFF” using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

cardiagn.com

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000001096776

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000001096777

1. START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-365, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

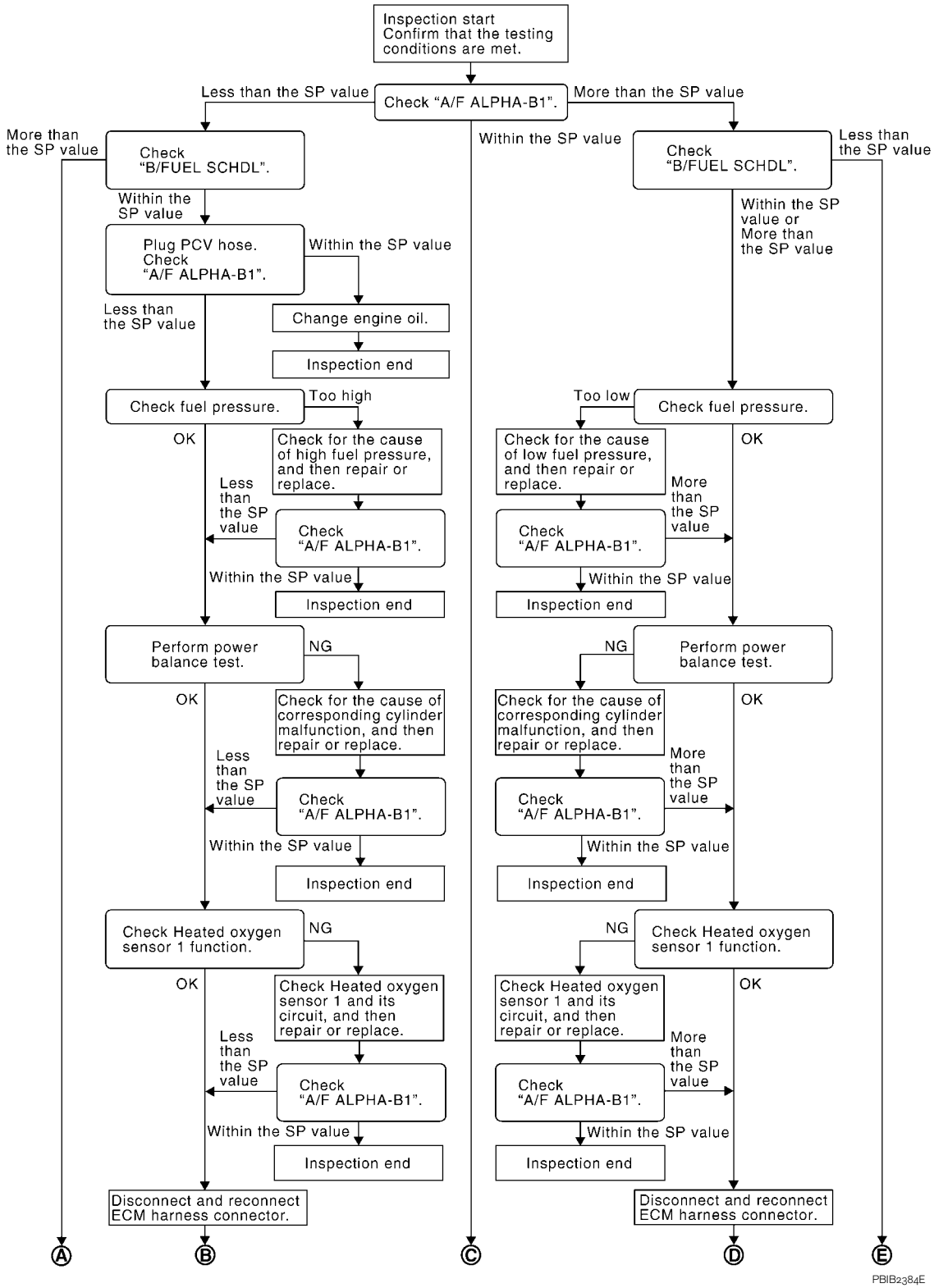
YES >> END
NO >> Go to EC-438, "Diagnosis Procedure".

Diagnosis Procedure

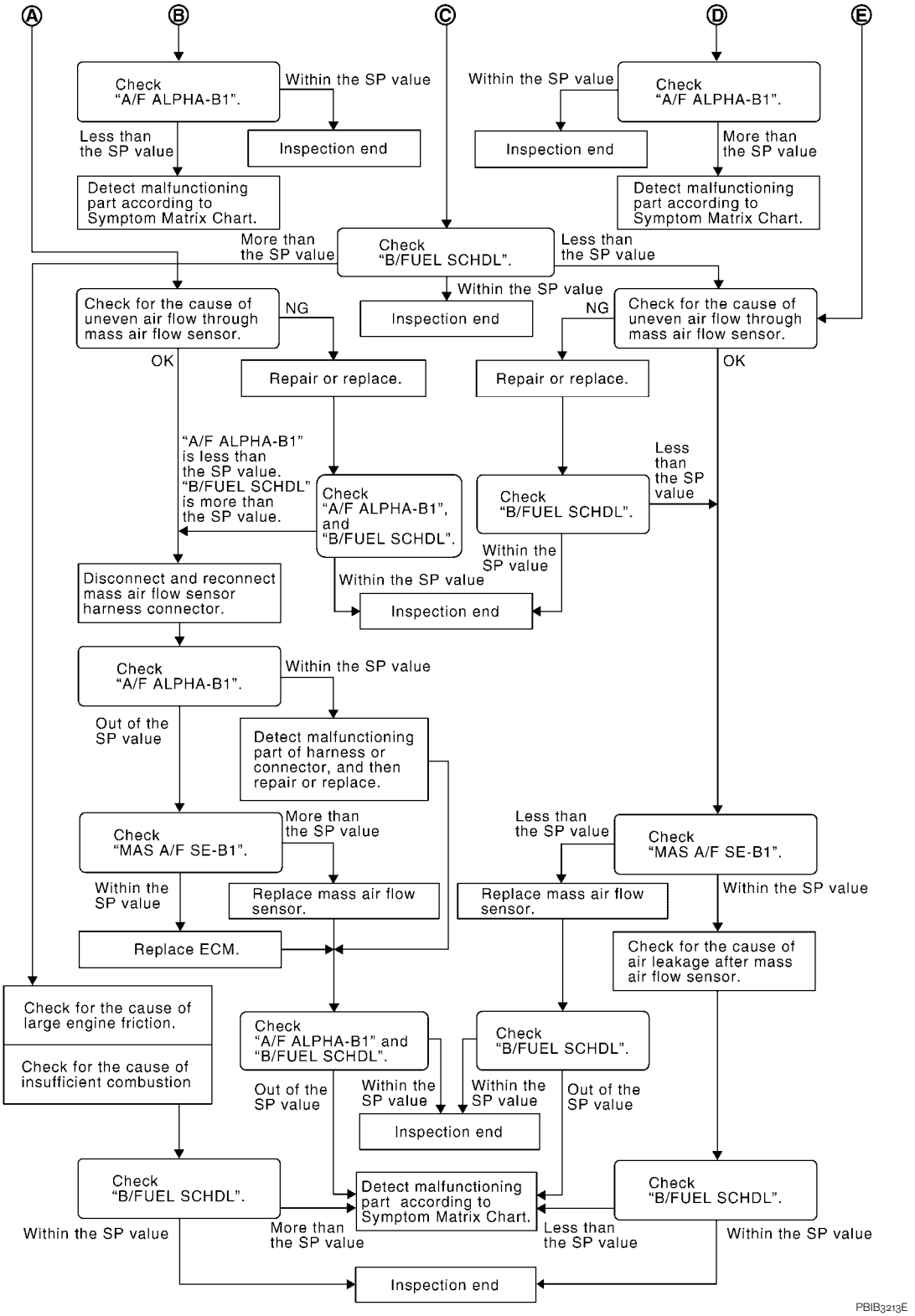
INFOID:0000000001096778

cardiagn.com

OVERALL SEQUENCE



cardiagn.com



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-438, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:

cardiagn.com

Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.
   NOTE:
   This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-634, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

1. Start engine.

cardiagn.com

2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-588, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-565, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-24, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH

Is the inspection result more than 5 times during 10 seconds?

YES >> GO TO 15.
NO >> GO TO 13.

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit. Refer to EC-467, "DTC Logic".

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

cardiagn.com

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-623, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

cardiagn.com

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-456, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Go to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.
NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

cardiagn.com

- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-623, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-623, "Symptom Table".

cardiagn.com

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001096779

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

cardiagn.com

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E11	15	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-588, "Diagnosis Procedure".
NO >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for more than a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 15.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E11	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

cardiagn.com

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	32	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 51) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

cardiagn.com

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

cardiagn.com

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000001096780

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001096781

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> EC-450, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096782

Go toLAN-46, "Trouble Diagnosis Flow Chart".

cardiagn.com

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001096783

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001096784

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-451, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096785

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-451, "DTC Logic".
5. Check DTC.

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II Self-diagnostic results) memory.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-451, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

cardiagn.com

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001096786

DTC DETECTION LOGIC

NOTE:

- **If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for DTC P1111, refer to EC-497, "Description".**
- **The MI will not light up for this self-diagnosis.**

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec
Shift lever	Neutral position

CAUTION:

Always drive at a safe speed.

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-453, "Diagnosis Procedure"
NO >> GO TO 4.

cardiagn.com

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-453, "Diagnosis Procedure"
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to.

NOTE:
Use component function check to check the overall function of intake valve timing control system. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-453, "Diagnosis Procedure"

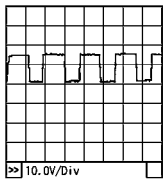
Component Function Check

INFOID:0000000001098044

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

Connector	ECM Terminal	Ground	Condition	Voltage signal
F8	73 IVT control solenoid valve	Ground	At idle	BATTERY VOLTAGE (11 - 14V)
			Engine speed: 2,000 rpm	7-12V*  PBIA4937J

*: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-303, "Diagnosis Procedure".

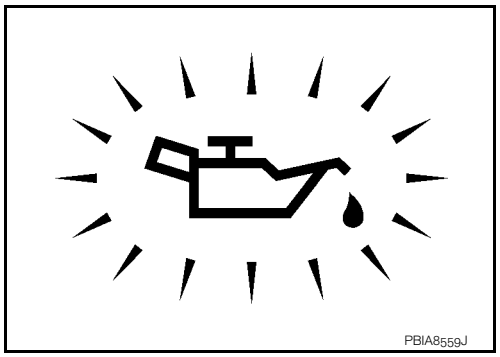
Diagnosis Procedure

INFOID:0000000001096787

1. CHECK OIL PRESSURE WARNING LAMP

cardiagn.com

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



Is oil pressure warning lamp illuminated?

YES >> Go to MWI-34, "Description".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-455, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-488, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-491, "Component Inspection".

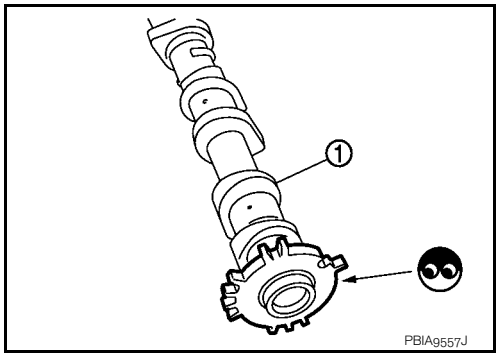
Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-46, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-3, "Engine Lubrication System".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096788

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

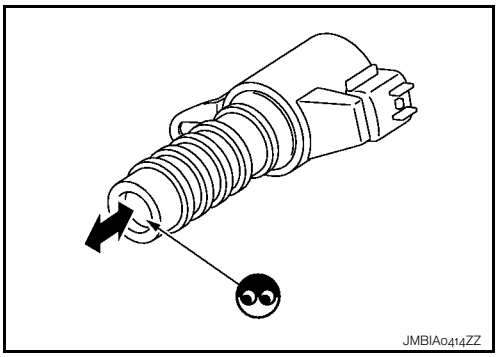
Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
   CAUTION:
   Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
   NOTE:
   Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

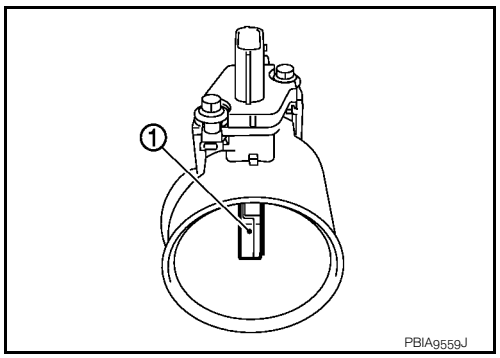
cardiagn.com

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001096789

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001096790

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-457, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-457, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-457, "Diagnosis Procedure".

cardiagn.com

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096791

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between mass air flow sensor and ECM

cardiagn.com

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-458, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096792

1. CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

cardiagn.com

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
			Idle to about 4,000 rpm	1.0 - 1.3V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

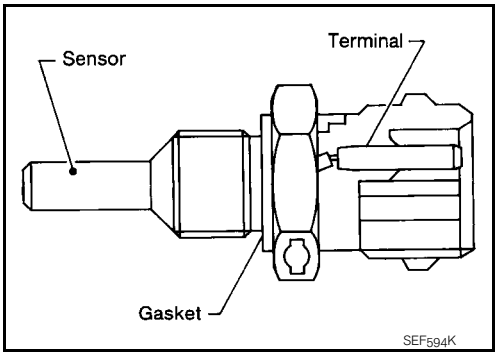
cardiagn.com

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001096797

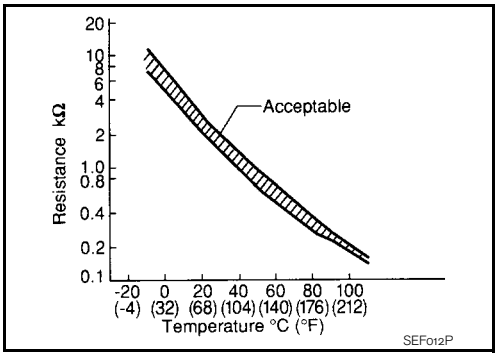
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:0000000001096798

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-462, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001096799

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F28	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-462, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

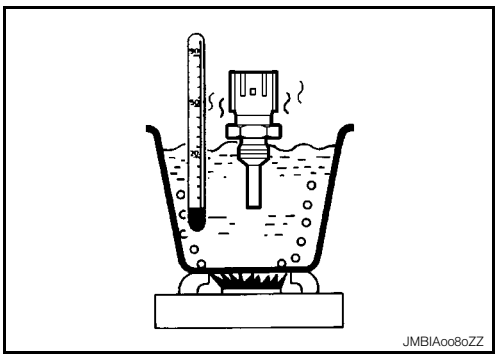
INFOID:0000000001096800

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

cardiagn.com

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

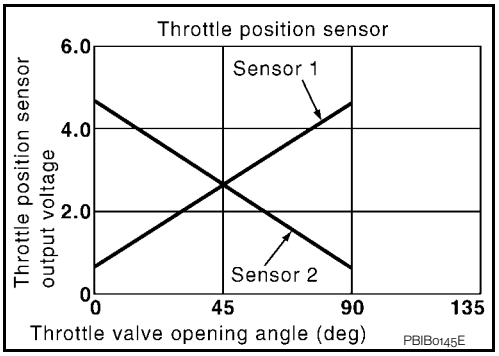
cardiagn.com

P0122, P0123 TP SENSOR

Description

INFOID:0000000001096801

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001096802

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-464, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096803

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-465, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-466, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096804

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-466, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096805

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

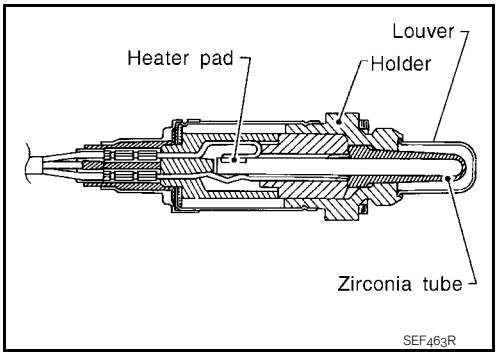
cardiagn.com

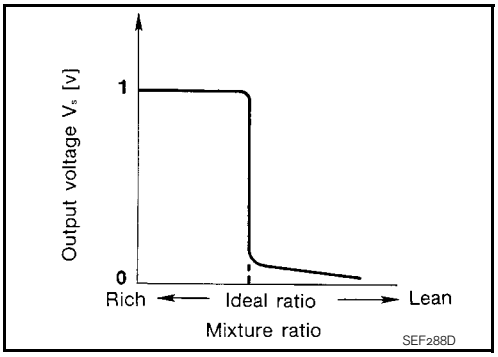
P0132 HO2S1

Description

INFOID:0000000001096806

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



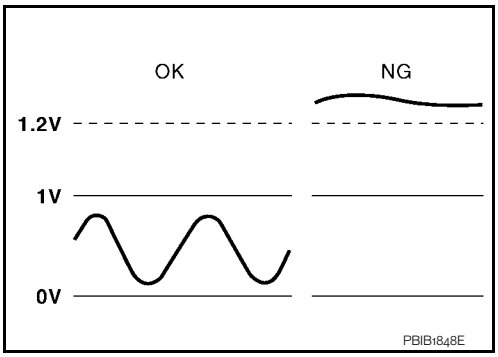


DTC Logic

INFOID:0000000001102030

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

cardiagn.com

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-1091, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096808

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

cardiagn.com

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-469, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001096809

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

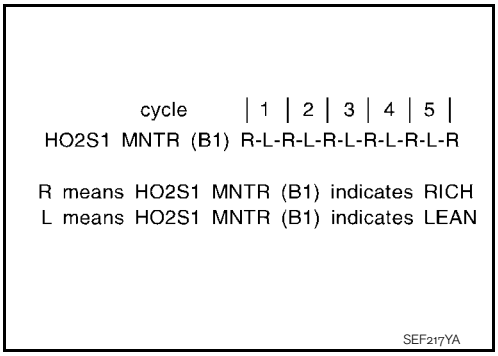
YES >> GO TO 2.
NO >> GO TO 3.

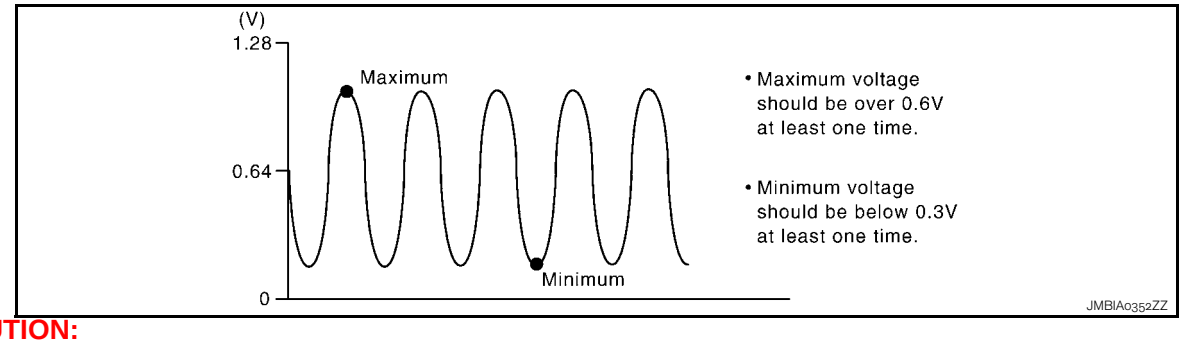
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

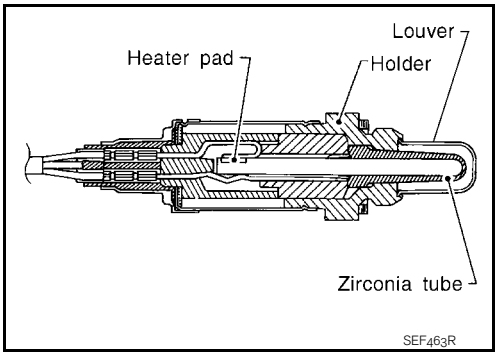
cardiagn.com

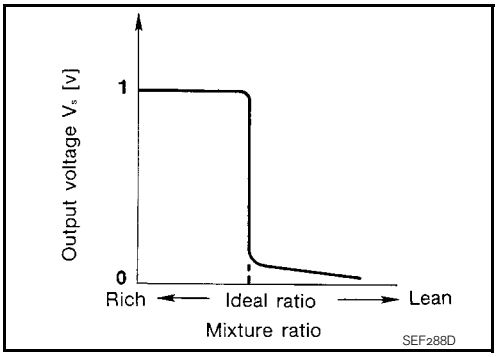
P0134 HO2S1

Description

INFOID:0000000001096814

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



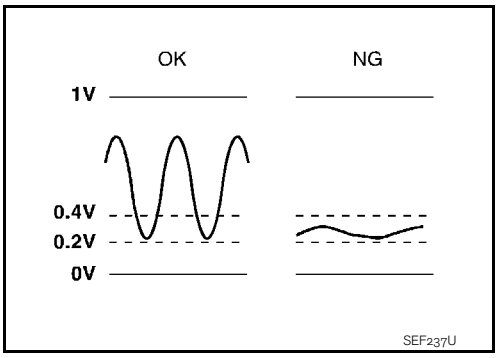


DTC Logic

INFOID:0000000001102039

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 2.
NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-III, and select "HO2S1 (B1)".
3. Hold engine speed at 2,000 rpm under no load.
4. Make sure that the indications do not remain in the range between 0.2V to 0.4V.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096816

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Also check harness for short to ground and short to power.

Is inspection result normal?

YES >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector 49.

cardiagn.com

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

2. Check harness continuity between ECM harness connector 49 or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-473, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001096817

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

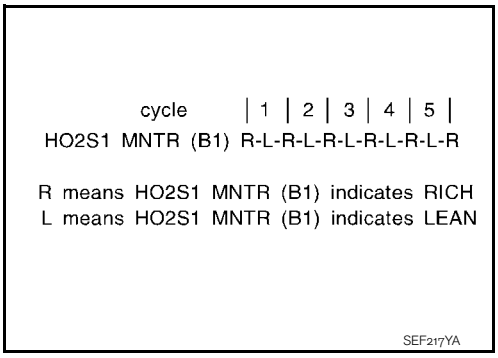
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

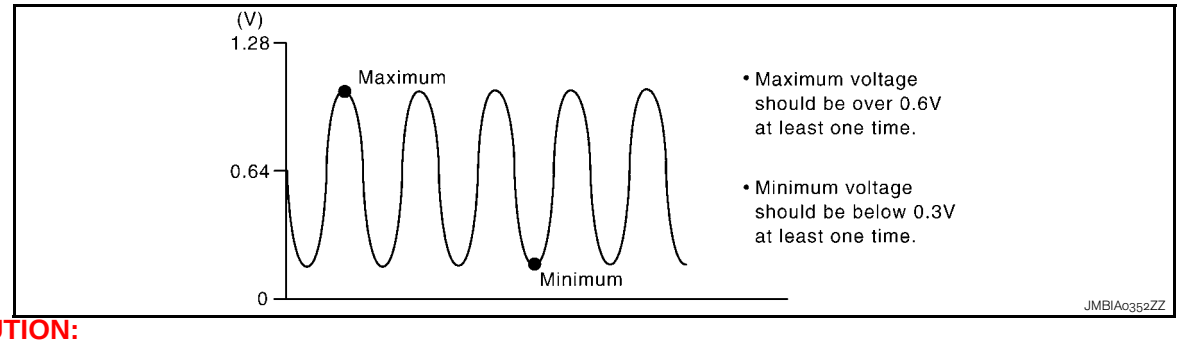
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.



cardiagn.com



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

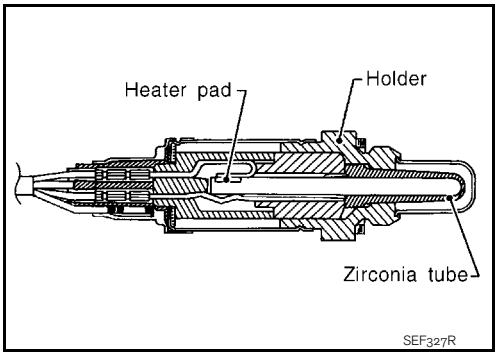
cardiagn.com

P0138 HO2S2

Description

INFOID:0000000001096822

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

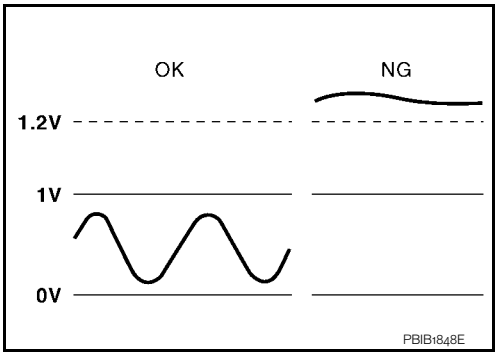


DTC Logic

INFOID:0000000001096823

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-476, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096824

cardiagn.com

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between HO2S2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

cardiagn.com

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connectors.

7.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-477, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096825

1.INSPECTION START

Do you have CONSULT-III?

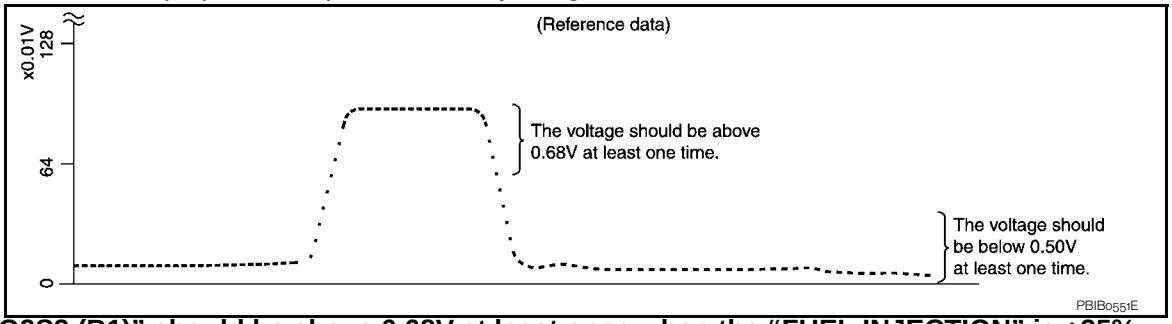
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

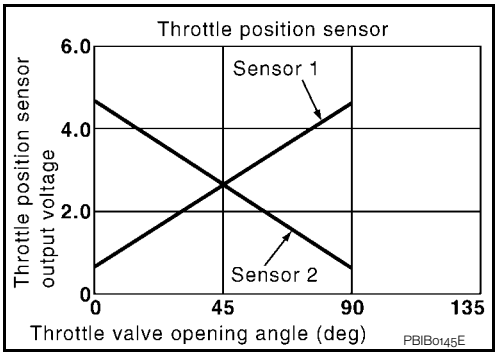
cardiagn.com

P0222, P0223 TP SENSOR

Description

INFOID:0000000001096839

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001096840

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-519, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-480, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096841

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-481, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-482, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096842

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-482, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096843

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P0327, P0328 KS

Description

INFOID:0000000001096846

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001096847

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-483, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096848

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F8	40	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to EC-484, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096849

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

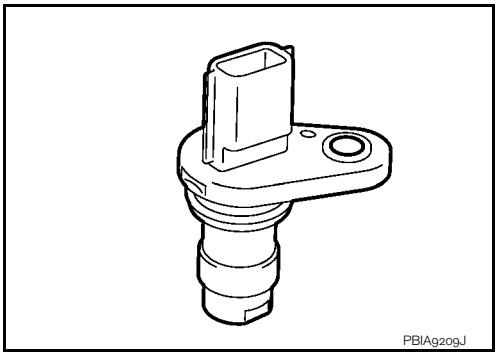
cardiagn.com

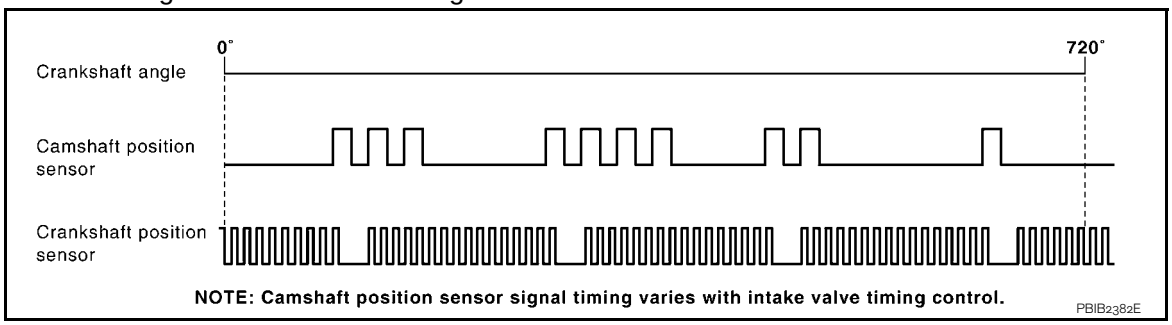
P0335 CKP SENSOR (POS)

Description

INFOID:0000000001096850

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIAg209J



NOTE: Camshaft position sensor signal timing varies with intake valve timing control.
PBIB2382E

DTC Logic

INFOID:0000000001096851

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.

cardiagn.com

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-486, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096852

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to HAC-161, "Component Inspection")

cardiagn.com

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-544, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-545, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F8	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F8	61	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-488, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

cardiagn.com

>> INSPECTION END

Component Inspection

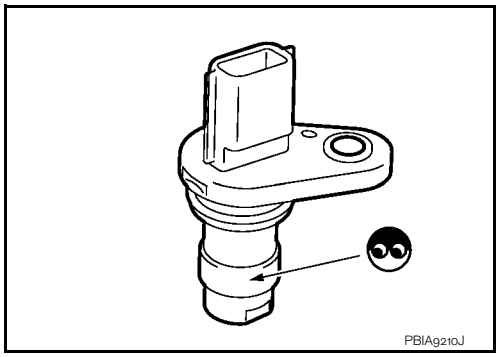
INFOID:0000000001096853

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

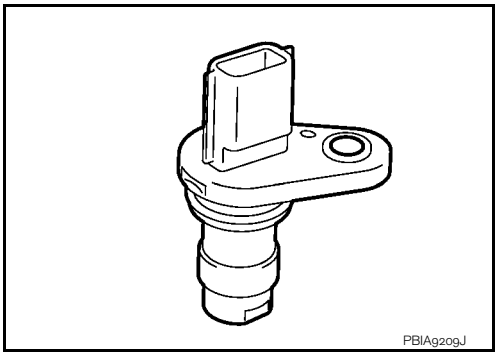
cardiagn.com

P0340 CMP SENSOR (PHASE)

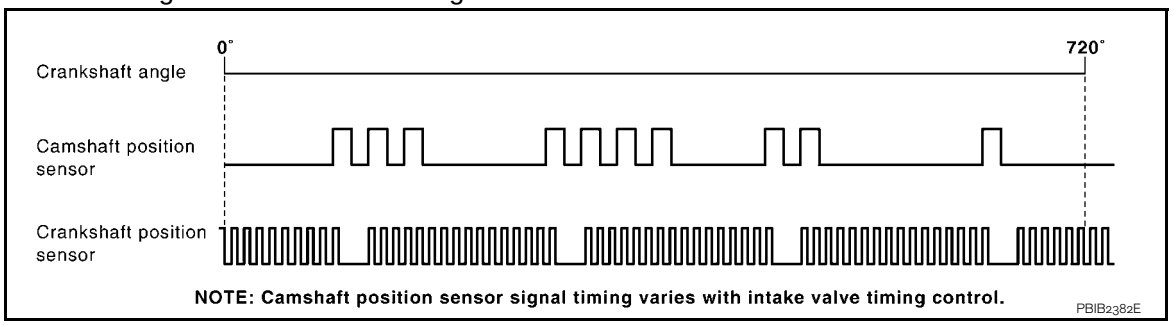
Description

INFOID:0000000001096854

The camshaft position sensor (PHASE) senses the protrusion of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.


PBIAg209J

Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001096855

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-490, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-490, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096856

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F8	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

cardiagn.com

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F8	65	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-491, "Component Inspection".

Is the inspection result normal?

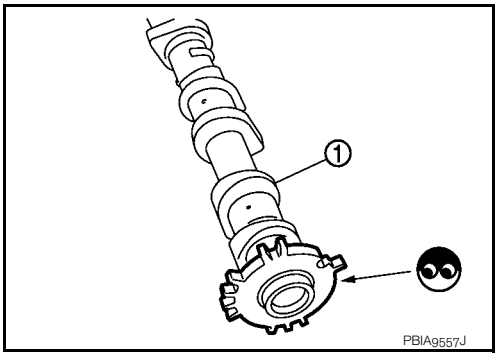
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

Check the following.
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

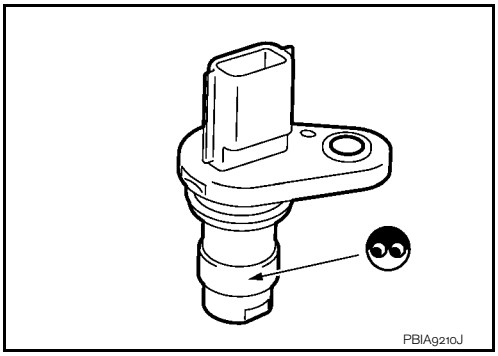
INFOID:0000000001096857

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

cardiagn.com

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

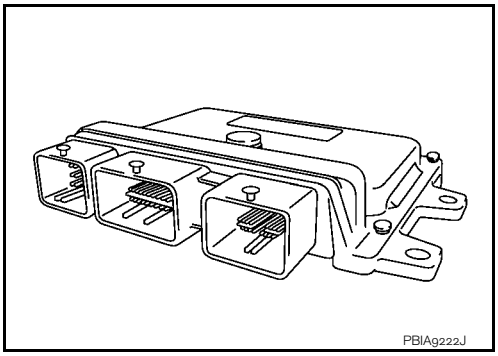
cardiagn.com

P0605 ECM

Description

INFOID:0000000001096869

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001096870

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and waitait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001096871

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-493, "DTC Logic".

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-493, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

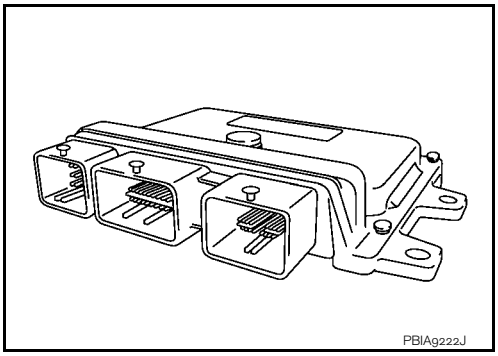
cardiagn.com

P1065 ECM

Description

INFOID:0000000001096872

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.



DTC Logic

INFOID:0000000001096873

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065	Engine control module	ECM back-up RAM system does not function properly.	• ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for four times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-495, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096874

1.INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-495, "DTC Logic".

Without CONSULT-III
1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-495, "DTC Logic".

Is the 1st trip DTC P1065 displayed again?

YES >> GO TO 2.

cardiagn.com

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-368, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

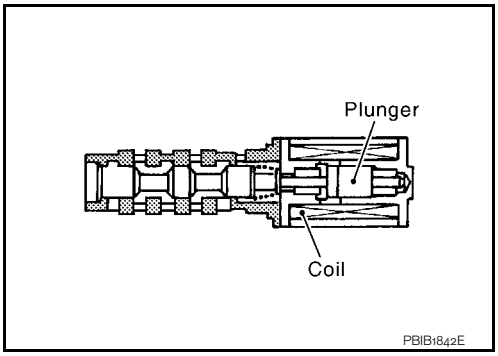
cardiagn.com

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001096875

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:0000000001096876

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-497, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096877

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F41	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN

cardiagn.com

AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	1	F8	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-498, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace intake valve timing control solenoid valve.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096878

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

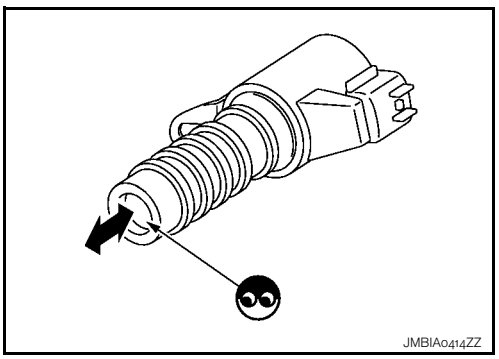
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

cardiagn.com

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001096879

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001096880

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to 1st position and wait at least 3 seconds.
7. Set shift lever to Neutral position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-499, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-499, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

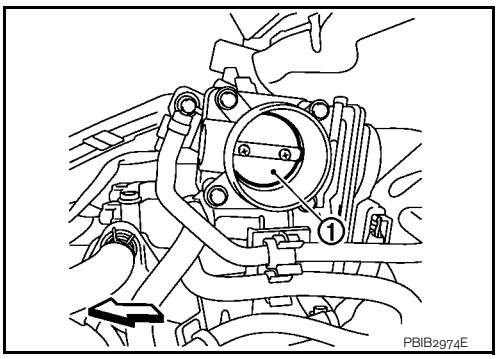
INFOID:0000000001096881

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

cardiagn.com

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-500, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096882

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001096883

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001096884

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-505, "DTC Logic" or EC-499, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-501, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096885

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, E9
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

7.CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

8.CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

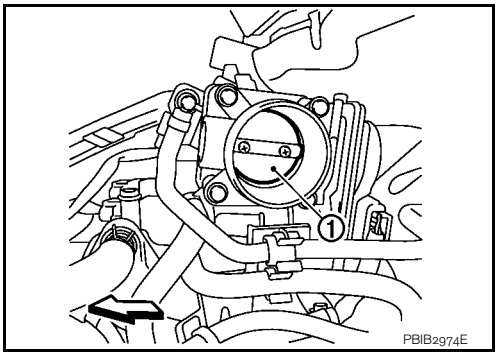
Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 11.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-503, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001096886

cardiagn.com

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25 °C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096887

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001096888

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001096889

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay
P1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P1124 >> GO TO 2.
P1126 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-505, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-505, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096890

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E12.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	15	E12	25	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Reconnect ECM and IPDM E/R harness connectors.
2. Turn ignition switch ON.
3. Check voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

cardiagn.com

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	E12	32	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, E9
- Harness for open or short between throttle motor relay and ECM

>> Repair open or short to ground or short to power in harness or connectors.

8. CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

cardiagn.com

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001096891

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001096892

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-508, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096893

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-509, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-509, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001096894

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance [at 25 °C (77°F)]
5 and 6	Approx. 1 - 15 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-509, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096895

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001116301

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001116302

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-450, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-450, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or short-ed.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-510, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116303

Go to BRC-6, "Work Flow".

cardiagn.com

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001096914

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-450, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-451, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relays -1 and -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Inspection". Also, replace the engine oil. Refer to LU-6, "Inspection".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to LU-6, "Inspection".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-511, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-512, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001096915

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

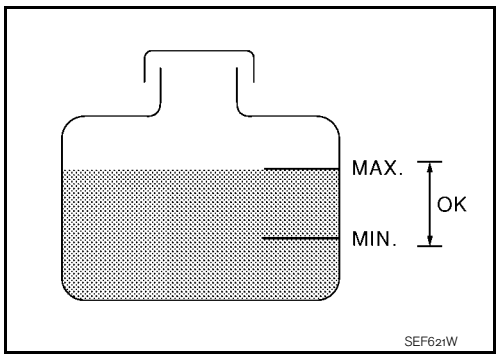
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

cardiagn.com

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-512, "Diagnosis Procedure".
NO >> GO TO 2



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-512, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to PCS-9, "Diagnosis Description".

Diagnosis Procedure

INFOID:0000000001096916

1. CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".
2. Make sure that cooling fan motor operate at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-558, "Diagnosis Procedure".

2. CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.
NO >> GO TO 4.

3. CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-9, "Inspection".
- Hose
- Radiator
- Water pump

cardiagn.com

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-19, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-462, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace engine coolant temperature sensor.

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	CO-9, "Inspection"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-14, "Inspection"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-9, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-20, "Inspection"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-559, "Component Inspection (Cooling Fan Motor)"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-9, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-80, "Inspection"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-101, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

cardiagn.com

*4: After 60 minutes of cool down time.

For more information, refer to CO-5, "Troubleshooting Chart".

>> INSPECTION END

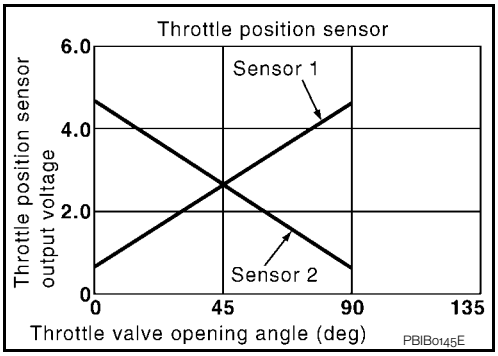
cardiagn.com

P1225 TP SENSOR

Description

INFOID:0000000001096917

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001096918

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-515, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

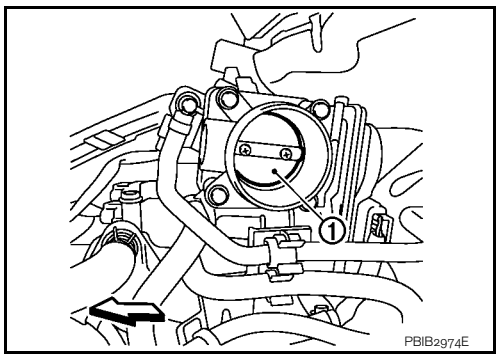
INFOID:0000000001096919

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-516, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096920

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

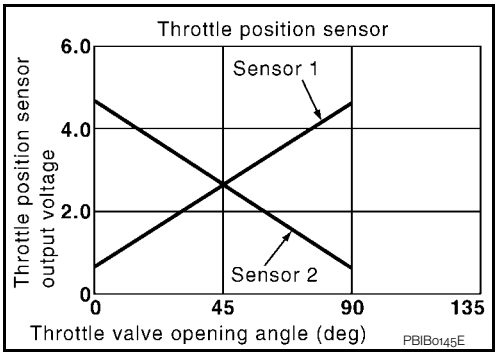
cardiagn.com

P1226 TP SENSOR

Description

INFOID:0000000001096921

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001096922

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-517, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096923

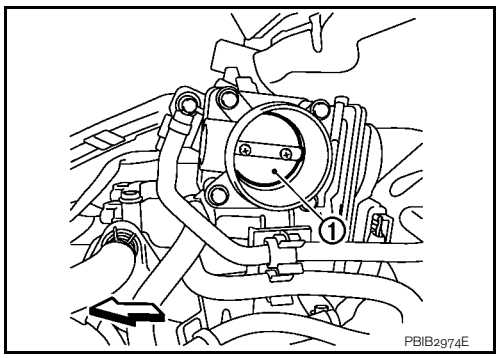
1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

⇦ : Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-516, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096924

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001096925

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-519, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096926

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

cardiagn.com

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	72	Electric throttle control actuator	F29	1
	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	4

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.
• Camshaft position sensor (PHASE) (Refer to EC-491, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5. CHECK TP SENSOR

Refer to EC-481, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-541, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001116278

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-399, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116279

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to EC-521, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116280

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

cardiagn.com

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	94 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector M352.
4. Check the continuity between ASCD steering switch and ECM harness connector.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Check the continuity between ECM harness connector and ASCD steering switch.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
14	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-523, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001116281

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M325	14 and 15	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch

cardiagn.com

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001116282

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-60, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116283

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572	ASCD brake switch	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • ASCD clutch switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:
Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.

cardiagn.com

NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-526, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-526, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component check. Refer to
Use component function check to check the overall function of the ASCD brake circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-526, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001116284

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-826, "Diagnosis Procedure".

2. PERFORM COMPONENT FUNCTION CHECK-II

cardiagn.com

Without CONSSULT-III
Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-826, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001116285

1. CHECK OVERALL FUNCTION-I

With CONSULT-III
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III
Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal and clutch pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III
Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

cardiagn.com

YES >> GO TO 15.
NO >> GO TO 6.

3.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD Clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH

Refer to EC-529, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 11.
NO >> Replace ASCD brake switch.

8. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ASCD brake switch harness connector.

ECM		ASCD brake switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	100	E112	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

Refer to EC-529, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 12.

11. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E114	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

cardiagn.com

Check the following.
• Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-530, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to .

>> INSPECTION ENDGI-39, "Intermittent Incident"

Component Inspection (ASCD Brake Switch)

INFOID:0000000001116286

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001116287

1. CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001116288

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-18, "Inspection and Adjustment"
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

cardiagn.com

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001116289

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-60, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001116290

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-450, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-451, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-493, "DTC Logic"**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-531, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116291

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-57, "DTC No. Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK COMBINATION METER

cardiagn.com

Check combination meter function.
Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

cardiagn.com

P1706 PNP SWITCH

Description

INFOID:0000000001096927

When the shift lever position is in the neutral position, ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001096928

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	Known-good signal
Neutral position	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-534, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	1,925 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.5 - 31.8 msec

cardiagn.com

VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-534, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

Perform component function check. Refer to EC-534, "Component Function Check".

NOTE:

Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-534, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001096929

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	69 (PNP switch signal)	Ground	Shift lever	Neutral position	Approx. 0V
				Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-534, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096930

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F46	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following

- Harness connectors E6, F123
- Harness for open or short between neutral position switch and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F8	69	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to TM-10, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1805 BRAKE SWITCH

Description

INFOID:0000000001096931

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001096932

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-536, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096933

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E105, M77

cardiagn.com

- 10A fuse (No. 11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E114	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to EC-537, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001096934

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-18, "Inspection and Adjustment"(LHD) or BR-62, "Inspection and Adjustment"(LHD).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

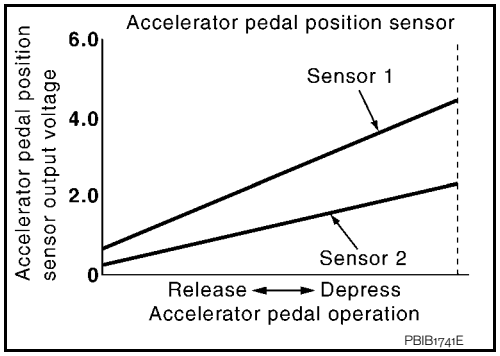
cardiagn.com

P2122, P2123 APP SENSOR

Description

INFOID:0000000001096935

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001096936

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-519, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-539, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096937

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to EC-541, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-541, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection

INFOID:0000000001096938

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-541, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096939

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

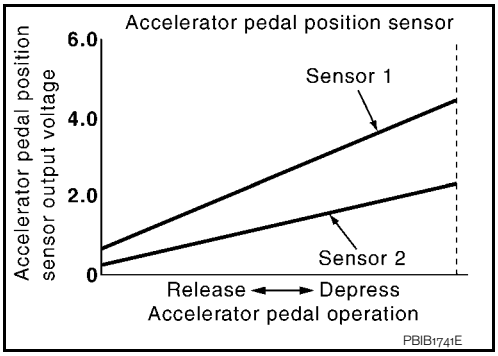
cardiagn.com

P2127, P2128 APP SENSOR

Description

INFOID:0000000001096940

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001096941

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-542, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096942

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-488, "Component Inspection".)
- Refrigerant pressure sensor (Refer to HAC-70, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

cardiagn.com

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-544, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-545, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096943

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-545, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096944

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

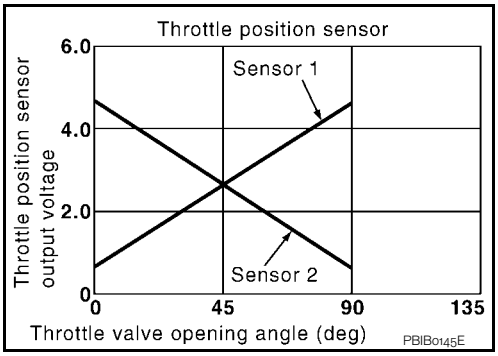
cardiagn.com

P2135 TP SENSOR

Description

INFOID:0000000001096945

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001096946

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-546, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096947

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F8	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-548, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

cardiagn.com

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-548, "Special Repair Requirement"

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096948

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-548, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-548, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096949

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

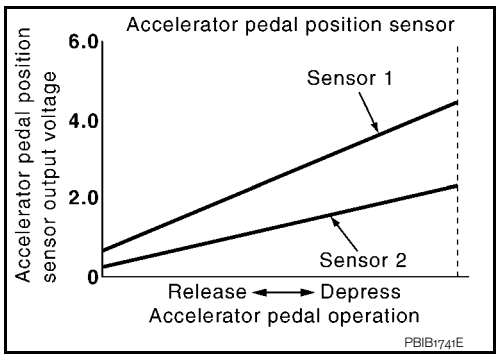
cardiagn.com

P2138 APP SENSOR

Description

INFOID:0000000001096950

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001096951

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-261, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-549, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001096952

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

cardiagn.com

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

cardiagn.com

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-488, "Component Inspection".)
- Refrigerant pressure sensor (Refer to HAC-70, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed
	2		111	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-551, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-552, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096953

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E110	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-552, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001096954

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-369, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-370, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-370, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

ASCD BRAKE SWITCH

Description

INFOID:0000000001096955

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-399, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001096956

1. CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-553, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096957

1. CHECK ASCD BRAKE SWITCH CIRCUIT - I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD clutch switch		Ground	Voltage (V)
Connector	Terminal		
E112	1	Ground	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT - II

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

cardiagn.com

ASCD clutch switch		Ground	Voltage (V)
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH

Refer to EC-555, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace ASCD clutch switch.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-555, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD brake switch.

cardiagn.com

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001096958

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-17, "Removal and Installation" (LHD) or BR-61, "Removal and Installation" (RHD).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001096959

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-8, "Removal and Installation".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

cardiagn.com

ASCD INDICATOR

Description

INFOID:0000000001096960

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-399, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001096961

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-557, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096962

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-450, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-43, "Wiring Diagram - METER -".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

COOLING FAN

Description

INFOID:0000000001096963

Cooling fan operates at low and high speed when the current flows in the cooling fan motor.
Refer to EC-407, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001096964

1.CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan operates at low and high speed.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-9, "Diagnosis Description".
2. Make sure that cooling fan operates at low and high speed.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-558, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096965

1.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E14.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E14	53	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors

2.CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Check the continuity between cooling fan motor harness connector and IPDM E/R harness connector.

Cooling fan motor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E14	52	Existed
			54	

4. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		IPDM/ER		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E10	5	Ground	Existed
			6		

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Resistor E57.
- Harness for open or short between IPDM E/R and cooling fan.
- Harness for open or short between cooling fan and ground.
- Harness for open or short between IPDM E/R and ground.

>> Repair or replace malfunctioning part.

4. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5. CHECK COOLING FAN MOTOR

Refer to EC-559, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning cooling fan motor.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001096966

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E3.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

cardiagn.com

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001096967

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001096968

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-560, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-560, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-560, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096969

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-560, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-3, "Work Flow".

cardiagn.com

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-11, "System Description".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

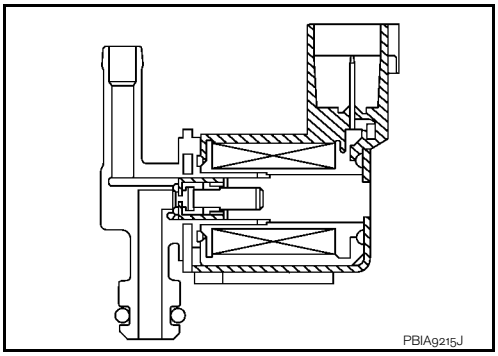
cardiagn.com

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001096861

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



Component Function Check

INFOID:0000000001098054

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE FUNCTION

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle.
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode wit CONSULT-III.
5. Touch “Qu” and “Qd” on CONSULT-III screen to adjust “PURG VOL CONT/V” and check vacuum existence under the following conditions.

PURG VOL CONT/V	Vacuum
100%	Existed
0 %	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle for at least 100 seconds.
4. Check vacuum existence under the following conditions.

Condition	Vacuum
At idle	Not existed
About 2,000 rpm	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-562, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096863

1. CHECK EVAP CANISTER

Refer to EC-636, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.

cardiagn.com

3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 5.
YES-2 >> Without CONSULT-III: GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-564, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

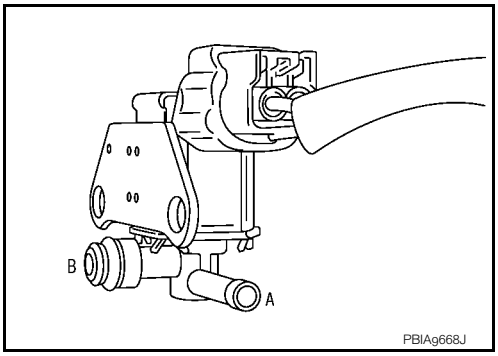
Component Inspection

INFOID:0000000001096864

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

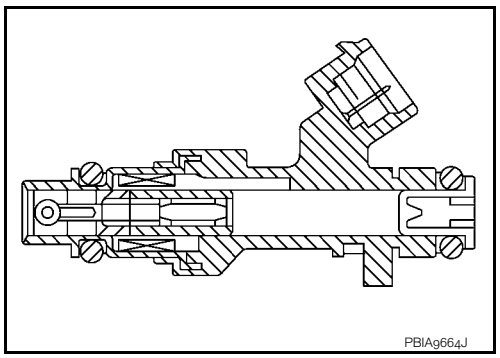
cardiagn.com

FUEL INJECTOR

Description

INFOID:0000000001096970

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000001096971

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-565, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

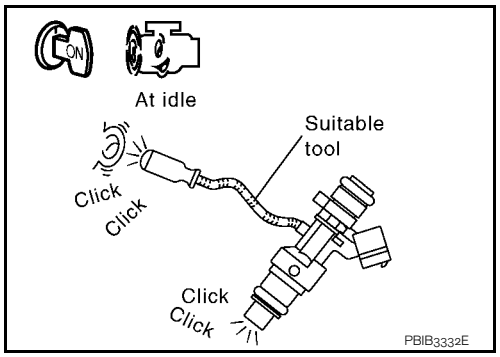
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-565, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096972

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

cardiagn.com

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 58)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	2	F7	31	Existed
2	F38	2		30	
3	F39	2		29	
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-566, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001096973

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

cardiagn.com

Terminals	Resistance [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

cardiagn.com

FUEL PUMP

Description

INFOID:0000000001096974

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

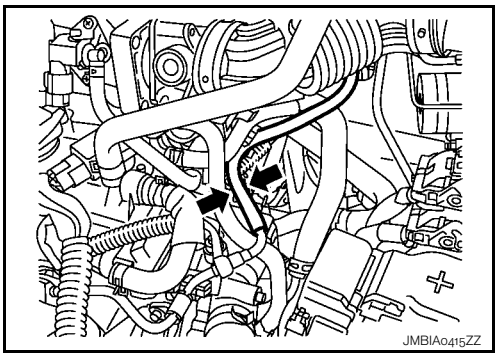
Component Function Check

INFOID:0000000001096975

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-306, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001116057

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	23	E13	33	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E6, F123.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 10A fuse (No. 57) from IPDM E/R.
3. Check 10A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F13	42	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

cardiagn.com

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-928, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001096977

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 3	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

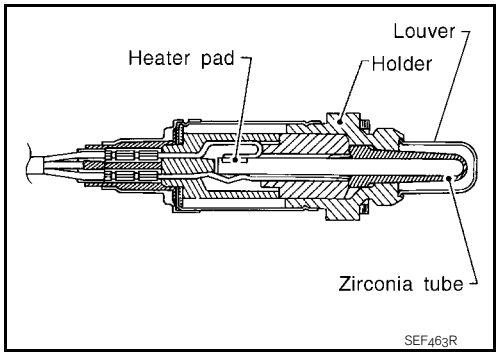
cardiagn.com

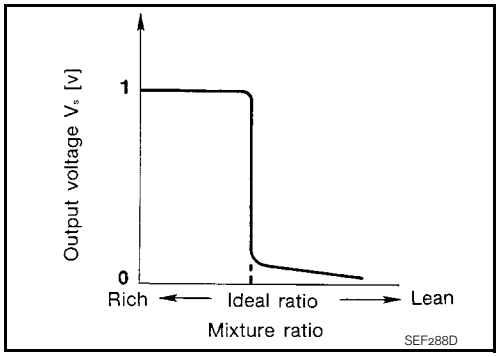
HO2S1

Description

INFOID:0000000001096810

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





Component Function Check

INFOID:0000000001098057

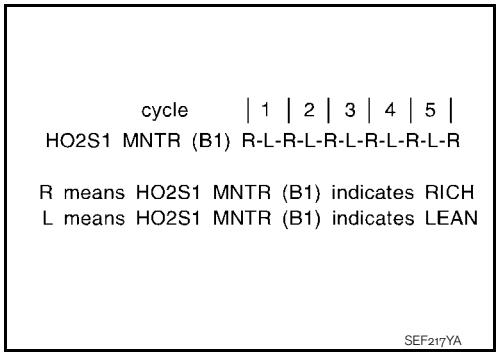
1. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNITOR (B1)” in ”DATA MONITOR” mode with CONSULT-III.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuates between LEAN and RICH more than five times in 10 seconds.

1 times: RICH →LEAN → RICH

2 times: RICH → LEAN → RICH → LEAN → RICH

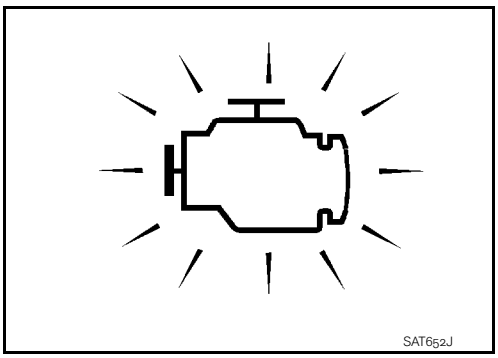


Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Set ECM in Diagnostic test mode - II (Heated oxygen sensor 1 monitor).

cardiagn.com

4. Keep the engine speed at 2,000 rpm under no load, and make sure that the MI comes ON more than five times in 10 seconds.



Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-146, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096812

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

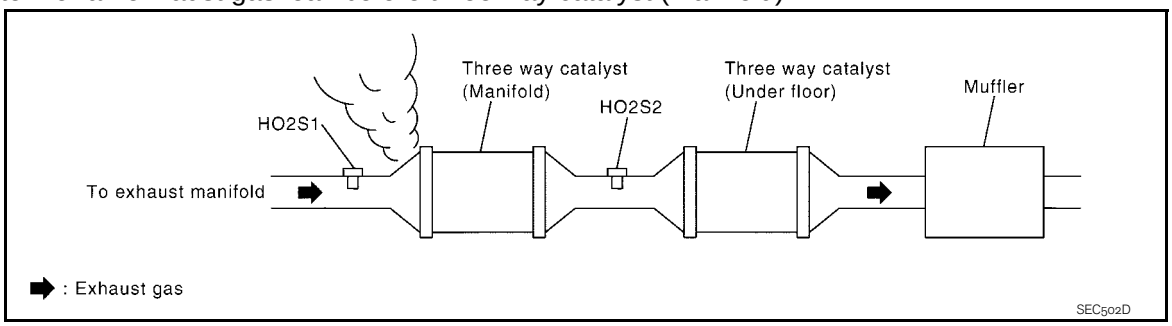
Loosen and retighten the heated oxygen sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

cardiagn.com

2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

2. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-458, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK PCV VALVE

Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace PCV valve.

9.CHECK HEATED OXYGEN SENSOR 1

Perform EC-573, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heated oxygen sensor 1.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096813

cardiagn.com

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

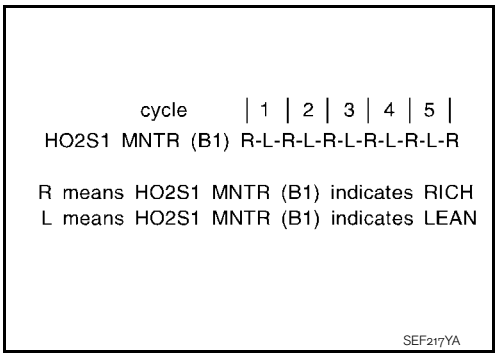
YES >> GO TO 2.
NO >> GO TO 3.

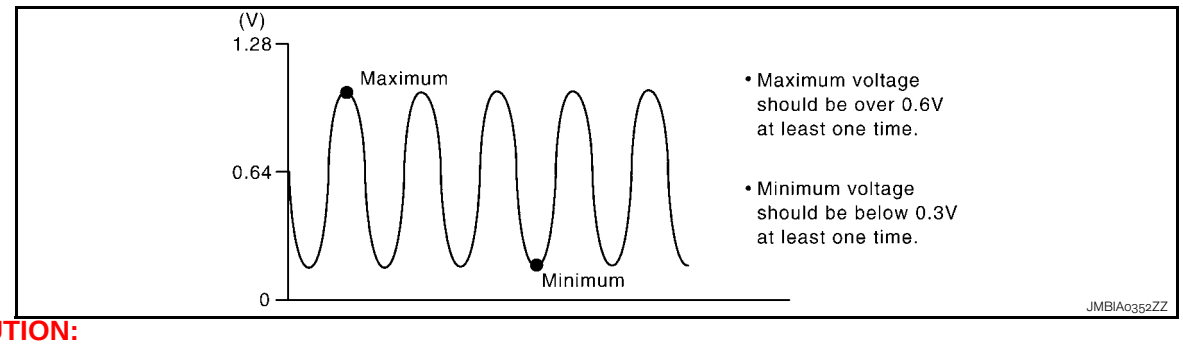
2. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

HO2S1 HEATER

Description

INFOID:0000000001096818

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the Heated oxygen sensor 1 heater corresponding to the engine operating condition to keep the temperature of Heated oxygen sensor 1 element at the specified range.

OPERATION

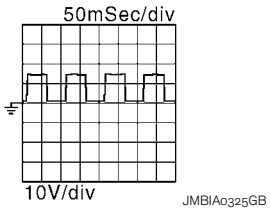
Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up	ON

Component Function Check

INFOID:0000000001102383

1.CHECK HEATED OXYGEN SENSOR 2 HEATER FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Set tester prove between ECM harness connection and ground.
4. Start engine and let it idle.
5. Check the voltage under the following conditions.Verify that the oscilloscope screen shows the signal waves as shown below.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	3 (HO2S1 HEATER signal)	Ground	At idle	Approximately 7.0★ 
			Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-146, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096820

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect HO2S1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F30	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 56)
- Harness for open or short between HO2S1 and fuse

>> Repair or replace harness or connectors.

4. CHECK HO2S1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F7	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S1 HEATER

Refer to EC-578, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 1

Replace Heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor 1 which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor 1, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> Repair or replace.

cardiagn.com

Component Inspection

INFOID:0000000001096821

1. CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

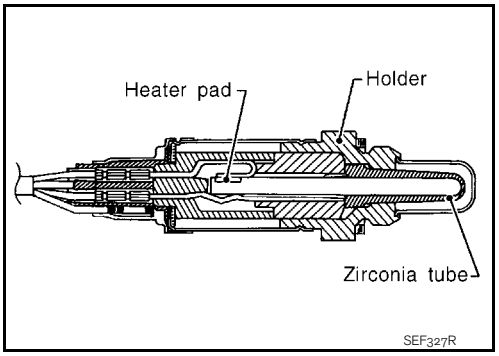
cardiagn.com

HO2S2

Description

INFOID:0000000001096826

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



Component Function Check

INFOID:0000000001102386

1. PERFORM COMPONENT FUNCTION CHECK-I

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 3rd gear position	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1200, "Diagnosis Procedure".

cardiagn.com

Diagnosis Procedure

INFOID:0000000001096829

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F42	1	F13	35	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

- Harness or connectors F121, E7
- Harness for open or short between HO2S2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F42	4	F13	33	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F42	4	F13	33	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

- Harness or connectors F121, E7
- Harness for open or short between HO2S2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-581, "Component Inspection".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096830

1. INSPECTION START

Do you have CONSULT-III?

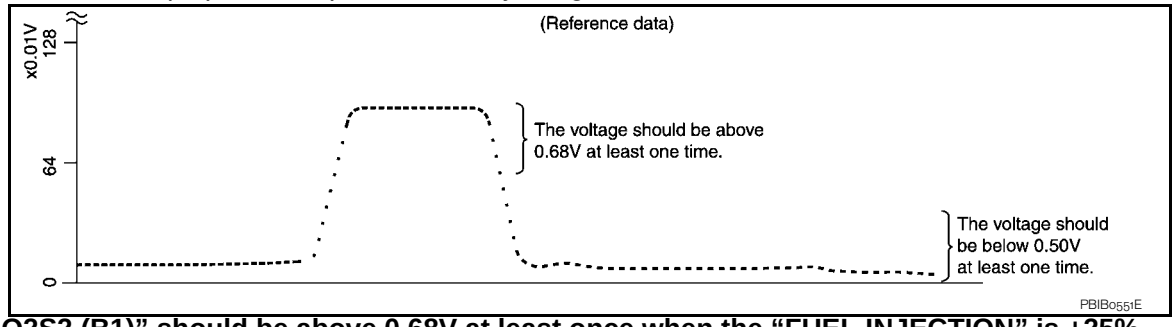
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is –25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

cardiagn.com

4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

HO2S2 HEATER

Description

INFOID:0000000001096831

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

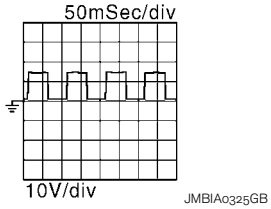
Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,900	OFF
Below 3,900 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Component Function Check

INFOID:0000000001102384

1. CHECK HEATED OXYGEN SENSOR 2 HRATER FUNCTION

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage signal
Connector	Terminal			
F7	5 (HO2S2 heater signal)	Ground	At idle	Approx. 10V★ 
			Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-583, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:0000000001096833

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect HO2S2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E11
- 10A fuse (No. 56)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	3	F7	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between heated oxygen sensor 2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 HEATER

Refer to EC-585, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096834

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

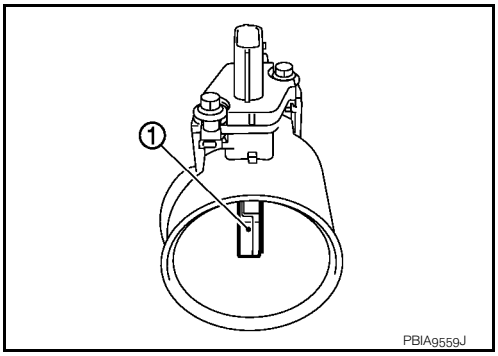
cardiagn.com

IAT SENSOR

Description

INFOID:0000000001096793

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



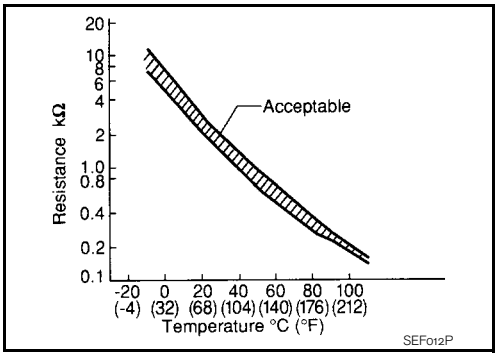
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



Component Function Check

INFOID:0000000001102385

1.CHECK INTAKE AIR TEMPERATURE SENSOR FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	46	Ground	Approx. 0 - 4.8V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-586, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096795

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

cardiagn.com

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F8	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-587, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001096796

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance
1 and 2	Temperature C°° (F°)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

cardiagn.com

IGNITION SIGNAL

Description

INFOID:0000000001096978

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001096979

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-588, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

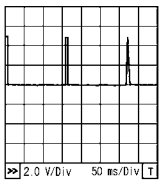
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-588, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal
Connector	Terminal		
F7	17	Ground	
	18		
	22		
	21		

PBIAg2265J

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-588, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096980

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

cardiagn.com

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-446, "Diagnosis Procedure".

2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E11	10	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-446, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CONDENSER

Refer to EC-591, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

cardiagn.com

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F7	17	Existed
2	F34	1		18	
3	F35	1		22	
4	F36	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-591, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001096981

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

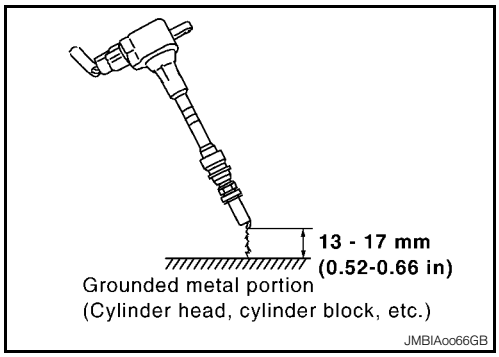
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001096982

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

cardiagn.com

3. Check resistance between condenser terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Above 1 MΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

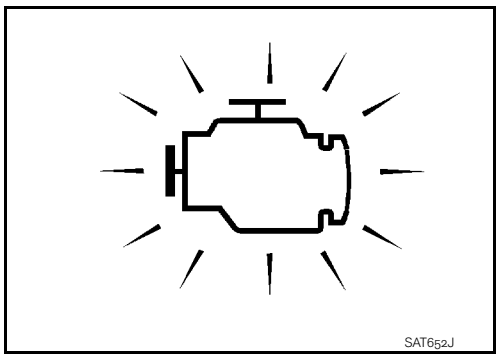
cardiagn.com

MALFUNCTION INDICATOR

Description

INFOID:0000000001096983

The Malfunction Indicator (MI) is located on the combination meter.
The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-593, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001096984

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-593, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096985

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-450, "Diagnosis Procedure".

2.CHECK COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

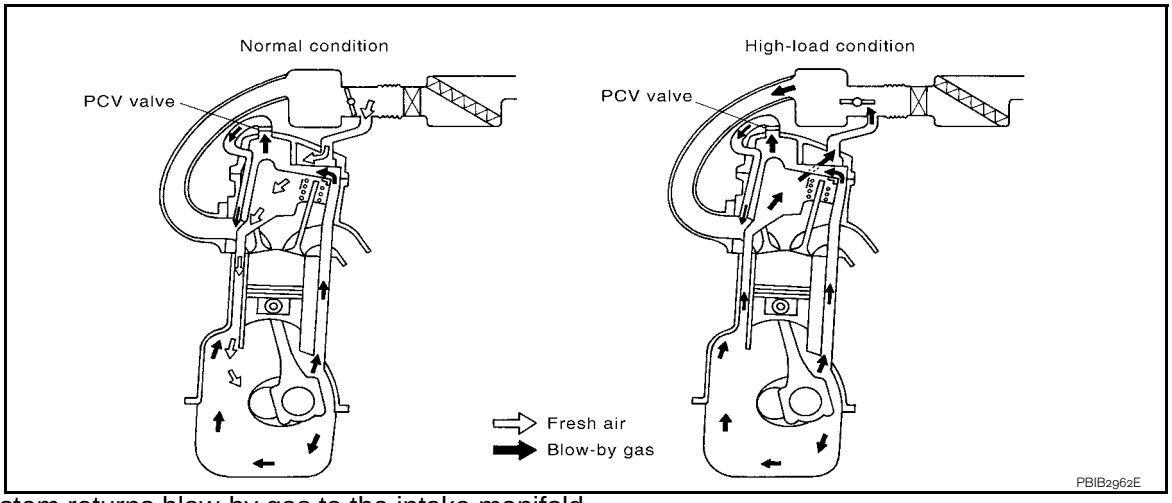
YES >> Replace combination meter.
NO >> Repair or replace.

cardiagn.com

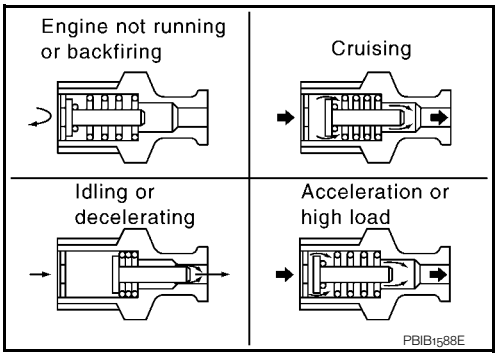
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001096986



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

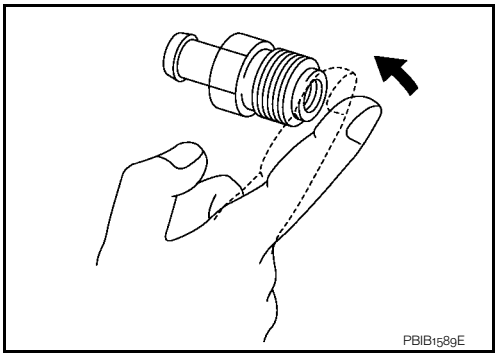


Component Inspection

INFOID:0000000001096987

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve.

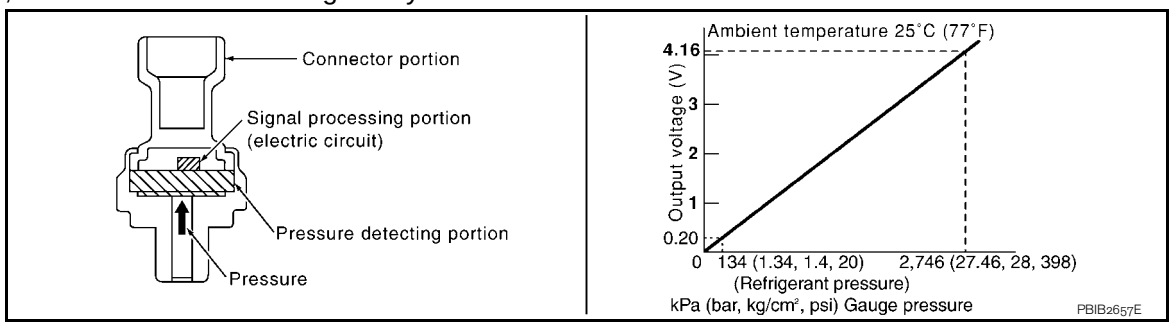
cardiagn.com

REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001096988

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001096989

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-595, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001096990

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

cardiagn.com

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F8	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F8	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

cardiagn.com

VSS

Description

INFOID:0000000001102381

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

Diagnosis Procedure

INFOID:0000000001102382

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III.
5. Select “VHCL SPEED SE” indication whe n rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-35, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK COMBINATION METER FUNCTION

Refer to MWI-27, "DTC Logic".

>> INSPECTION END

cardiagn.com

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001096991

VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

*Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-438, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-438, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-438, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds
HO2S2 MNTR (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: 1st	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1	• Ignition switch: ON (Engine stopped) • Shift lever:1st	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

cardiagn.com

Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: Neutral	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: Neutral • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Below 3,600rpm		ON
	• Engine speed: Above 3,600 rpm		OFF

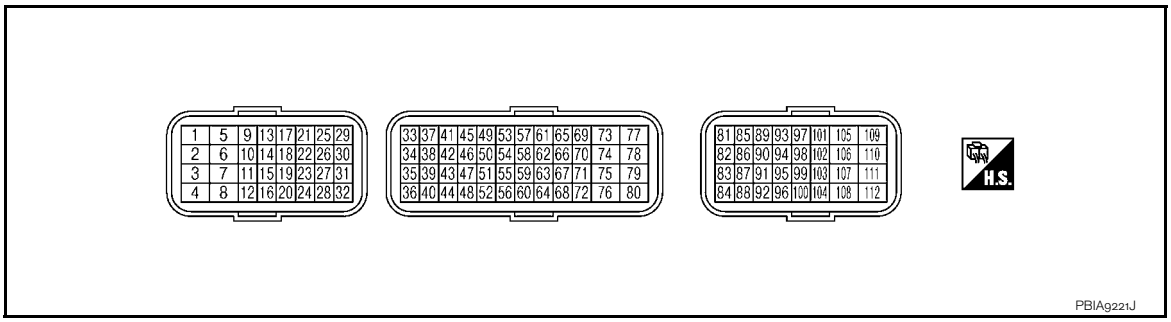
cardiagn.com

Monitor Item	Condition		Values/Status
HO2S2 HTR (B1)	• Engine speed: Below 3,900 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
O2 SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176 − F) • Engine speed: Below 3,600 rpm		Approx. 30%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal and clutch pedal: Fully released	ON
		Brake pedal and/or clutch pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

cardiagn.com

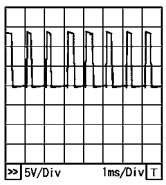
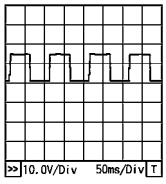
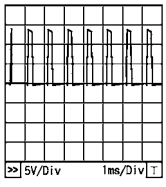
TERMINAL LAYOUT



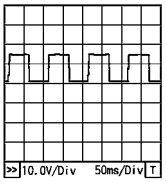
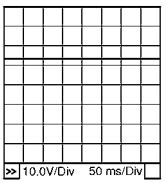
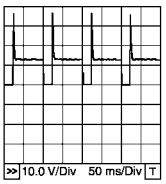
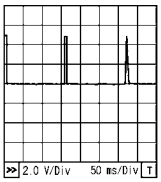
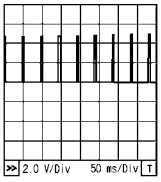
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

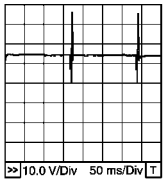
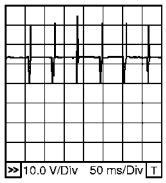
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
1	Ground	L/W	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	3.2V★  PBIA8150J
2	Ground	R/Y	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3	Ground	LG/R	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm up condition • Engine speed: Below 3,600 rpm	Approximately 3.2V★  PBIA8148J
					[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	0 - 14V★  PBIA8149J

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,900 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  PBIA8148J
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/B	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  PBIB0520E
10 11	Ground	B B/W	ECM ground	—	[Engine is running] • Idle speed	Body ground
15	Ground	G/L	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V
17 18 21 22	Ground	L/Y BR/Y R/G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  PBIA9265J
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5V★  PBIA9266J

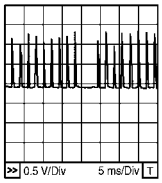
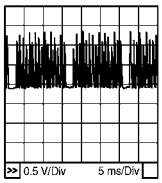
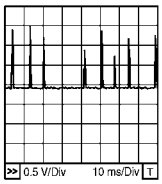
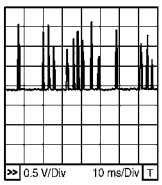
cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
					[Ignition switch: ON] • More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	Ground	R/O Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIA4943J
32	Ground	Y/L	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
33	Ground	L/R	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	L/O	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	More than 0.36V

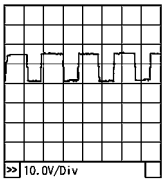
cardiagn.com

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
36	Ground	V/W	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	GR/B	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	—	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G/P	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
44	Ground	B	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4V
					[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
					[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	1.0 - 1.3 to 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46	Ground	V	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48	Ground	R/L	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
49	Ground	L/G	Heated oxygen sensor 1	—	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V (Periodically change)
50	Ground	Y	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	P	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	LG/B	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1453E
					[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★  MBIB1454E
62	Ground	GR/L	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	L	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
65	Ground	G	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1455E
					[Engine is running] • Engine speed is 2,000 rpm	0 - 1.0V★  MBIB1456E
69	Ground	W/B	Neutral position switch	Input	[Ignition switch: ON] • Neutral	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above position	0V
72	Ground	V/R	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V

cardiagn.com

Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
73	Ground	Y/R	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
					[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 10V★  PBIA4937J
74	Ground	Y/W	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
75	Ground	L/W	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	Y/V	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III: Disconnected	2.7V
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

cardiagn.com

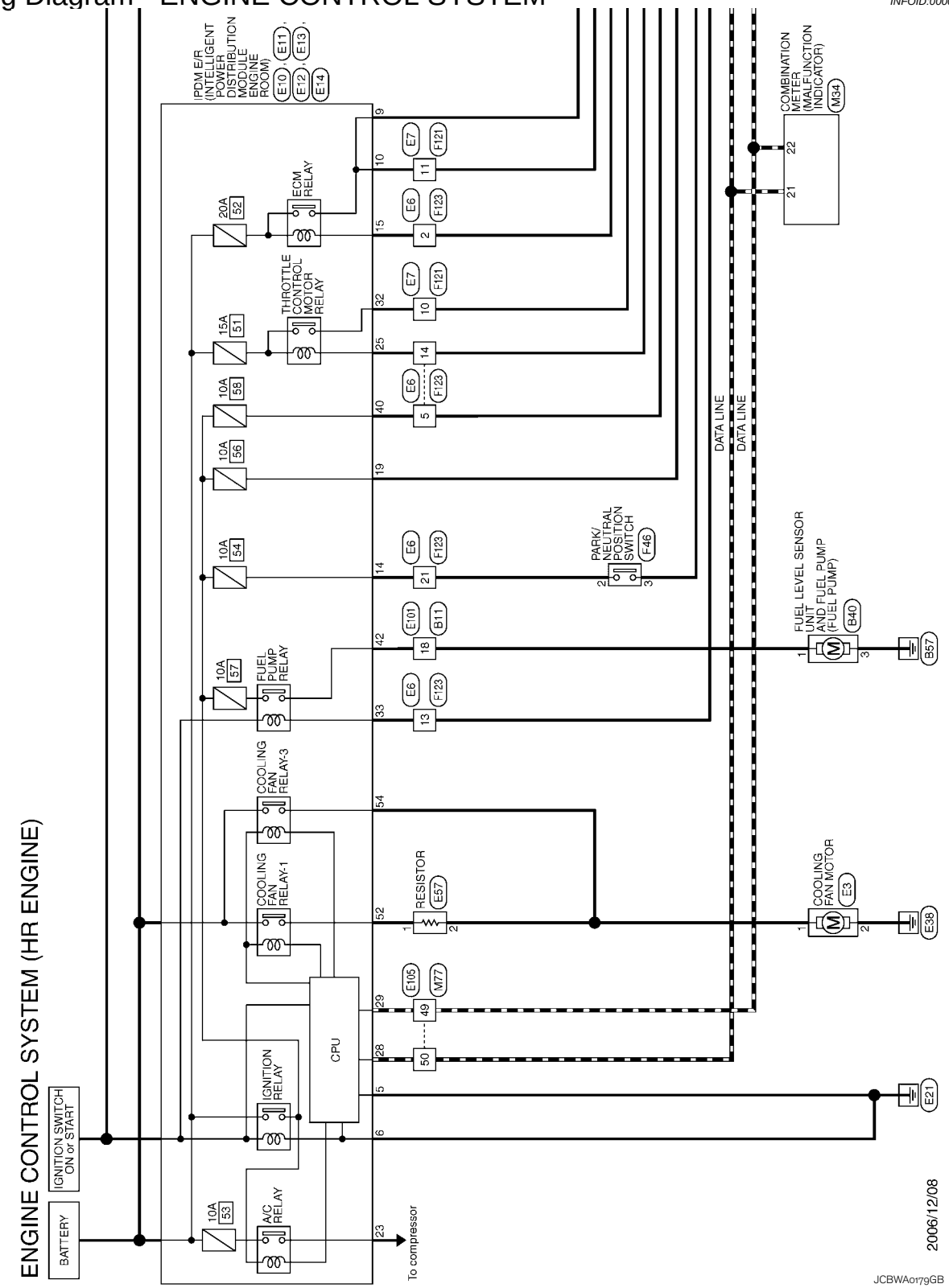
Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
100	Ground	R	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal and clutch pedal: Slightly depressed	0V
					[Ignition switch: ON] • Brake pedal and/or clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
103	Ground	GR	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Ground	Y	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	V	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground
110	Ground	G	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	Ground	R	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

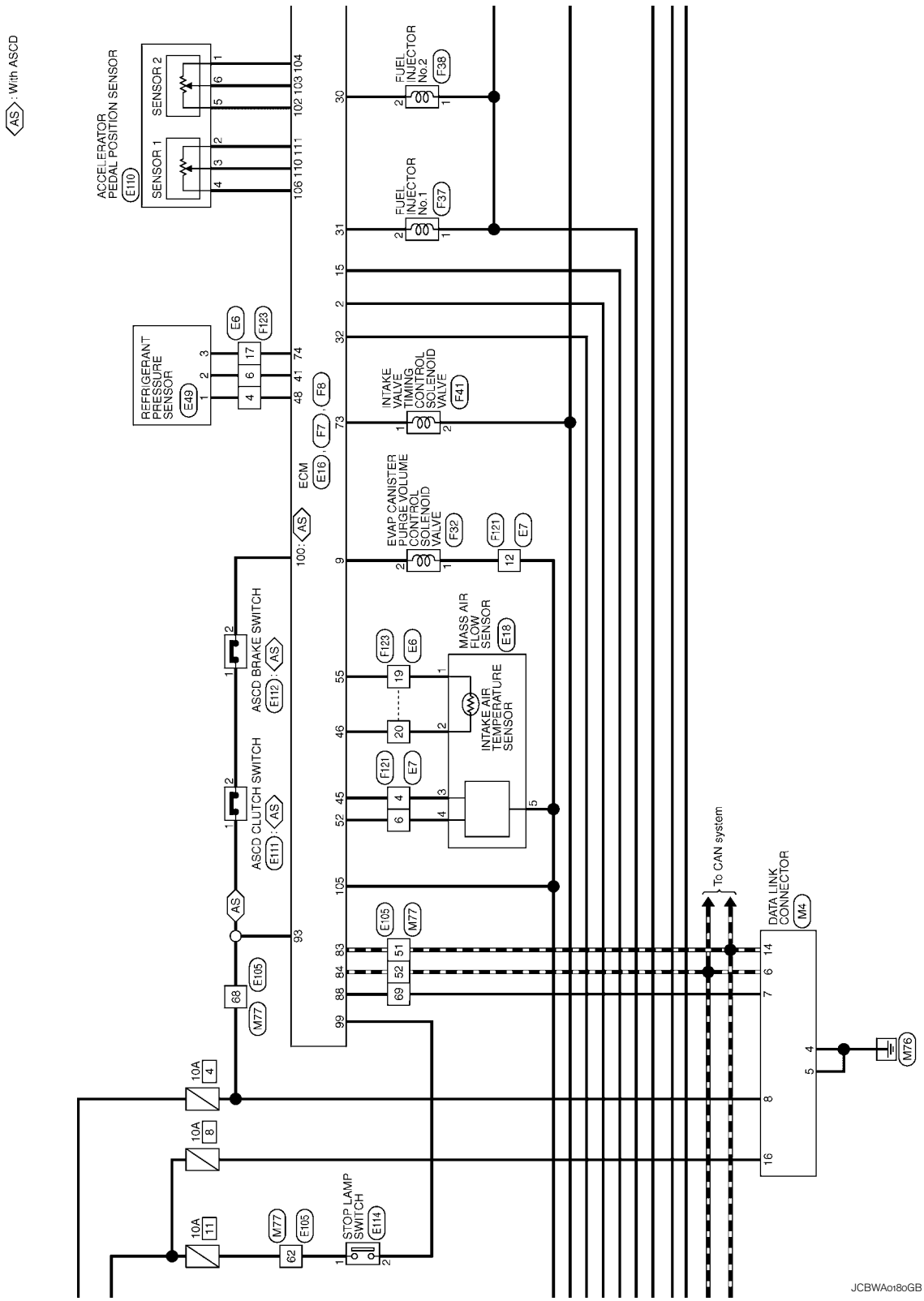
cardiagn.com

Wiring Diagram - ENGINE CONTROL SYSTEM -

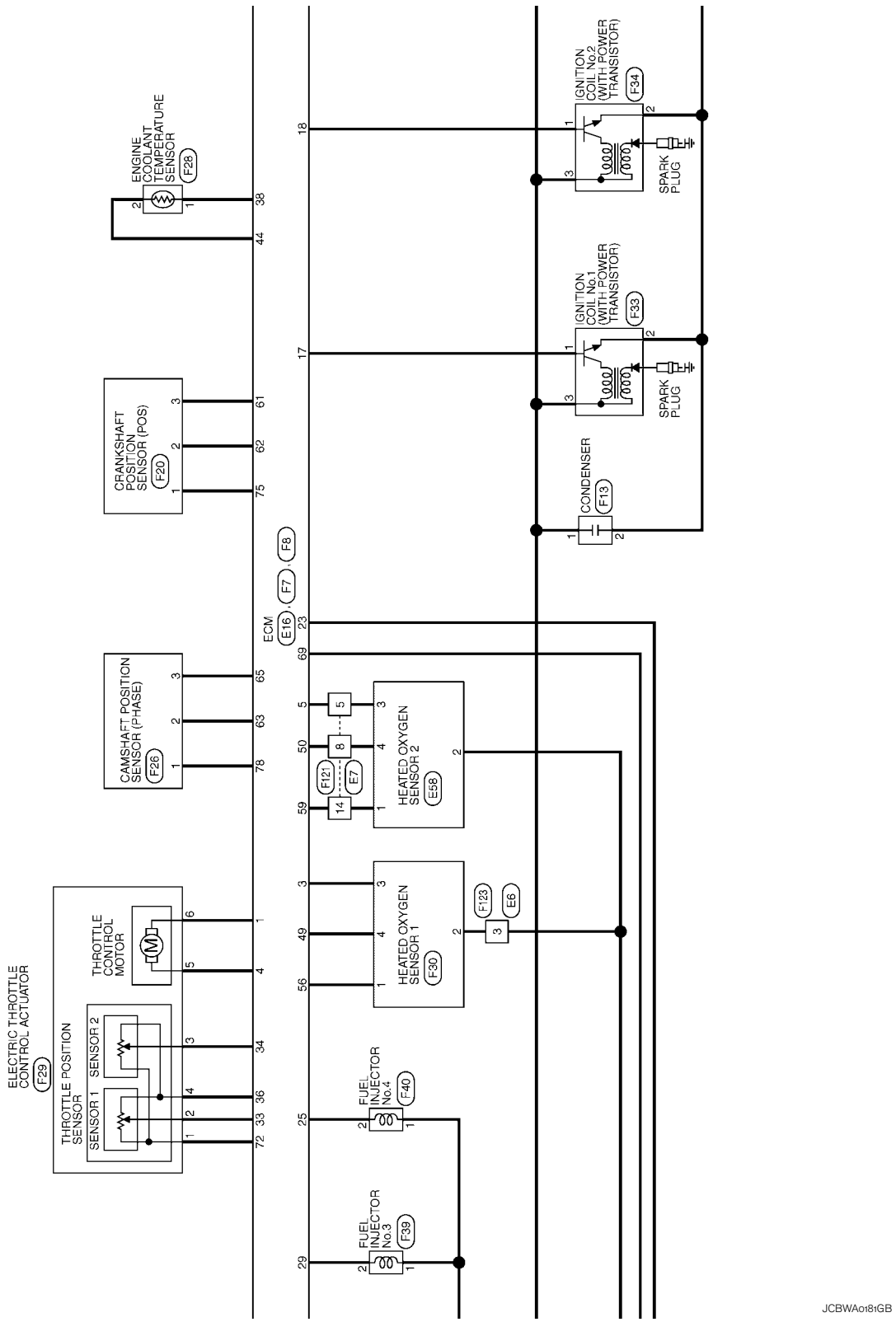
INFOID:0000000001125392



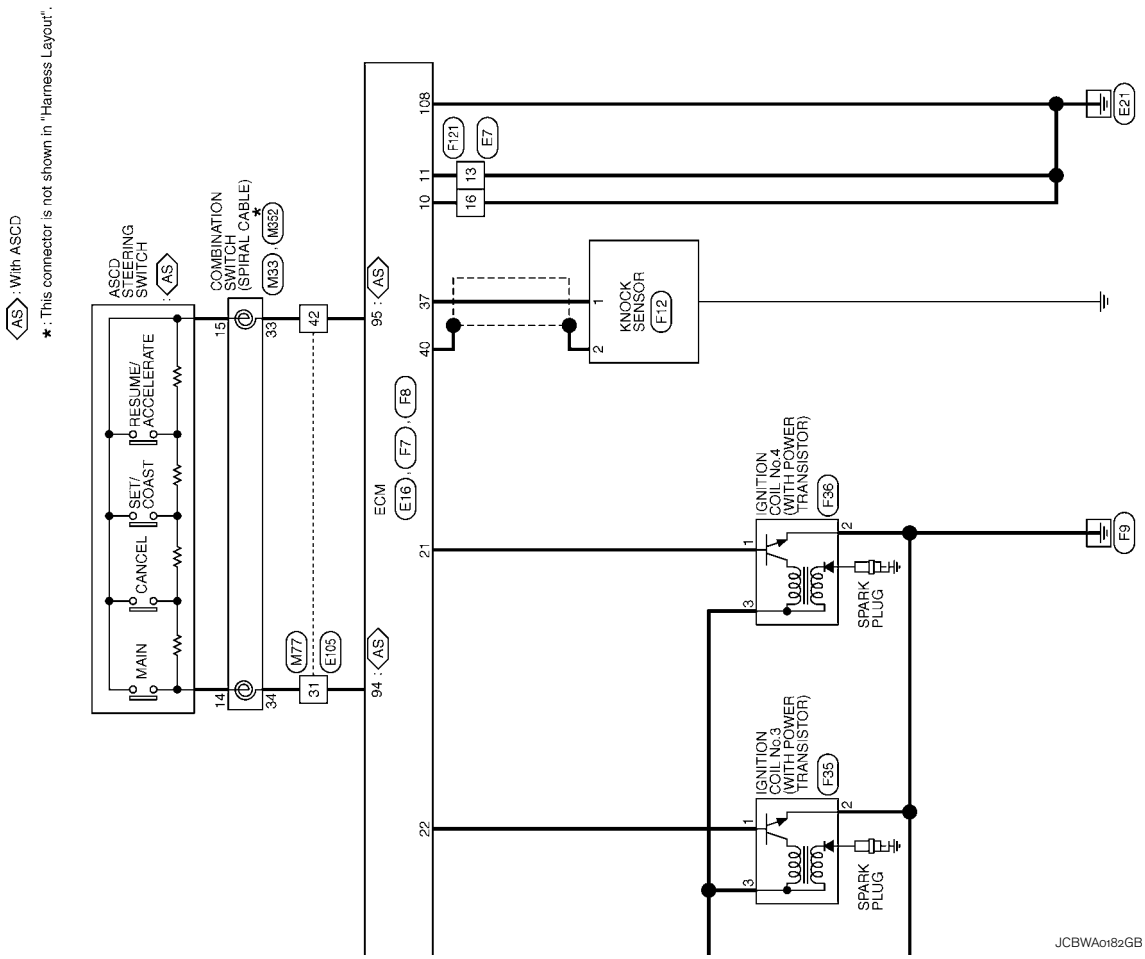
cardiagn.com



cardiagn.com

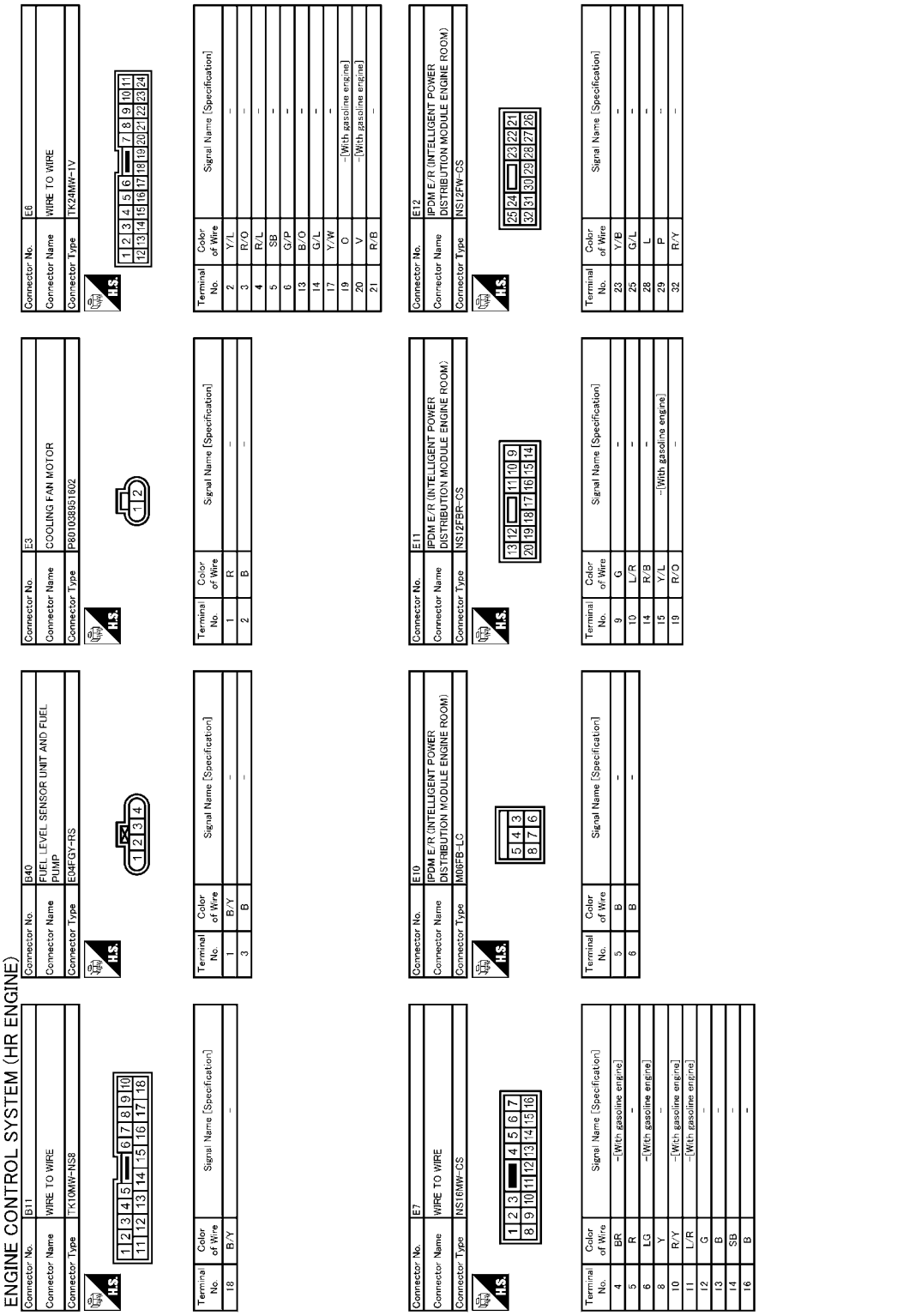


cardiagn.com



cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)



JCBWA0183GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
33	B/O	–
40	BR/Y	– [With HR engine]
42	B/Y	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	Y2K 7263-5591-40-F

Terminal No.	Color of Wire	Signal Name [Specification]
52	W	–
54	R	–

Connector No.	E16
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
83	P	CAN-LI
84	L	CAN-HI
88	O	K-LINE
93	W/L	IGN SW
94	V	ASCD STRG SW
95	B	GND-ASCD STRG SW
99	R/W	BRAKE
100	R	BNCSW(BNC)
102	BR	AVCC-APS2[With HR engine]
103	GR	APS2
104	Y	GND-A-APS2[With HR engine]

105	G	VBR
106	V	AVCC-APS1[With HR engine]
108	B	GND
110	G	APS1[With HR engine]
111	R	GND-A-APS1[With HR engine]

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH05FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	V	–
3	BR	–
4	LG	–
5	G	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	–
2	G/P	–
3	Y/W	–

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P801038951602

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	R	–

Connector No.	E58
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AF204FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–
3	R	–
4	Y	–

JCBWA0184GB

cardiagn.com

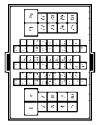
ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TK10FW-NS8



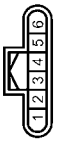
Terminal No.	Color of Wire	Signal Name [Specification]
18	B/Y	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-NS16-TM4



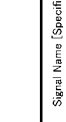
Terminal No.	Color of Wire	Signal Name [Specification]
31	V	–
42	B	–
49	P	–
50	L	–
51	P	–
52	L	–
62	V	–
68	W/L	–
69	O	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	– [With HR engine]
2	R	– [With HR engine]
3	G	– [With HR engine]
4	V	– [With HR engine]
5	BR	– [With HR engine]
6	GR	– [Except K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC

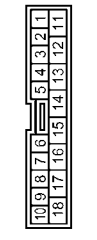


Terminal No.	Color of Wire	Signal Name [Specification]
1	W/L	– [With gasoline engine]
2	O	– [With gasoline engine]

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC

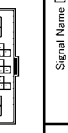
Terminal No.	Color of Wire	Signal Name [Specification]
1	O	– [With M/T]
1	W/L	– [With CVT]
2	R	–

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–

Connector No.	F7
Connector Name	ECM
Connector Type	MAA24FGY-MEA8-RH



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	MOTOR1
2	R/Y	VMOT
3	LG/R	O2HF[With HR engine]
4	P	MOTOR2
5	R	O2HR
9	W/B	EVAP
10	B	GND
11	B/W	GND
15	G/L	MOTRLY
17	L/Y	IGN COIL#1
18	BR/Y	IGN COIL#2
21	R/G	IGN COIL#4
22	Sb	IGN COIL#3[With HR engine]
23	B/O	FPR
25	R/O	INJ#4
29	Y	INJ#3[With HR engine]
30	O	INJ#2[With HR engine]
31	L	INJ#1
32	Y/L	SSOFF

JCBWA0185GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F8
Connector Name	ECM
Connector Type	MA40FBR-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
33	L/R	TPS1[With HR engine]
34	L/O	TPS2[With HR engine]
36	V/W	GND-A TPS[With HR engine]
37	W	KNK
38	GR/B	TW[With HR engine]
40	SHIELD	GND-A KNK
41	G/P	PDPRESS
44	B	GND-A TW[With HR engine]
45	BR	OA+
46	V	TA
48	R/L	GND-A(PDPRES)

Connector No.	F20
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	-
2	GR/L	-[With HR engine]
3	LG/B	-

Terminal No.	Color of Wire	O2SF[With HR engine]
49	L/G	O2SR
50	Y	OA-
52	LG	GND-TA
55	O	GND-A O2SF[With HR engine]
56	P	O2SR-GND
59	SB	POS
61	LG/B	GND-POS[With HR engine]
62	GR/L	GND-(A)-PHASE[With HR engine]
63	L	PHASE[With HR engine]
65	G	NEUT HIGH
69	W/B	AVCC-TPS[With HR engine]
72	V/R	CYTC
73	Y/R	AVCC(PDPRES)
74	Y/W	POS AVCC
75	L/W	PHASE AVCC
76	Y/V	

Connector No.	F26
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/V	-
2	L	-[With HR engine]
3	G	-[With HR engine]

Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BS02FB-AHY-S

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-
2	B/W	-

Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR/B	-[With HR engine]
2	B	-[With HR engine]

Connector No.	F13
Connector Name	CONDENSER
Connector Type	M02FW-GY-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/R	-
2	B	-

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	V/R	-[With HR engine]
2	L/R	-[With HR engine]
3	L/O	-[With HR engine]
4	V/W	-[With HR engine]
5	P	-
6	L/W	-

JCBWA0186GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F30
Connector Name	HEATED OXYGEN SENSOR 1
Connector Type	AFZ04FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	– [With HR engine]
2	R/O	–
3	LG/R	– [With HR engine]
4	L/G	– [With HR engine]

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL-RS-LGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	W/B	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	–
2	B	–
3	L/R	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	BR/Y	–
2	B	–
3	L/R	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	– [With HR engine]
2	B	–
3	L/R	–

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/G	–
2	B	–
3	L/R	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	L	–

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	O	– [With HR engine]

JCBWA0187GB

cardiagn.com

ENGINE CONTROL SYSTEM (HR ENGINE)

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	Y	–[With HR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–

Connector No.	F41
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/R	–
2	L/R	–

Connector No.	F46
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	FEA03FG

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
2	R/B	–
3	W/B	–

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS

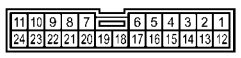
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	BR	–[With gasoline engine]
5	R	–
6	LG	–[With gasoline engine]
8	Y	–
10	R/Y	–[With gasoline engine]
11	L/R	–[With gasoline engine]
12	G	–
13	B	–
14	SB	–
16	B	–

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

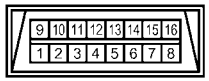
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
2	Y/L	–
3	R/O	–
4	R/L	–
5	SB	–
6	G/P	–
13	B/O	–
14	G/L	–
17	Y/W	–
19	O	–[With gasoline engine]
20	V	–[With gasoline engine]
21	R/B	–

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	B	–
5	B	–
6	L	–
7	O	–
8	W	–
14	P	–
16	Y	–

Connector No.	M33
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FGY-1V

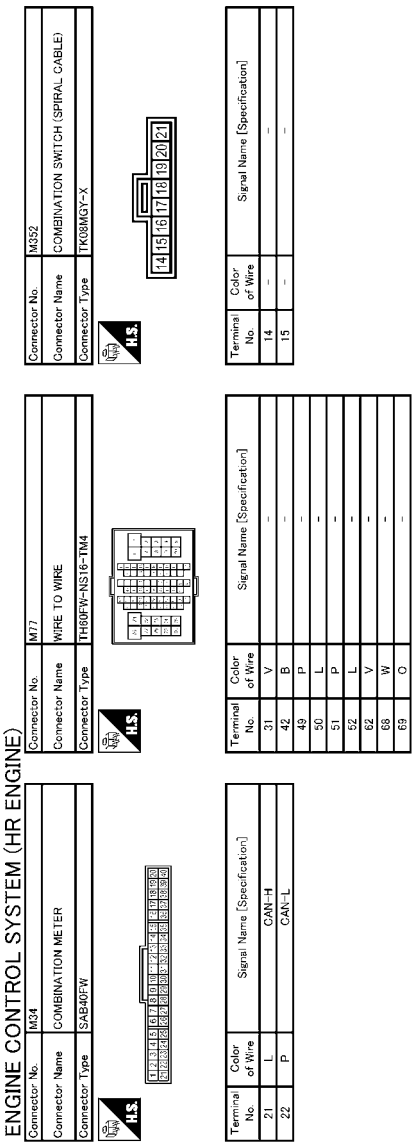
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
33	B	–
34	V	–

JCBWA0188GB

cardiagn.com



JCBWA0189GB

Fail Safe

INFOID:0000000001096993

NON DTC RELATED ITEM

cardiagn.com

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	EC-426

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in Neutral position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

cardiagn.com

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition: When engine is idling — Driving condition: Normal Vehicle condition: When accelerating — Driving condition: Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000001096994

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1001 CAN communication line • U1010 CAN communication • P0102 P0103 Mass air flow sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0134 Heated oxygen sensor 1 • P0138 Heated oxygen sensor 2 • P1065 ECM power supply • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1564 ASCD steering switch • P1572 ASCD brake switch • P1572 ASCD vehicle speed sensor • P1805 Brake switch
3	• P0011 Intake valve timing control • P1121 Electric throttle control actuator • P1212 ESP communication line

DTC Index

INFOID:0000000001096995

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III*2	ECM*3				
U1001	1001*4	CAN COMM CIRCUIT	2	—	EC-450
U1010	1010	CONTROL UNIT(CAN)	2	—	EC-451
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	**Flashing**	**—**
P0011	0011	INT/V TIM CONT-B1	2	—	EC-452

cardiagn.com

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III*2	ECM*3				
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	EC-456
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	EC-456
P0117	0117	ECT SEN/CIRC	1	×	EC-461
P0118	0118	ECT SEN/CIRC	1	×	EC-461
P0122	0122	TP SEN 2/CIRC-B1	1	×	EC-464
P0123	0123	TP SEN 2/CIRC-B1	1	×	EC-464
P0132	0132	HO2S1 (B1)	2	×	EC-467
P0134	0134	HO2S1 (B1)	2	×	EC-471
P0138	0138	HO2S2 (B1)	2	×	EC-475
P0222	0222	TP SEN 1/CIRC-B1	1	×	EC-480
P0223	0223	TP SEN 1/CIRC-B1	1	×	EC-480
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-483
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-483
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-485
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-489
P0605	0605	ECM	1 or 2	× or —	EC-493
P1065	1065	ECM BACK UP/CIRCUIT	2	×	EC-495
P1111	1111	INT/V TIM C/CIRC	1	×	EC-497
P1121	1121	ETC ACTR-B1	1	×	EC-499
P1122	1122	ETC FUNCTION/CIRC-B1	1	×	EC-501
P1124	1124	ETC MOT PWP	1	×	EC-505
P1126	1126	ETC MOT PWP-B1	1	×	EC-505
P1128	1128	ETC MOT-B1	1	×	EC-508
P1212	1212	TCS/CIRC	2	—	EC-252
P1217	1217	ENG OVER TEMP	1	×	EC-511
P1225	1225	CTP LEARNING-B1	2	—	EC-515
P1226	1226	CTP LEARNING-B1	2	—	EC-517
P1229	1129	SENSOR POWER/CIRC	1	×	EC-519
P1564	1564	ASCD SW	1	—	EC-263
P1572	1572	ASCD BRAKE SW	1	—	EC-266
P1574	1574	ASCD VHL SPD SEN	1	—	EC-272
P1610	1610	LOCK MODE	2	—	SEC-14
P1611	1611	ID DISCARD IMM-ECM	2	—	SEC-14
P1612	1612	CHAIN OF ECM-IMMU	2	—	SEC-14
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-14
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-533
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-536
P2122	2122	APP SEN 1/CIRC	1	×	EC-539
P2123	2123	APP SEN 1/CIRC	1	×	EC-539
P2127	2127	APP SEN 2/CIRC	1	×	EC-542
P2128	2128	APP SEN 2/CIRC	1	×	EC-542
P2135	2135	TP SENSOR-B1	1	×	EC-546
P2138	2138	APP SENSOR	1	×	EC-549

cardiagn.com

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

cardiagn.com

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001096998

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-306
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-634
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-565
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-413
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-594
	Incorrect idle speed adjustment						1	1	1	1		1			EC-369
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-217, EC-219, EC-499
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-369
	Ignition circuit	1	1	2	2	2		2	2			2			EC-588
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-446
Mass air flow sensor circuit		1			2										EC-456, EC-456
Engine coolant temperature sensor circuit							3			3					EC-461
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-467, EC-471, EC-571, EC-571, EC-571
Throttle position sensor circuit							2			2					EC-464, EC-480, EC-515, EC-517, EC-546
Accelerator pedal position sensor circuit				3	2	1									EC-539, EC-542, EC-549
Knock sensor circuit				2								3			EC-483

cardiagn.com

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												EC-485
Camshaft position sensor (PHASE) circuit	3	2												EC-489
Vehicle speed signal circuit		2	3		3						3			EC-597
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-493, EC-495
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-497
PNP switch circuit			3		3		3	3			3			EC-533
Refrigerant pressure sensor circuit		2				3			3		4			EC-595
Electrical load signal circuit							3							EC-560
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-108 ,HAC-187
ABS actuator and electric unit (control unit)			4											BRC-9

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FL-16 ,FL-19
	Fuel piping			5	5	5		5	5			5			FL-5
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct														EM-28
	Air cleaner														EM-28
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5	5	5	5	5	5	5	5	5		5			EM-28
	Electric throttle control actuator														EM-29
	Air leakage from intake manifold/ Collector/Gasket														EM-29
Cranking	Battery	1	1	1		1		1	1			1		1	PG-3
	Generator circuit														CHG-15
	Starter circuit	3													STR-18
	Signal plate	6													EM-101
	PNP switch	4													TM-10
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-80
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-101
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-53
	Camshaft														EM-65
	Intake valve timing control														EM-53
	Intake valve												3		EM-80
	Exhaust valve														

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-75, EM-32
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-42, EM-92, LU-9, LU-3
	Oil level (Low)/Filthy oil														LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-12
	Thermostat									5					CO-20
	Water pump														CO-18
	Water gallery														CO-22
	Cooling fan									5					CO-15
	Coolant level (Low)/Contaminat-ed coolant														CO-9
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-14

1 - 6: The numbers refer to the order of inspection.

cardiagn.com

NORMAL OPERATING CONDITION

Description

INFOID:0000000001096999

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the shift lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-379, "System Description".

cardiagn.com

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001100457

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

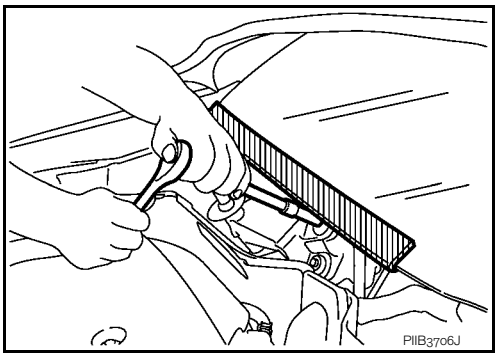
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRC section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001097001

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001097002

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)**
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

On Board Diagnostic (OBD) System of Engine

INFOID:0000000001097003

cardiagn.com

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

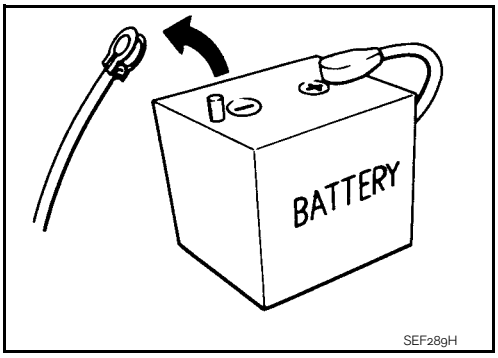
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-105, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

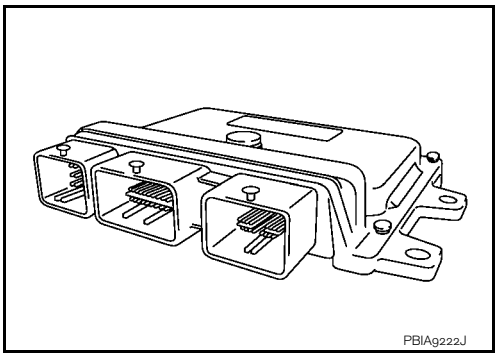
General Precautions

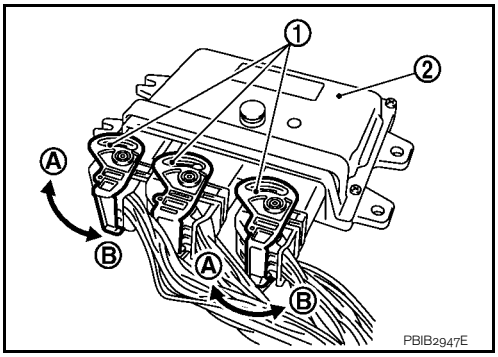
INFOID:0000000001097004

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

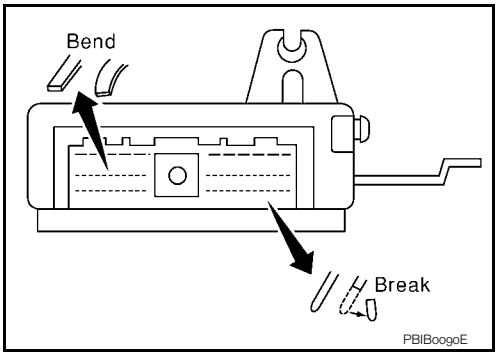


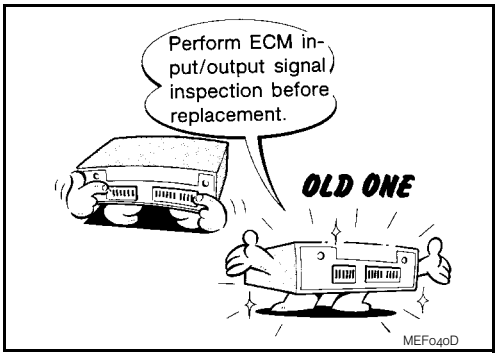


2. ECM
A. Loosen

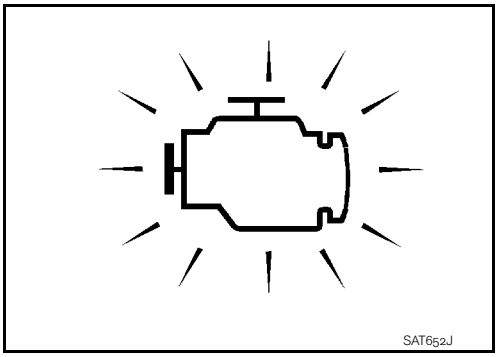
cardiagn.com

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-598, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



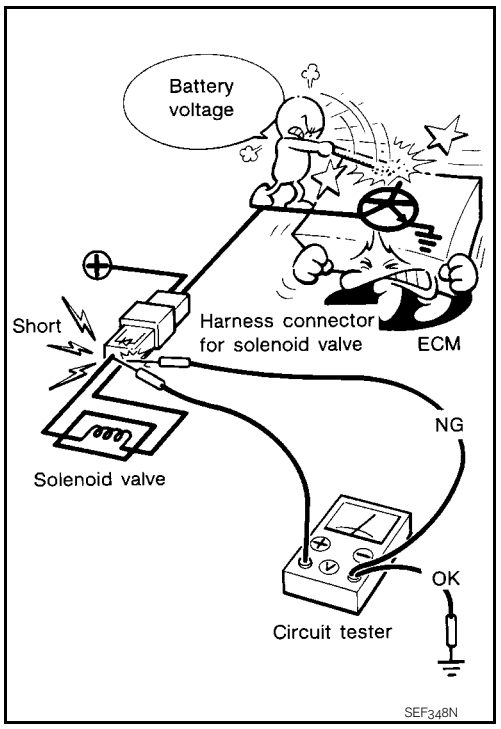


- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



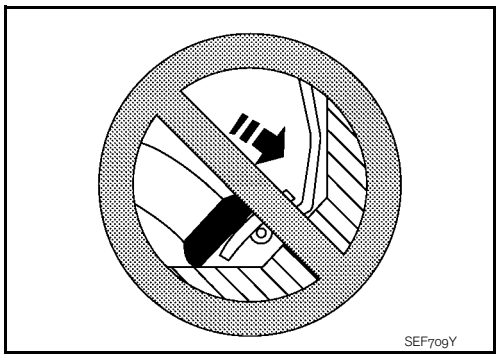
cardiagn.com

- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

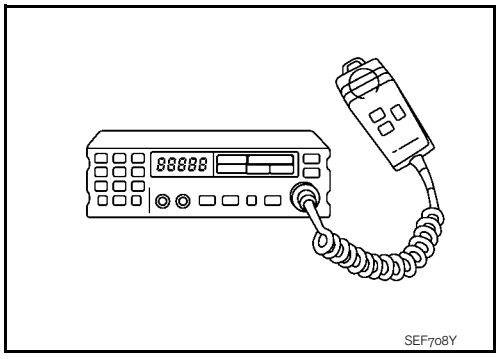


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



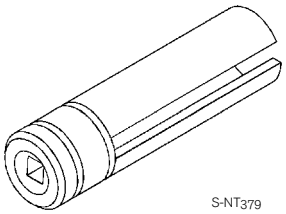
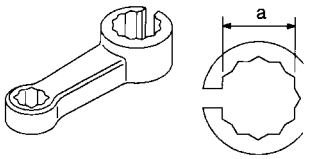
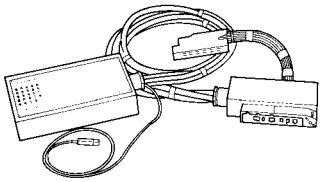
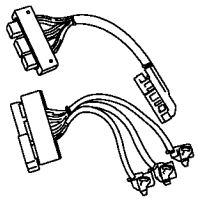
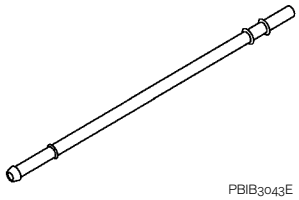
cardiagn.com

PREPARATION

PREPARATION

Special Service Tools

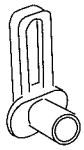
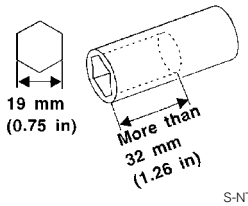
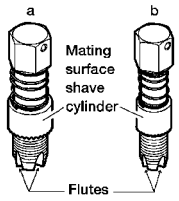
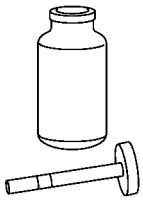
INFOID:0000000001097005

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
EG17550000 Break-out box  ZZA1194D	Measuring ECM signals with a circuit tester
EG17680000 Y-cable adapter  PBIA9379J	Measuring ECM signals with a circuit tester
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001115716

cardiagn.com

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

cardiagn.com

ON-VEHICLE MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000001097007

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

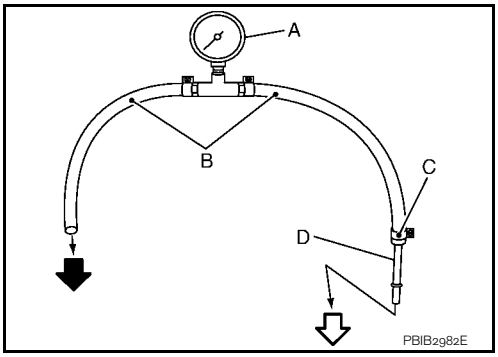
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

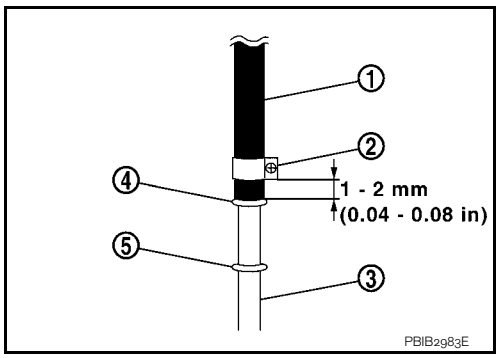
1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

cardiagn.com

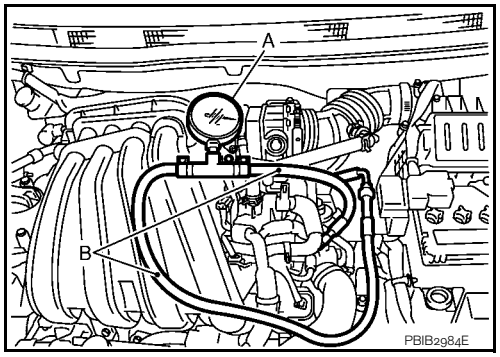
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

cardiagn.com

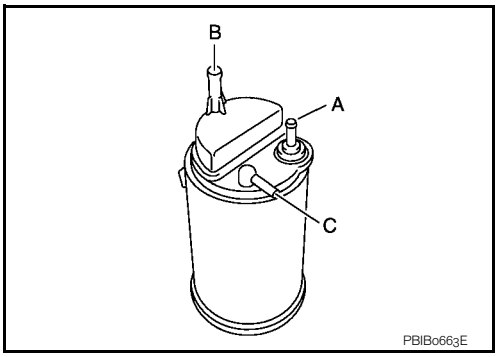
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000001097008

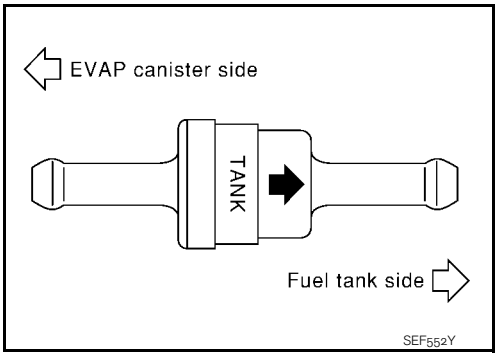
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).



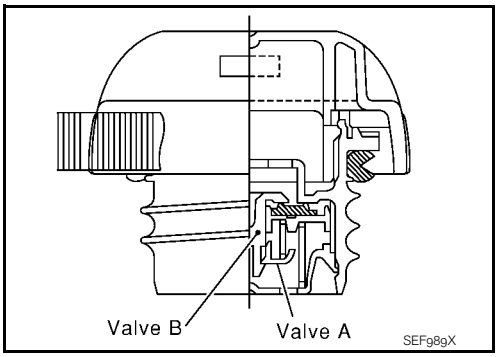
3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.
c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

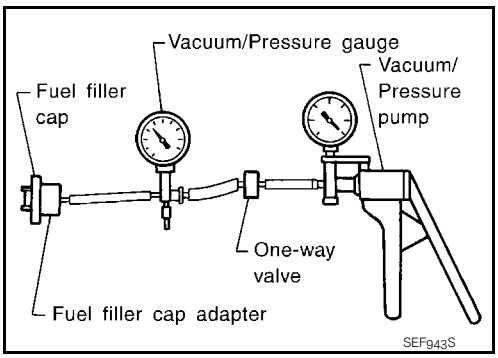
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



cardiagn.com

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001097009

Transmission	Condition	Specification
M/T	No load* (in Neutral position)	650 ±50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001097010

Transmission	Condition	Specification
M/T	No load* (in Neutral position)	15 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

cardiagn.com

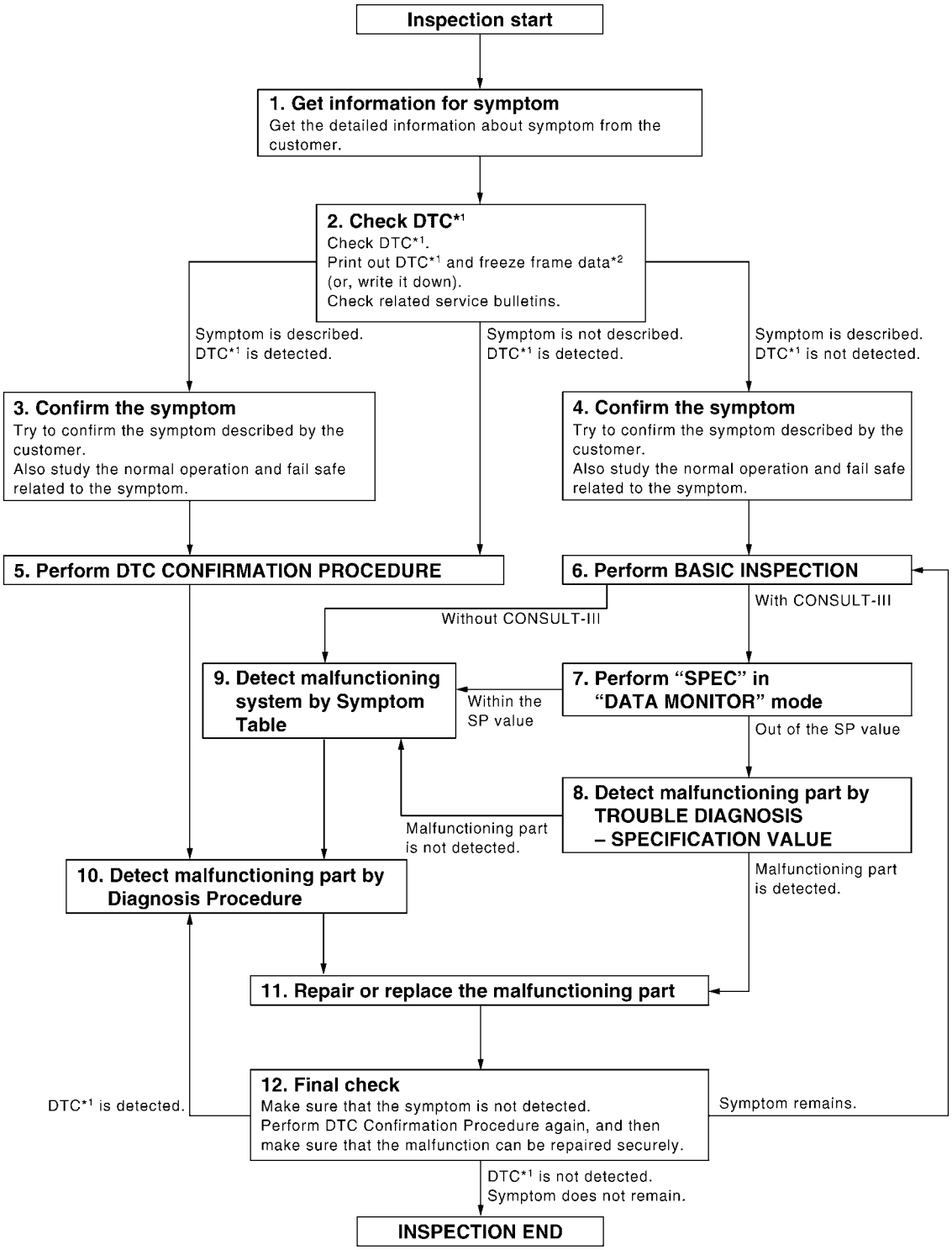
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000000936579

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

JMBIA0078GB

DETAILED FLOW

cardiagn.com

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-640, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-706, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-967, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-971, "Description" and EC-959, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-971, "Description" and EC-959, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-961, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to EC-962, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-642, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 7.
NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to EC-728, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-728, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-967, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-938, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to EC-706, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to EC-706, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in EC-964, "How to Set SRT Code".

Diagnostic Work Sheet

INFOID:0000000000936580

DESCRIPTION

cardiagn.com

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:
Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms – ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms – ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms – ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms – ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather conditions – Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Weather conditions – Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

MTBL0017

cardiagn.com

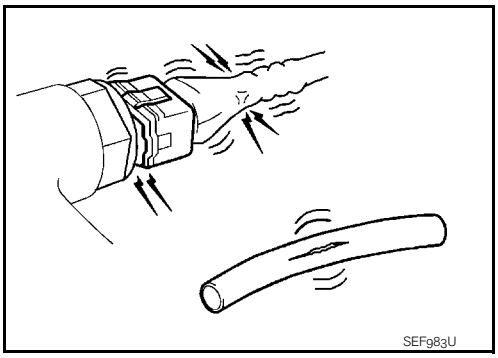
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

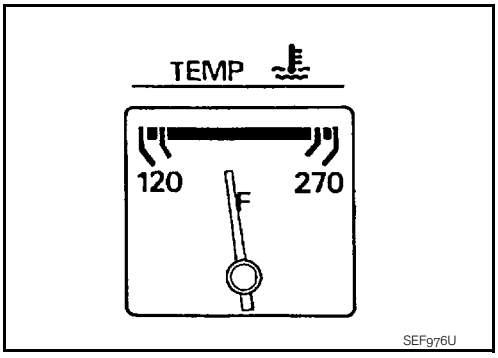
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000000936581

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.


SEF983U

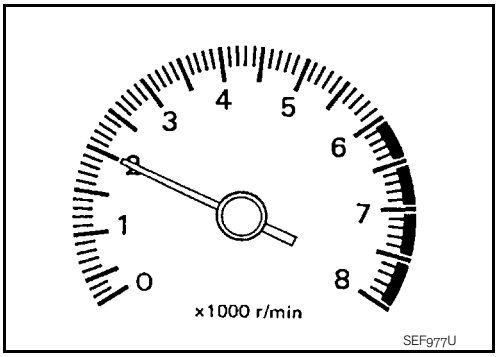


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

YES >> GO TO 2.
NO >> GO TO 3.



SEF977U

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

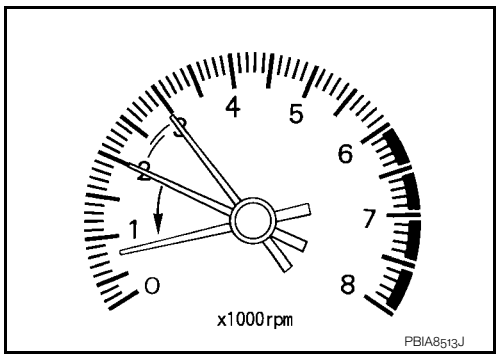
>> GO TO 3.

3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

cardiagn.com

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-646, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-981, "Idle Speed".



Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-646, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-981, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-813, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-809, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

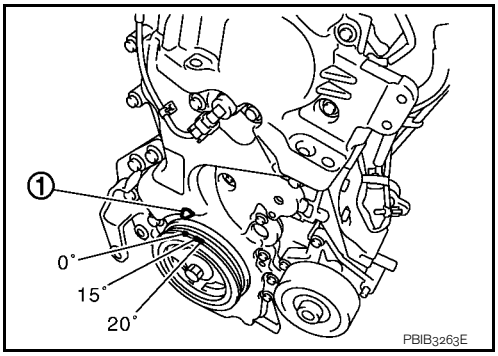
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

cardiagn.com

2. Check ignition timing with a timing light.
For procedure, refer to EC-646, "IGNITION TIMING : Special Repair Requirement"
For specification, refer to EC-981, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

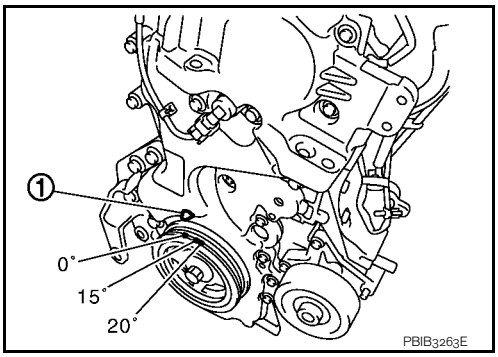
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-646, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-981, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-646, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-981, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-163, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

cardiagn.com

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-813, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-809, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-645, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000000936582

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000000936583

1. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

Refer to EC-646, "VIN REGISTRATION : Special Repair Requirement".

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000000936584

This describes how to check the idle speed. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

IDLE SPEED : Special Repair Requirement

INFOID:0000000000936585

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.
With GST
Check idle speed with Service $01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000000936586

This describes how to check the ignition timing. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

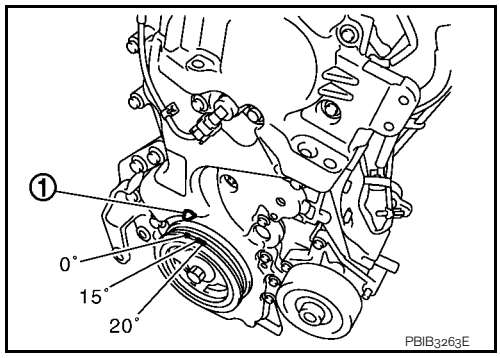
IGNITION TIMING : Special Repair Requirement

INFOID:0000000000936587

1.CHECK IGNITION TIMING

1. Attach timing light to the ignition coil No.4 harness.
2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

VIN REGISTRATION

VIN REGISTRATION : Description

INFOID:0000000000936588

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.
NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:0000000000936589

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-22, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT-III
1. Turn ignition switch ON and engine stopped.
2. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
3. Follow the instruction of CONSULT-III display.

cardiagn.com

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000000936590

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

INFOID:0000000000936591

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000000936592

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000000936593

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000000936594

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000000936595

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

cardiagn.com

On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.

- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- CVT models
- With CONSULT-III: Drive vehicle until “ATF TENP SEN” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

YES >> GO TO 4.
NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

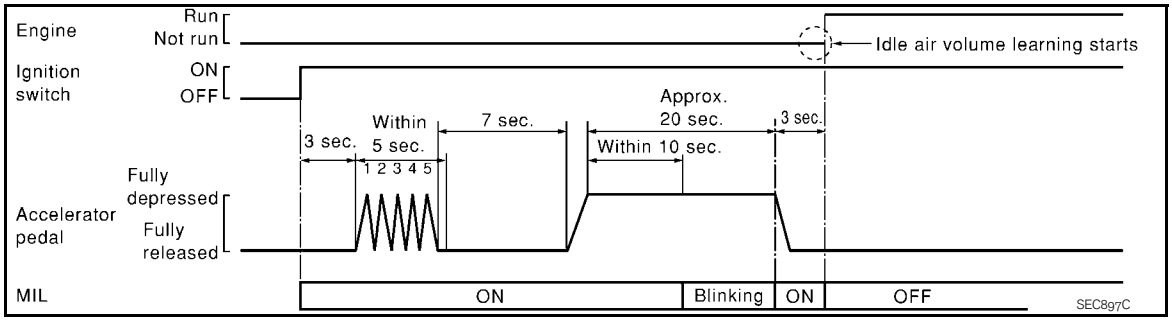
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



cardiagn.com

>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-981, "Idle Speed" and EC-981, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following
- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-728, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001092493

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:0000000001092494

1. START

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear mixture ratio self-learning value by touching “CLEAR”.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST to erase the DTC P0102.

>> END

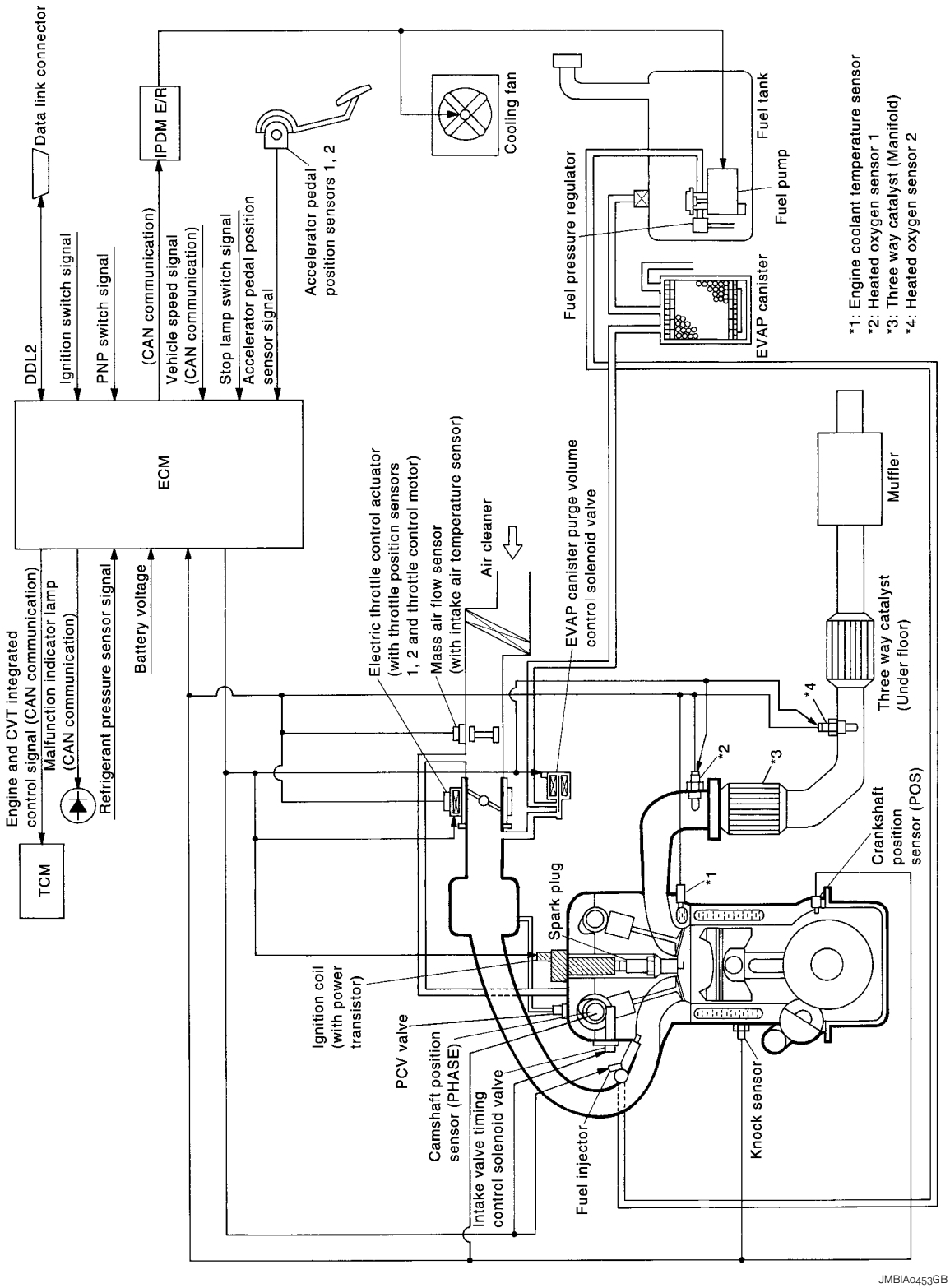
cardiagn.com

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000000936604



JMBIA0453GB

System Description

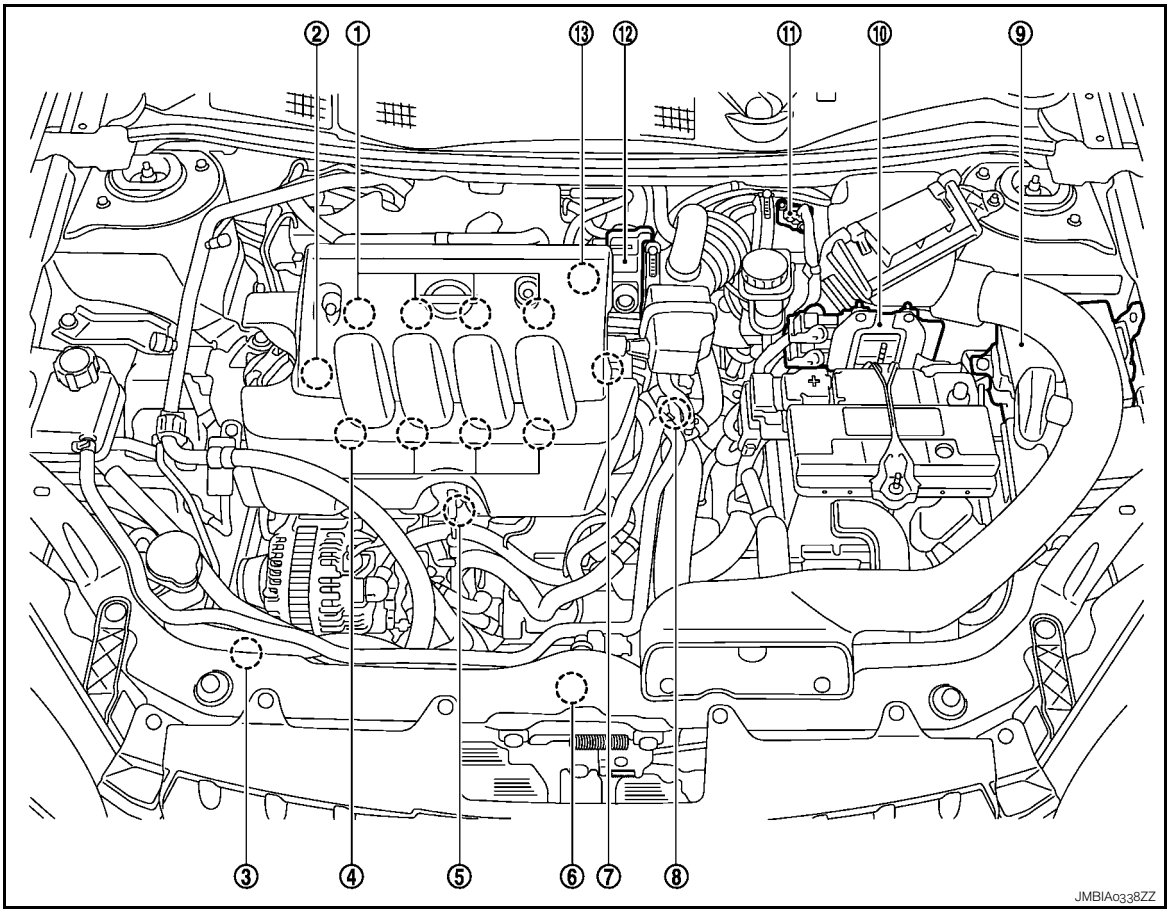
INFOID:0000000000936605

cardiagn.com

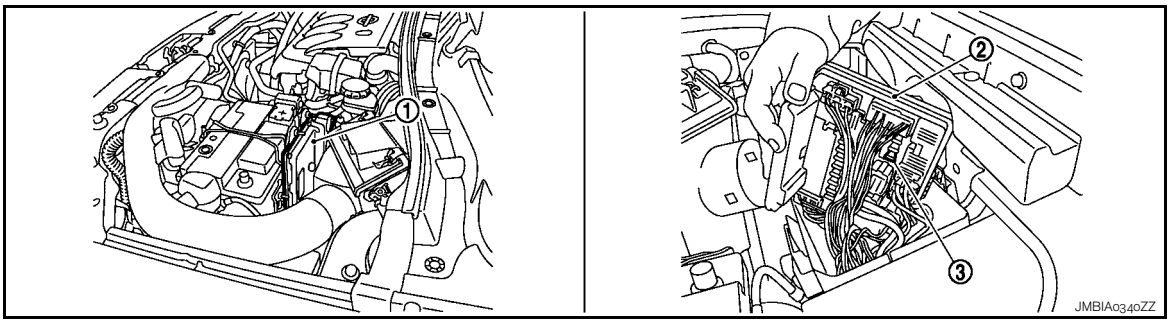
ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:0000000001093462

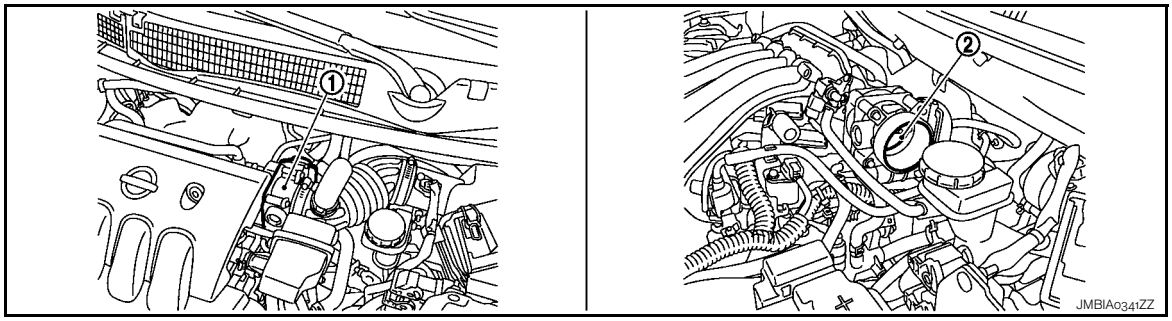


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

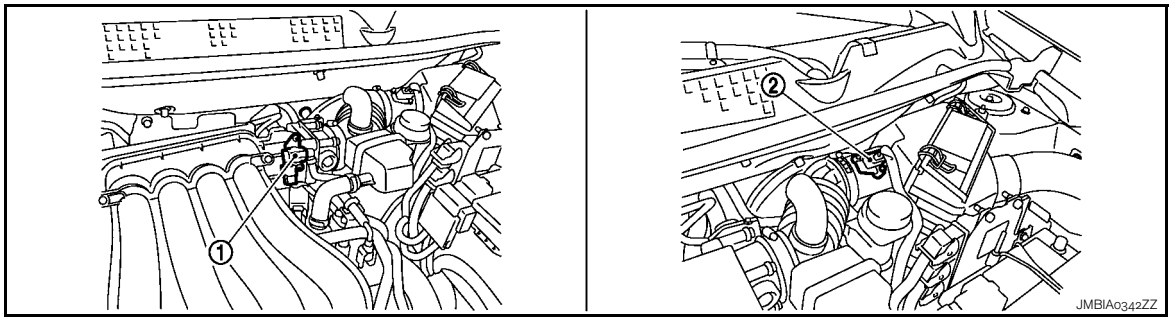


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

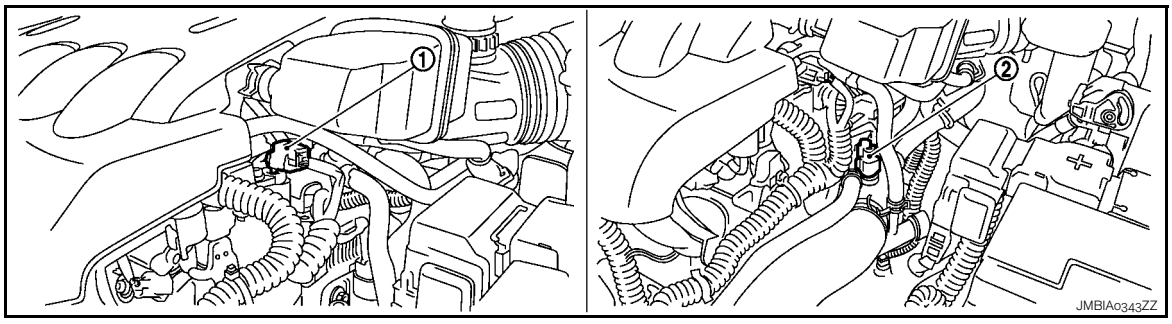
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

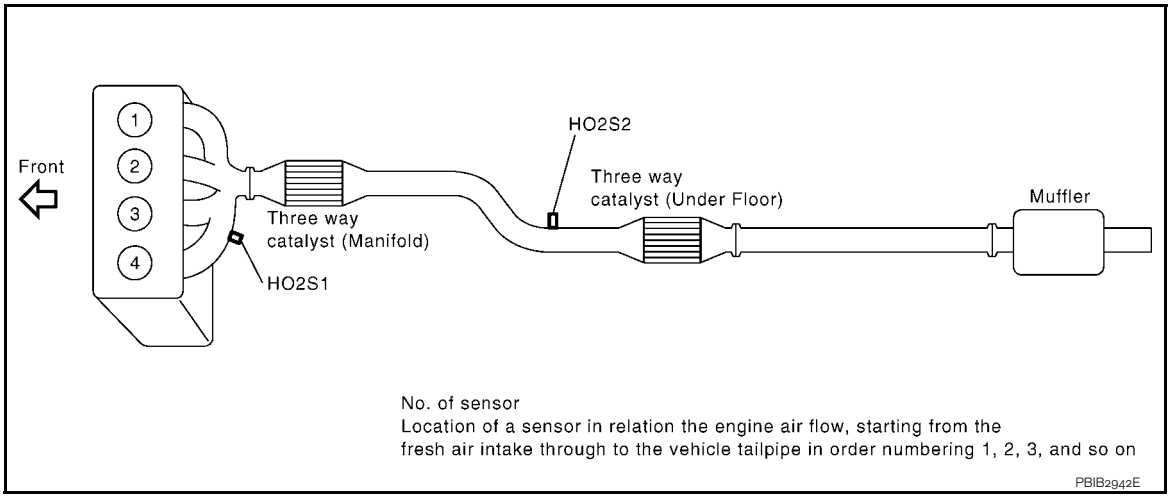


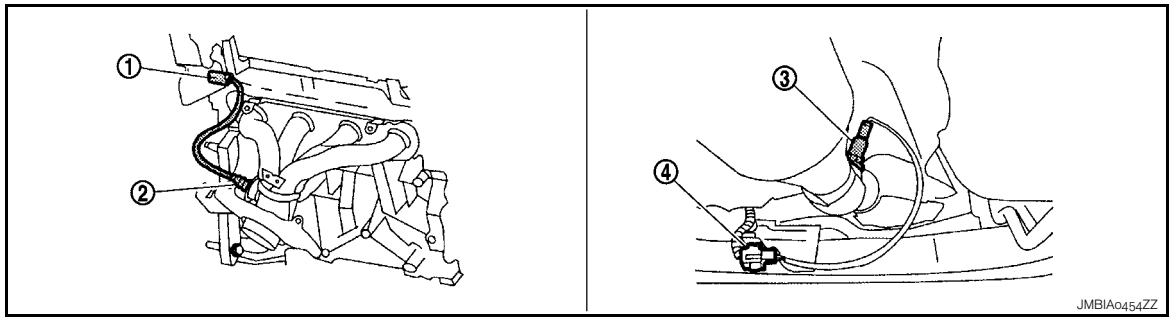
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



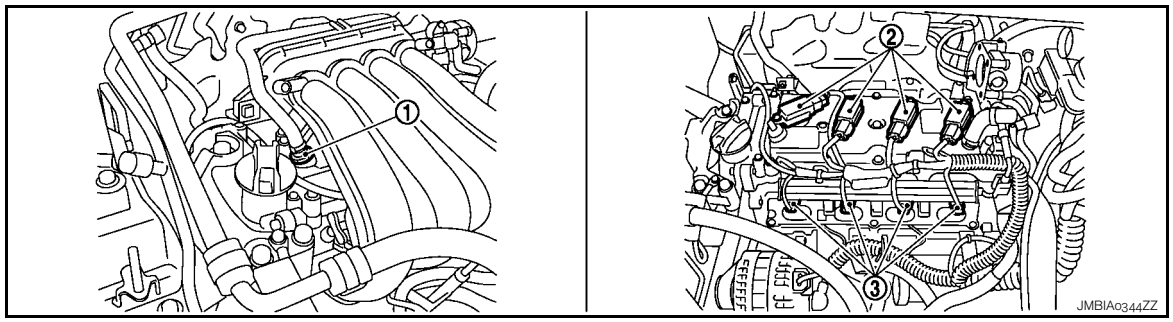
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

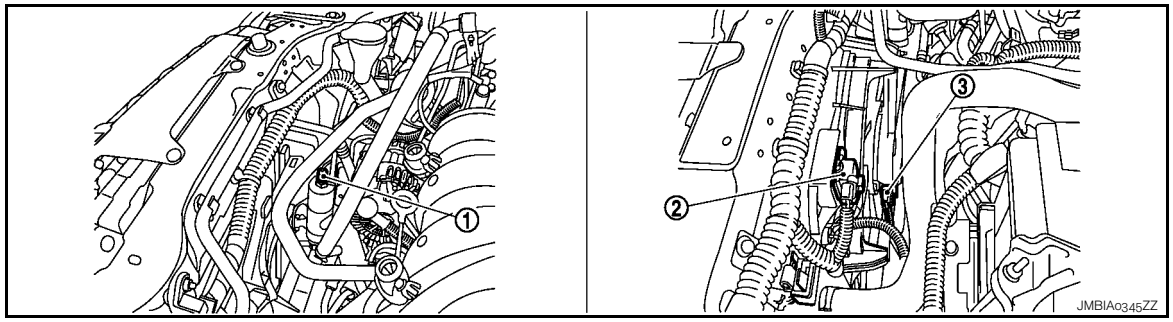




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

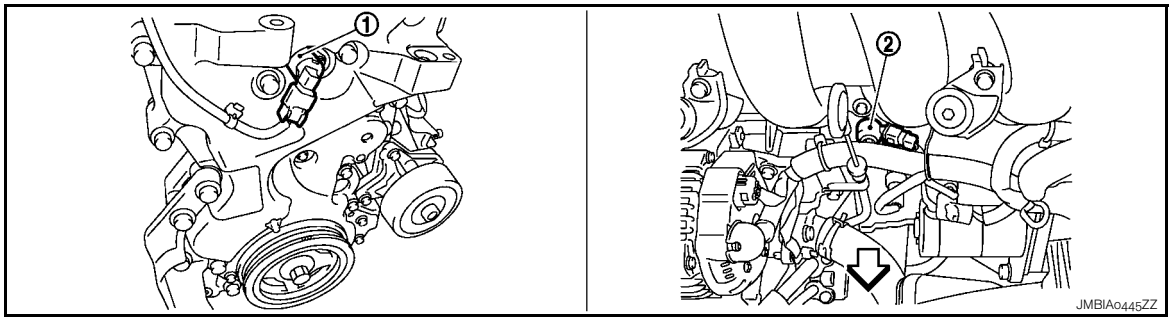


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

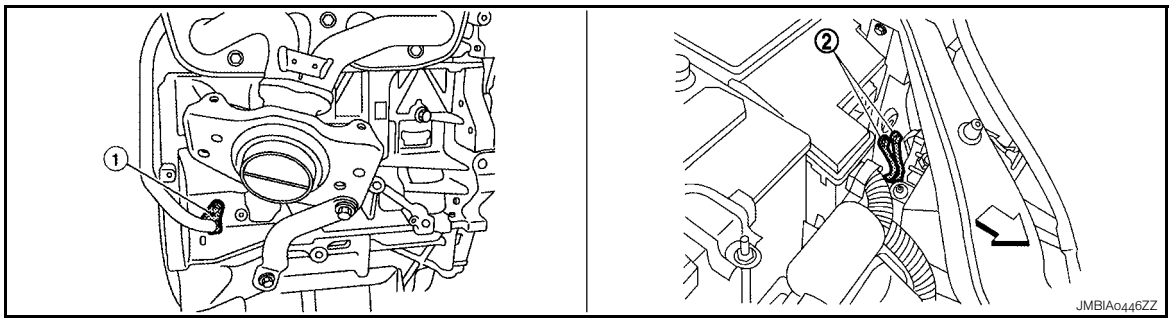


cardiagn.com

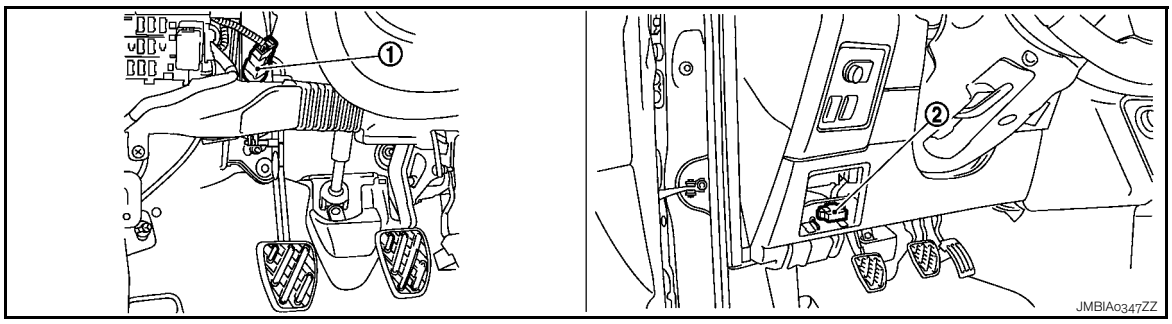
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



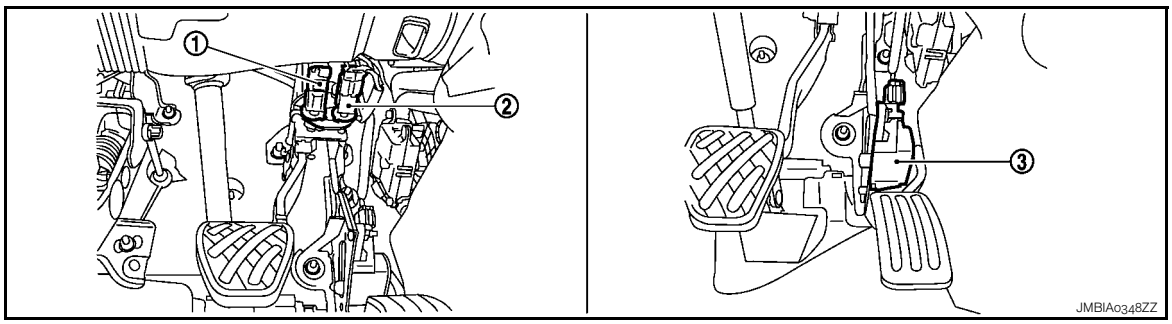
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

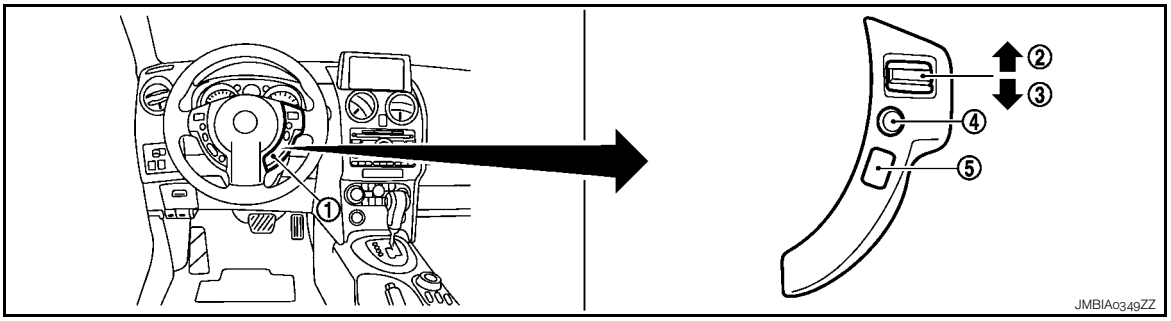


1. ASCD clutch switch 2. Data link connector

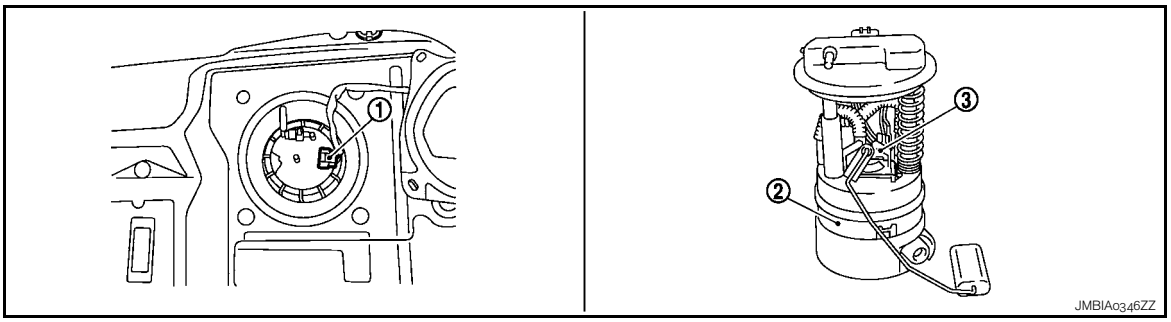


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936607

Component	Reference
Accelerator pedal position sensor	EC-899, "Description"
ASCD brake switch	EC-883, "Description"
ASCD steering switch	EC-880, "Description"
ASCD vehicle speed sensor	EC-890, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Cooling fan motor	EC-685, "System Diagram"
Electric throttle control actuator	EC-832, "Description"
Engine coolant temperature sensor	EC-754, "Description"
EVAP canister purge volume control solenoid valve	EC-822, "Description"
Fuel injector	EC-923, "Description"
Fuel pump	EC-926, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Heated oxygen sensor 1 heater	EC-775, "Description"
Heated oxygen sensor 2	EC-778, "Description"
Heated oxygen sensor 2 heater	EC-788, "Description"

cardiagn.com

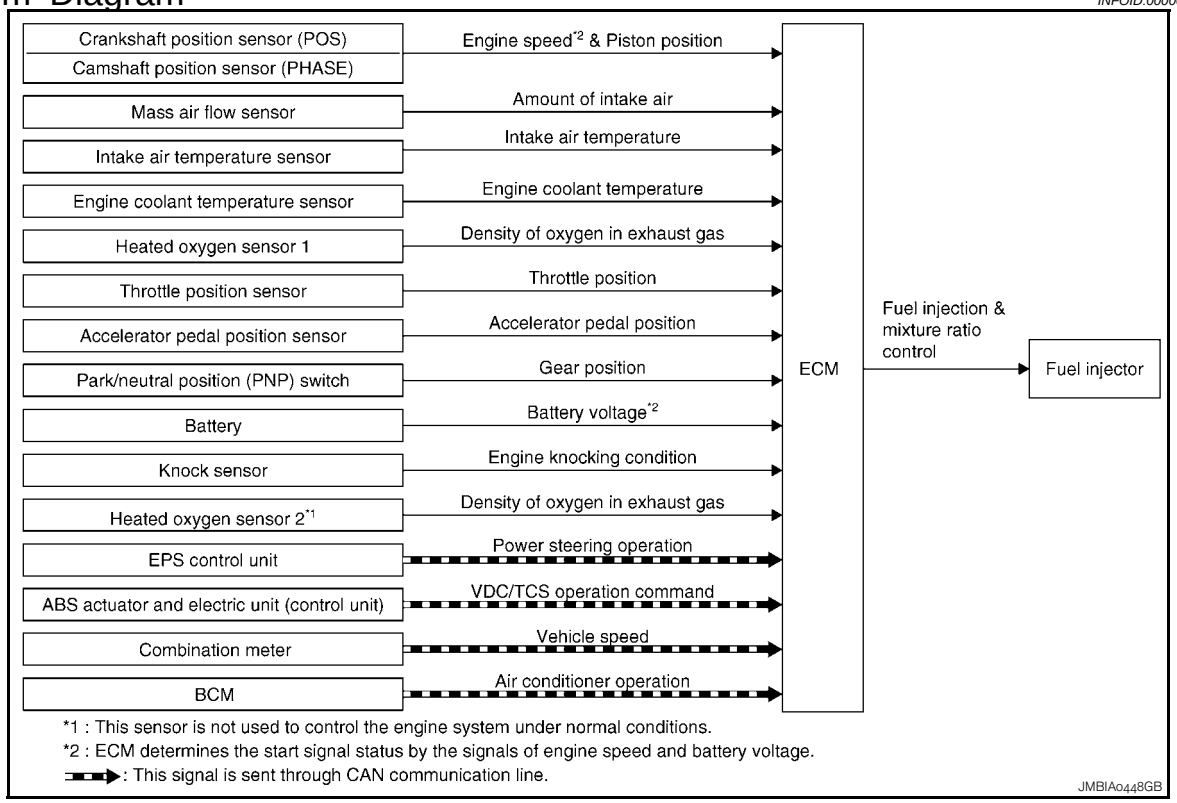
Component	Reference
Ignition signal	EC-929, "Description"
Intake air temperature sensor	EC-751, "Description"
Intake valve timing control solenoid valve	EC-700, "System Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
PCV valve	EC-935, "Description"
Refrigerant pressure sensor	EC-936, "Description"
Stop lamp switch	EC-896, "Description"
Throttle control motor	EC-841, "Description"
Throttle control motor relay	EC-838, "Description"
Throttle position sensor	EC-874, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000000936608



System Description

INFOID:0000000000936609

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
ABS actuator and electric unit (control unit)*2	ABS operation command		
Air conditioner switch*2	Air conditioner operation		
Combination meter*2	Vehicle speed		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

cardiagn.com

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-760, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

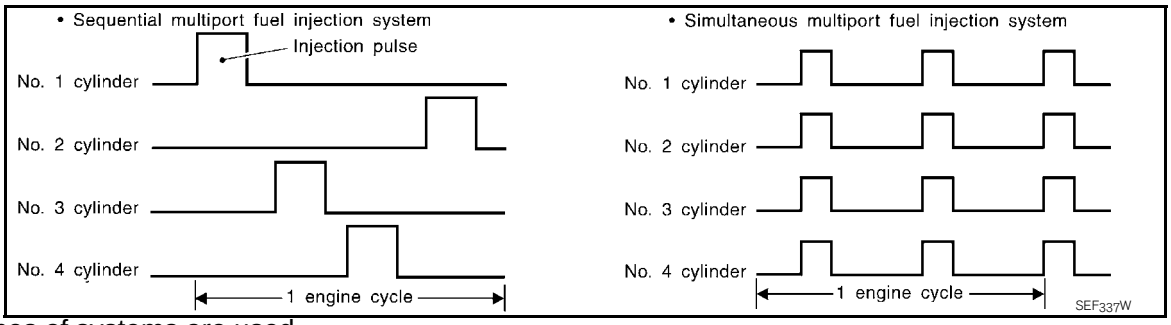
MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

cardiagn.com

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

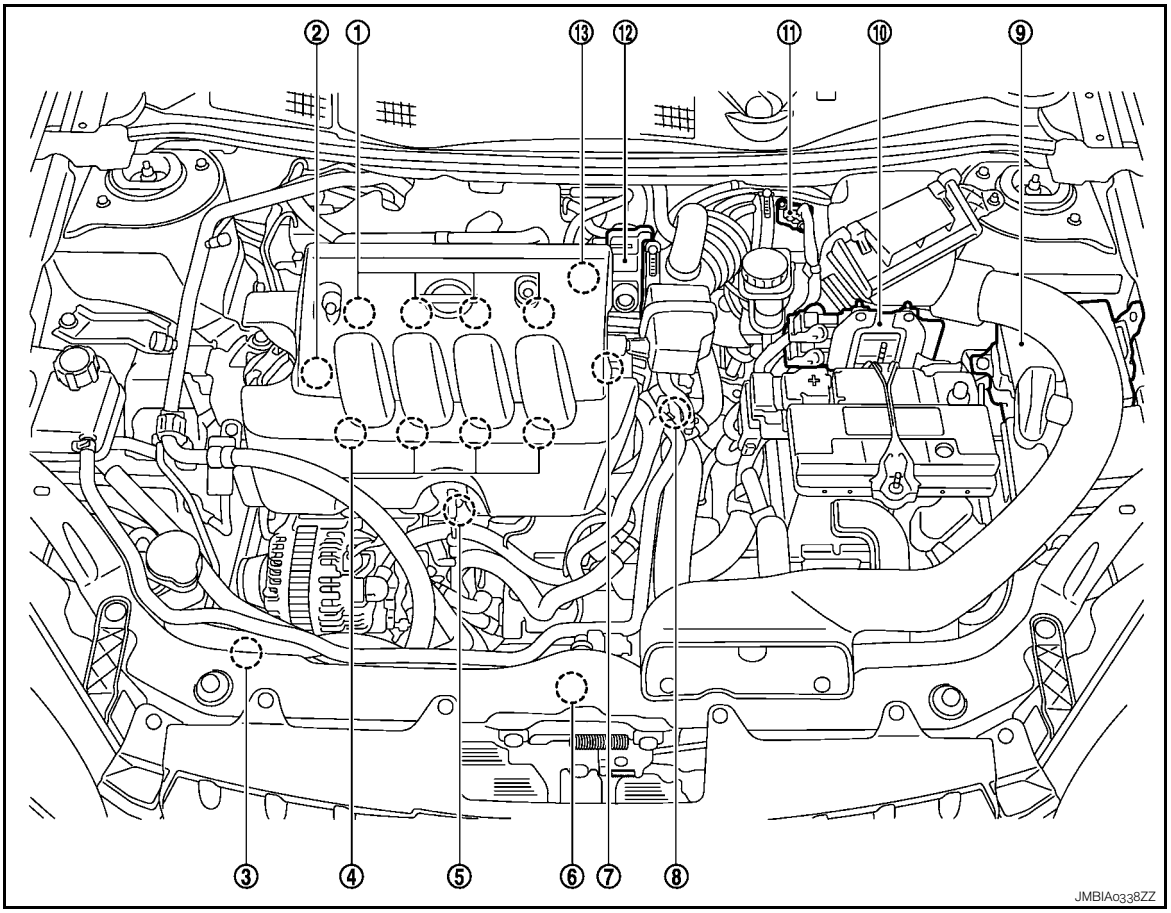
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

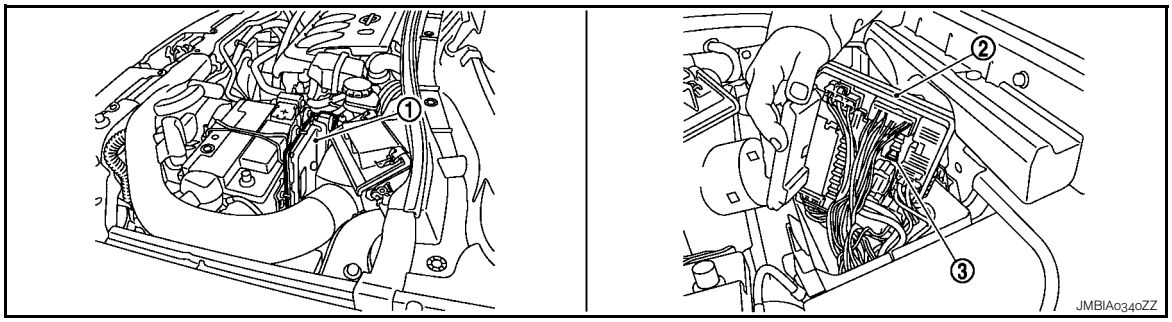
Component Parts Location

INFOID:0000000001093562

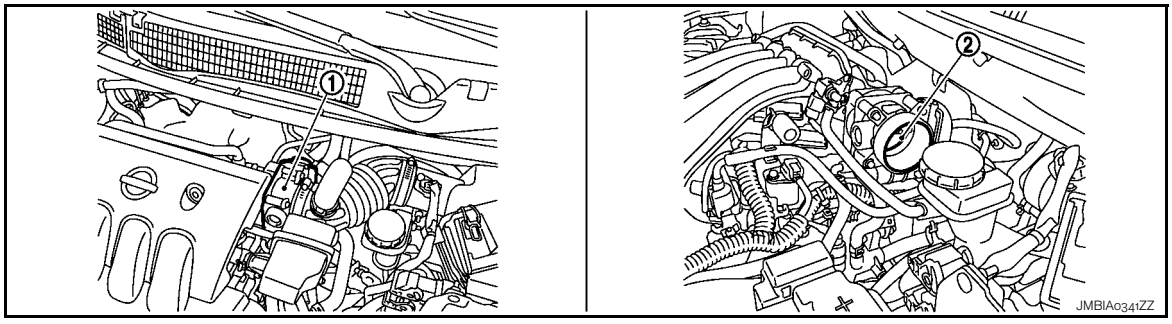


cardiagn.com

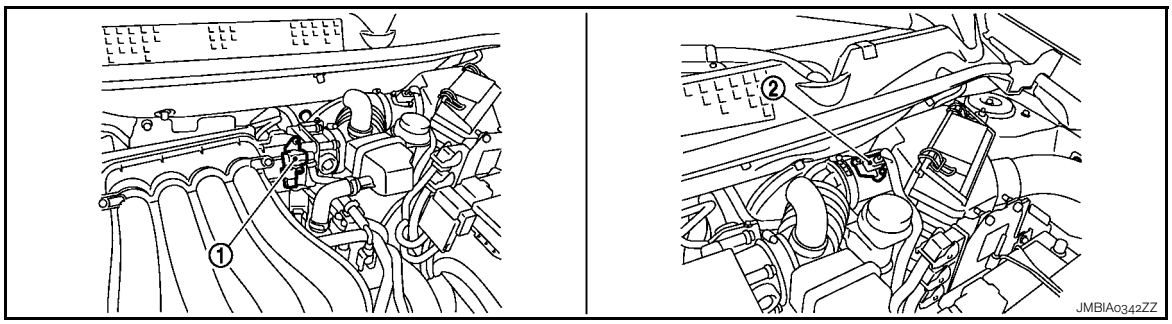
1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve



1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

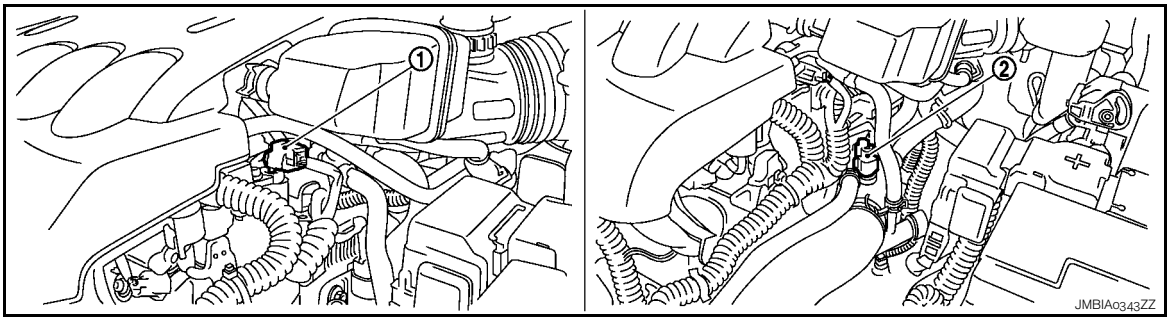


1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

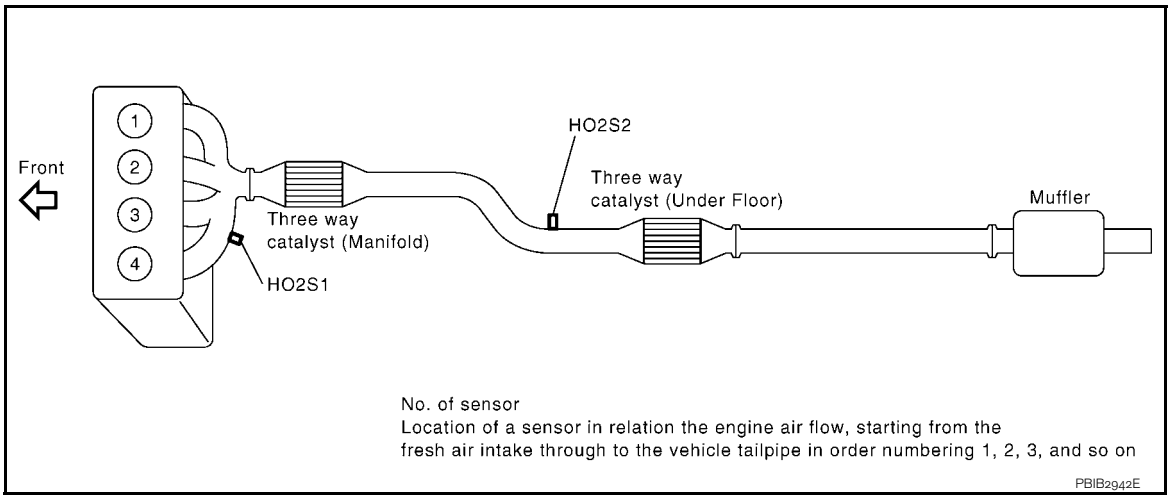


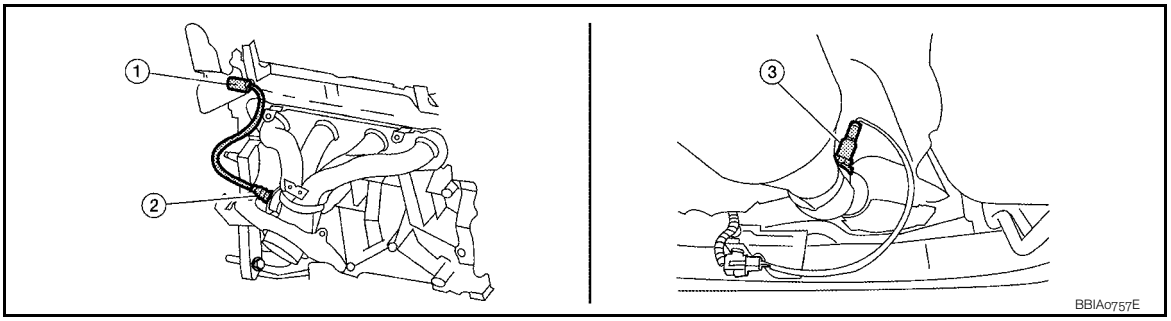
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)

cardiagn.com

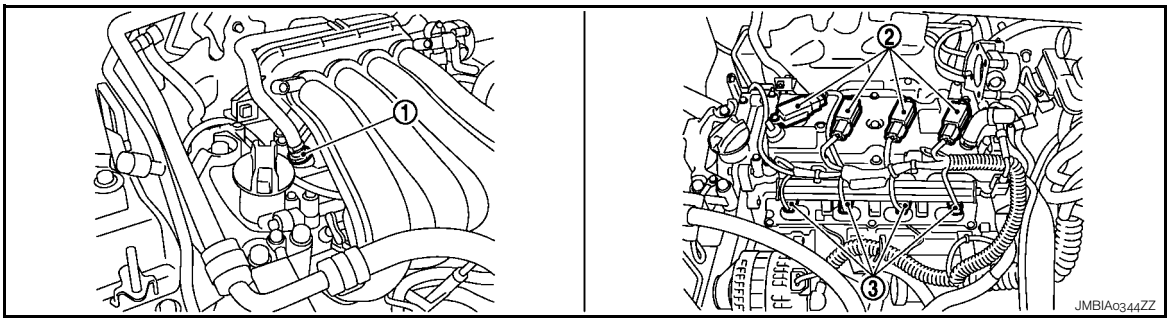


1. Camshaft position sensor
2. Engine coolant temperature sensor



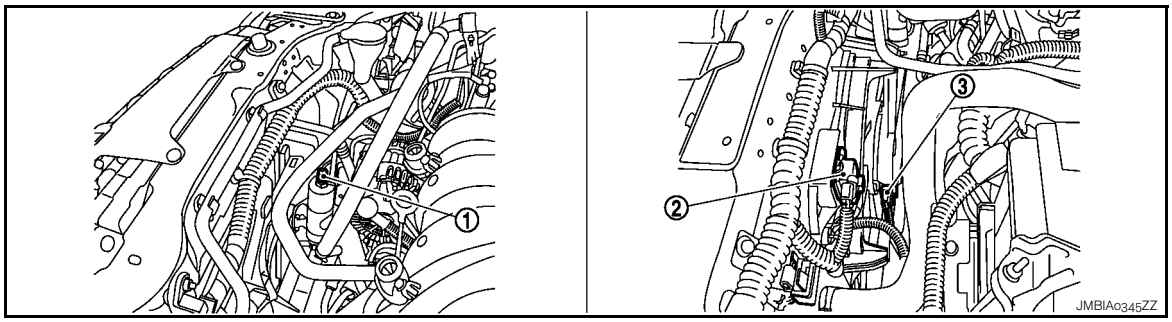


1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

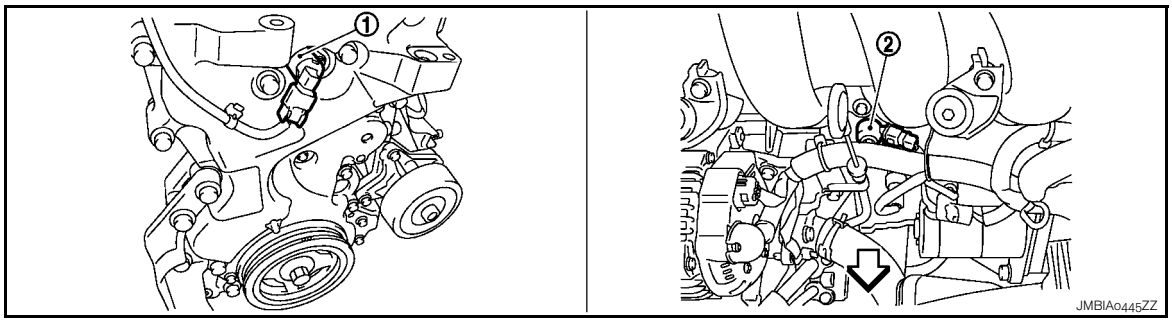


cardiagn.com

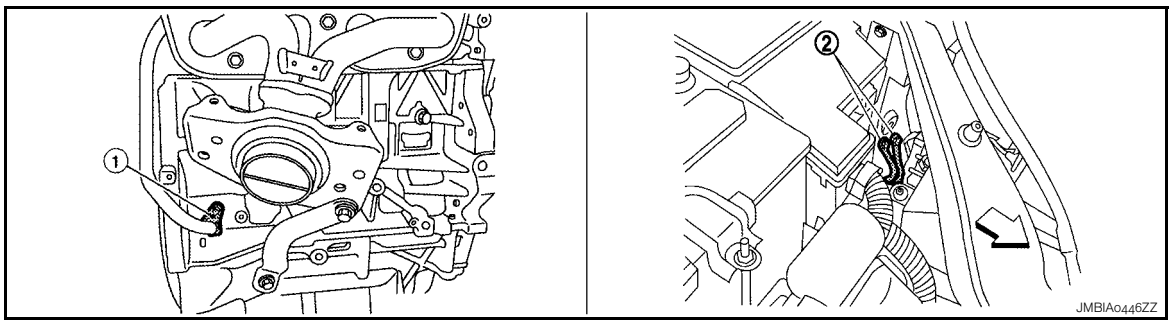
1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection



1. Refrigerant pressure sensor
2. Resister
3. Cooling fan motor

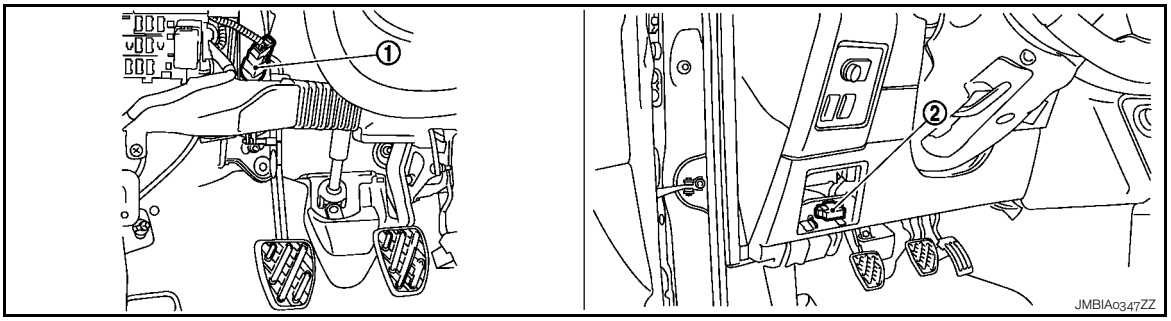


1. Intake valve timing control solenoid valve
2. Knock sensor

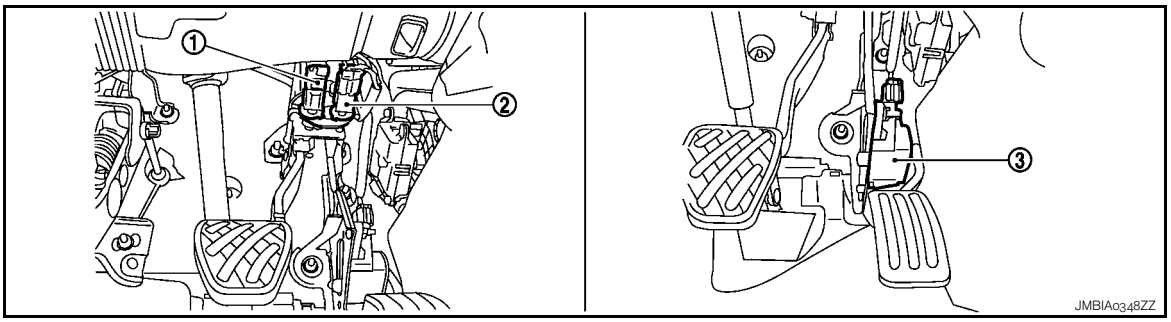


1. Crankshaft position sensor (POS)
2. Ground

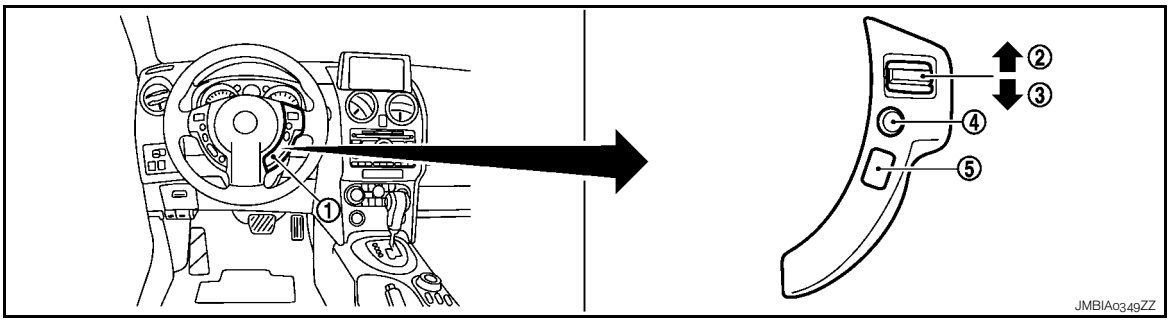
cardiagn.com



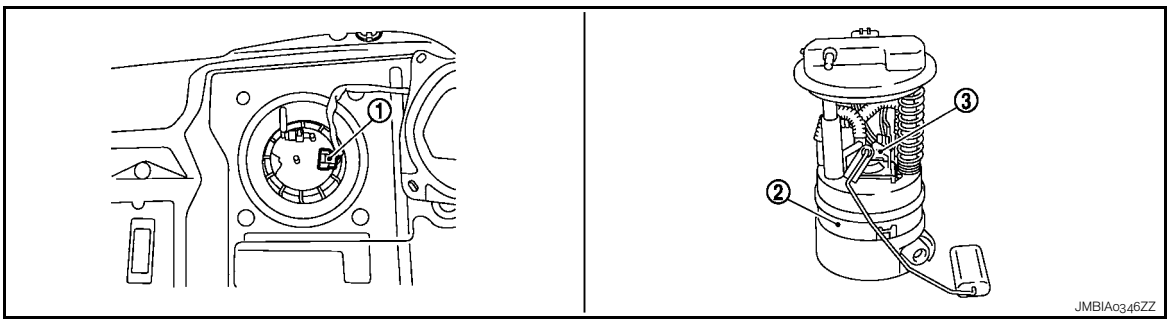
1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

cardiagn.com

Component Description

INFOID:0000000000936611

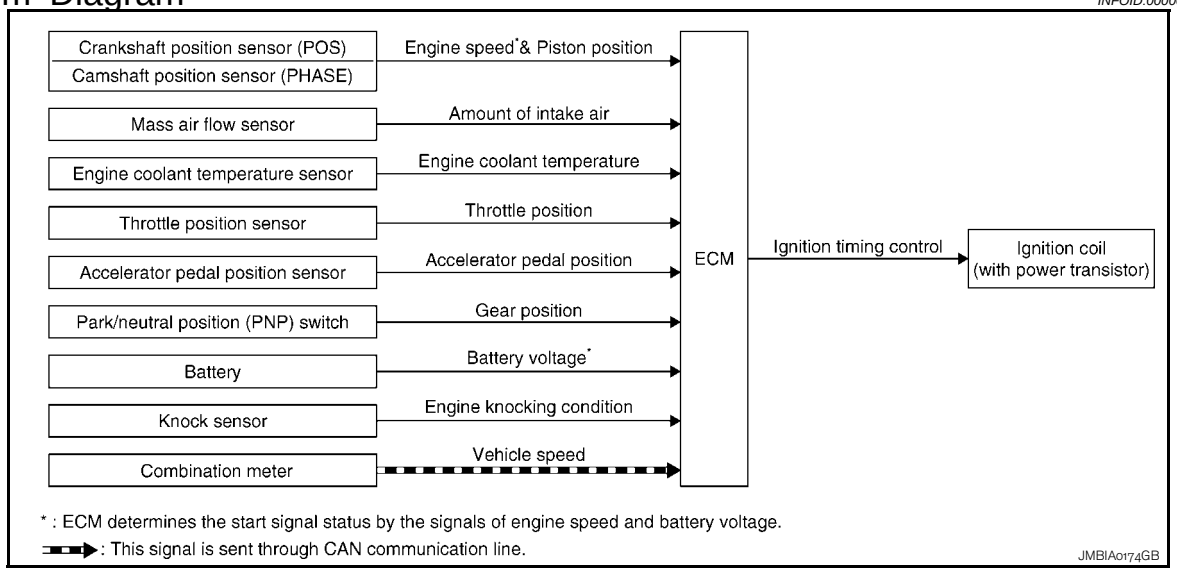
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Fuel injector	EC-923, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Heated oxygen sensor 2	EC-778, "Description"
Intake air temperature sensor	EC-751, "Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000000936612



System Description

INFOID:0000000000936613

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking condition		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

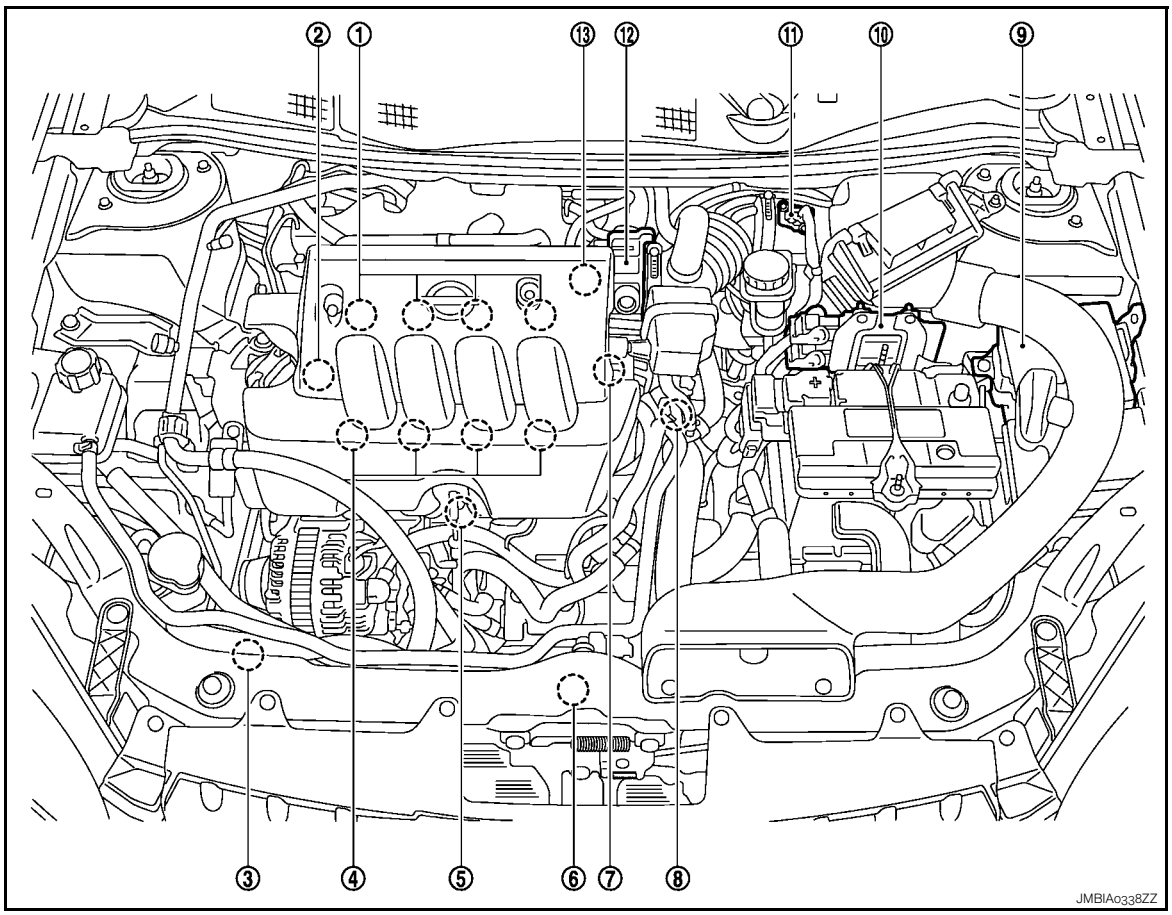
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

cardiagn.com

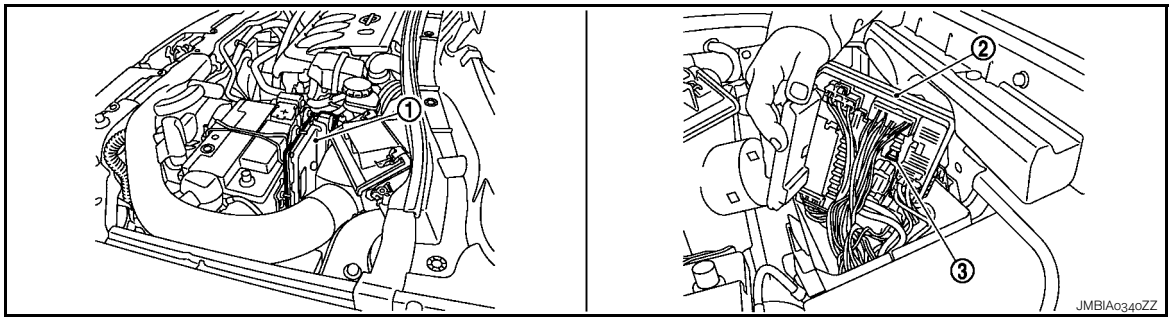
operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:0000000001093563

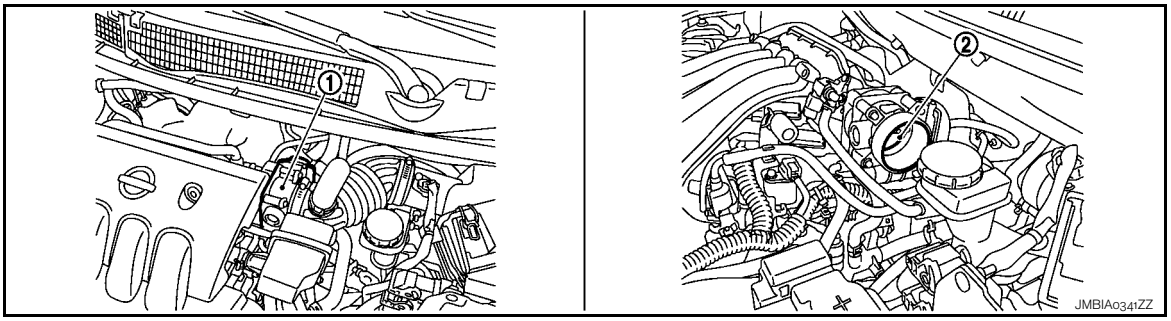


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

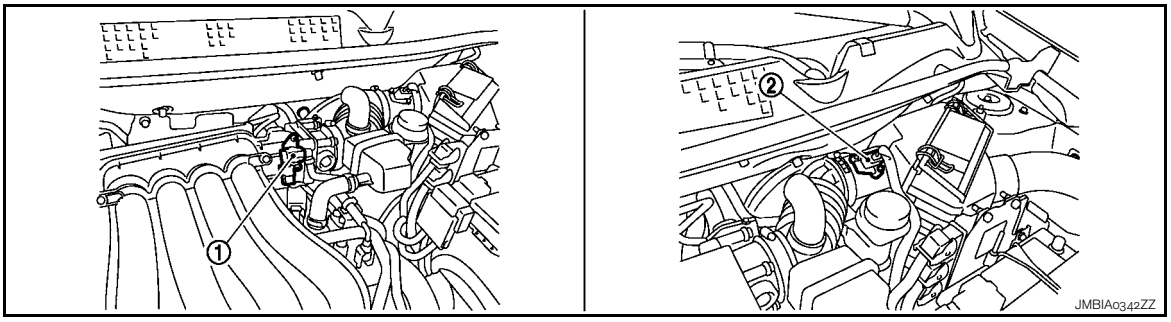


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

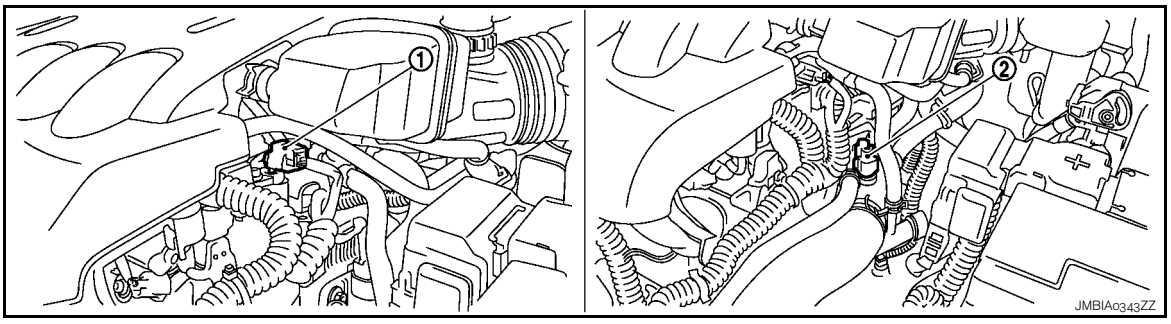
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

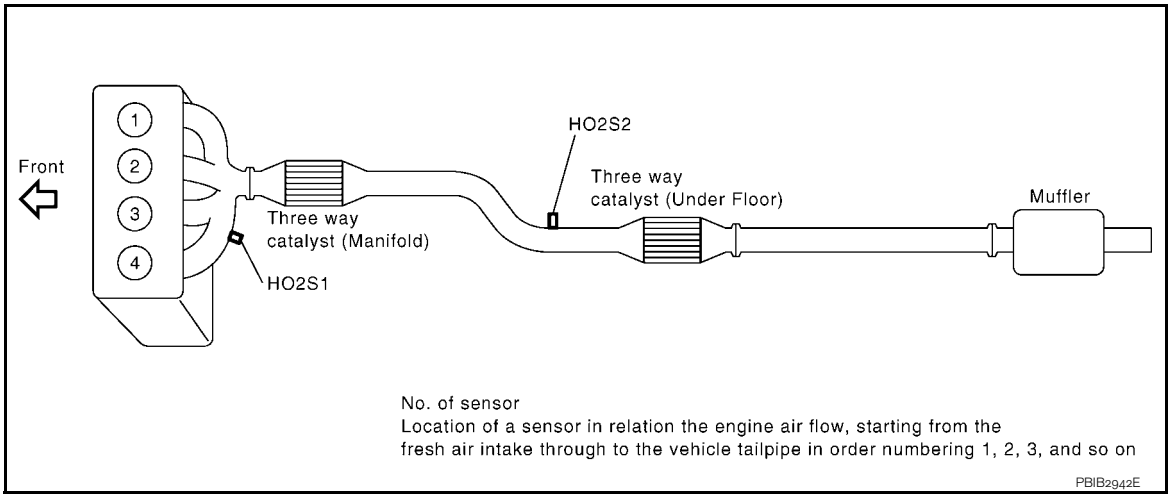


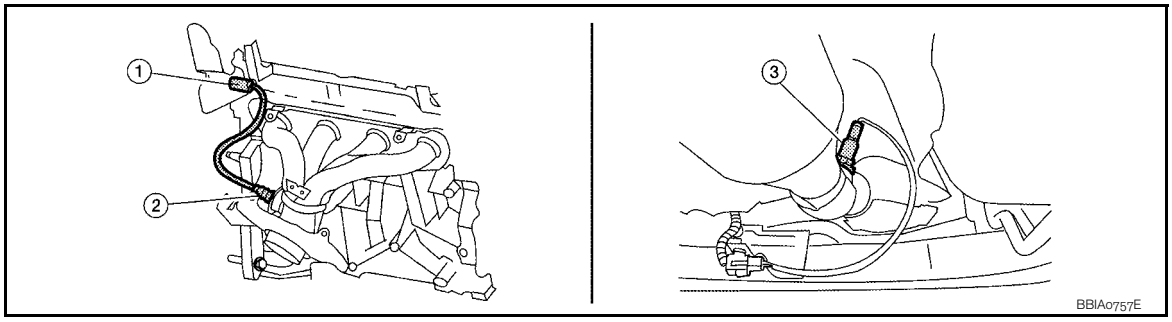
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



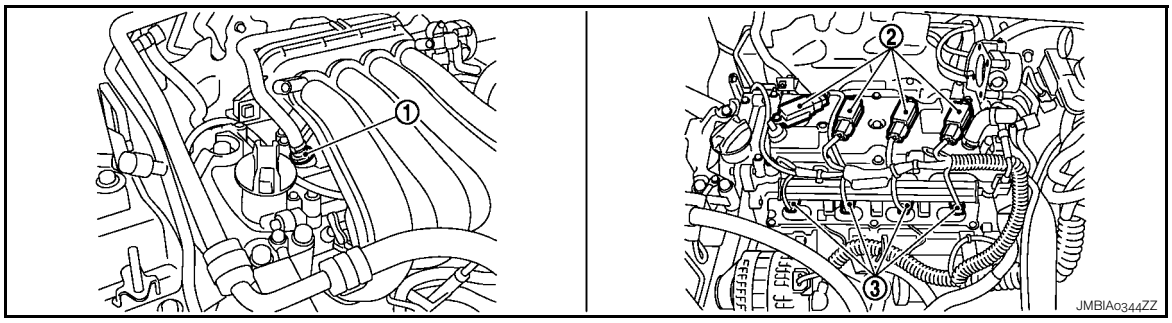
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

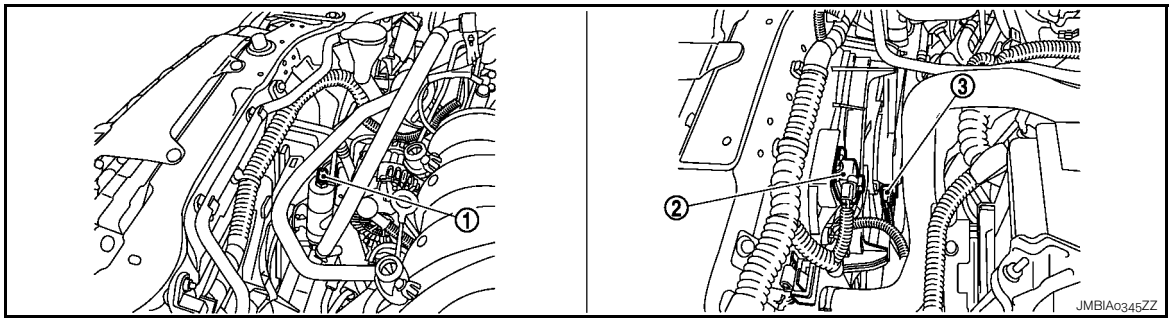




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

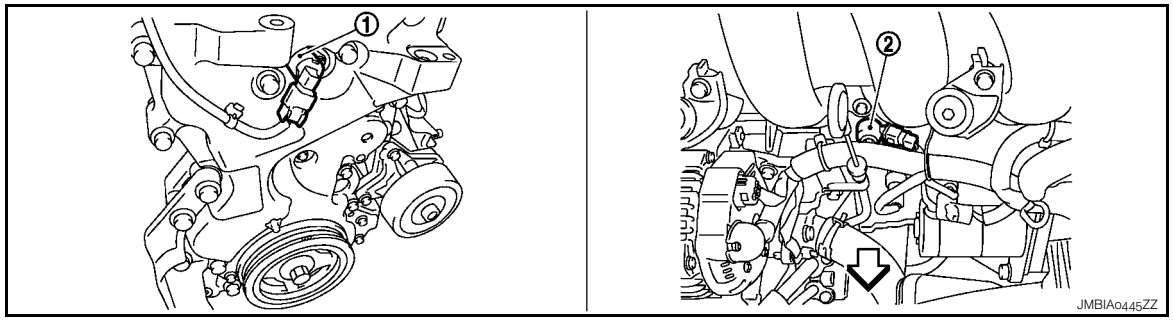


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

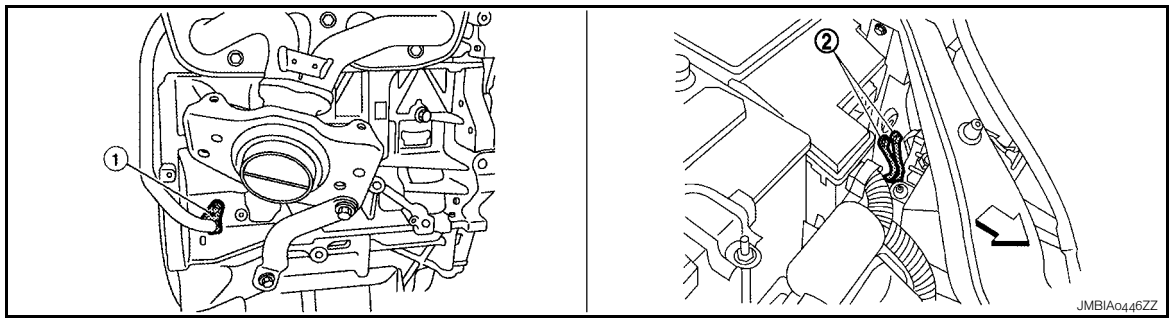


cardiagn.com

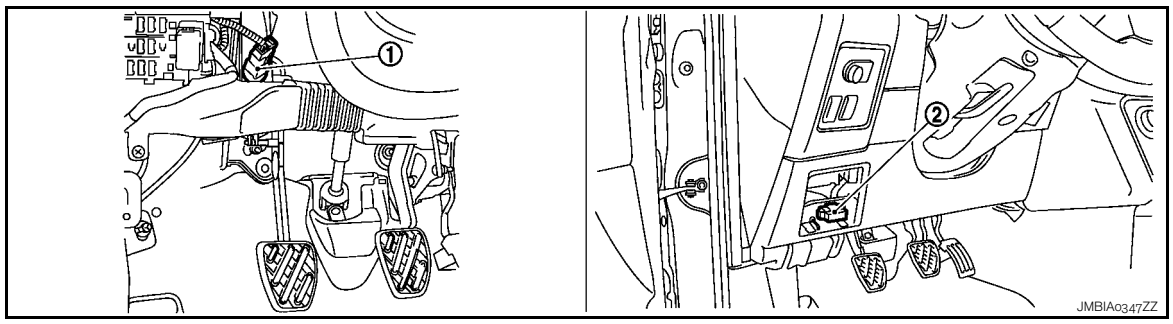
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



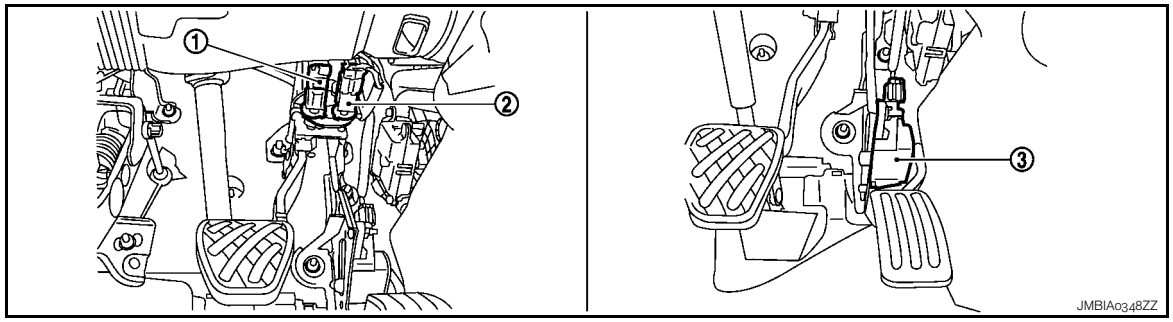
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

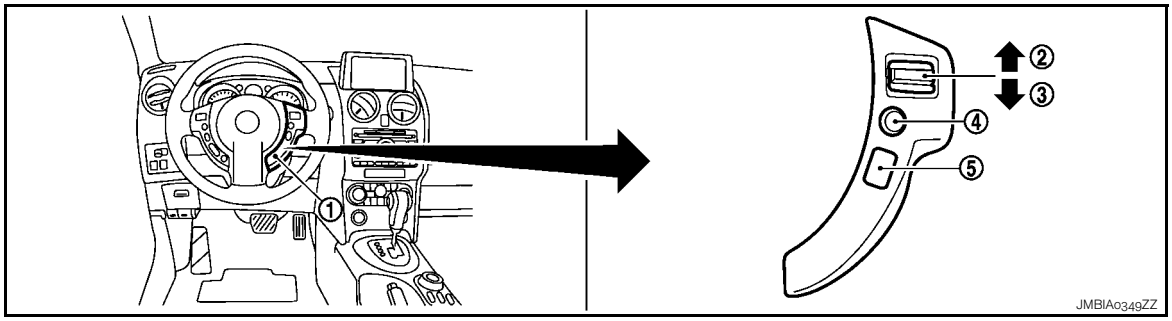


1. ASCD clutch switch 2. Data link connector

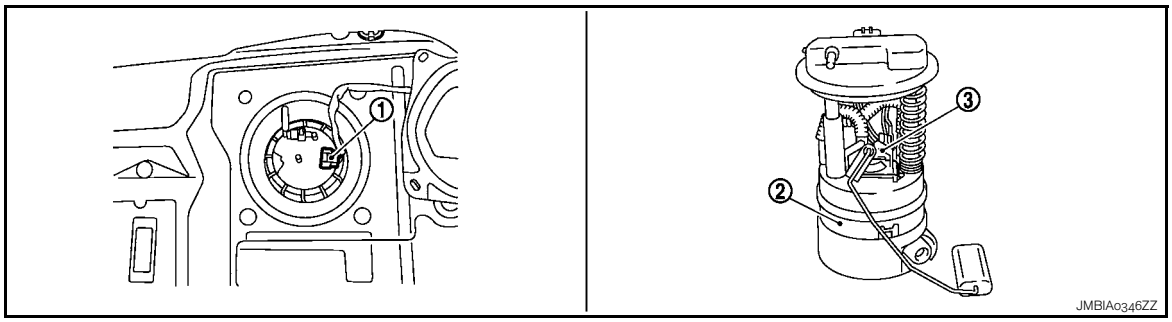


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936615

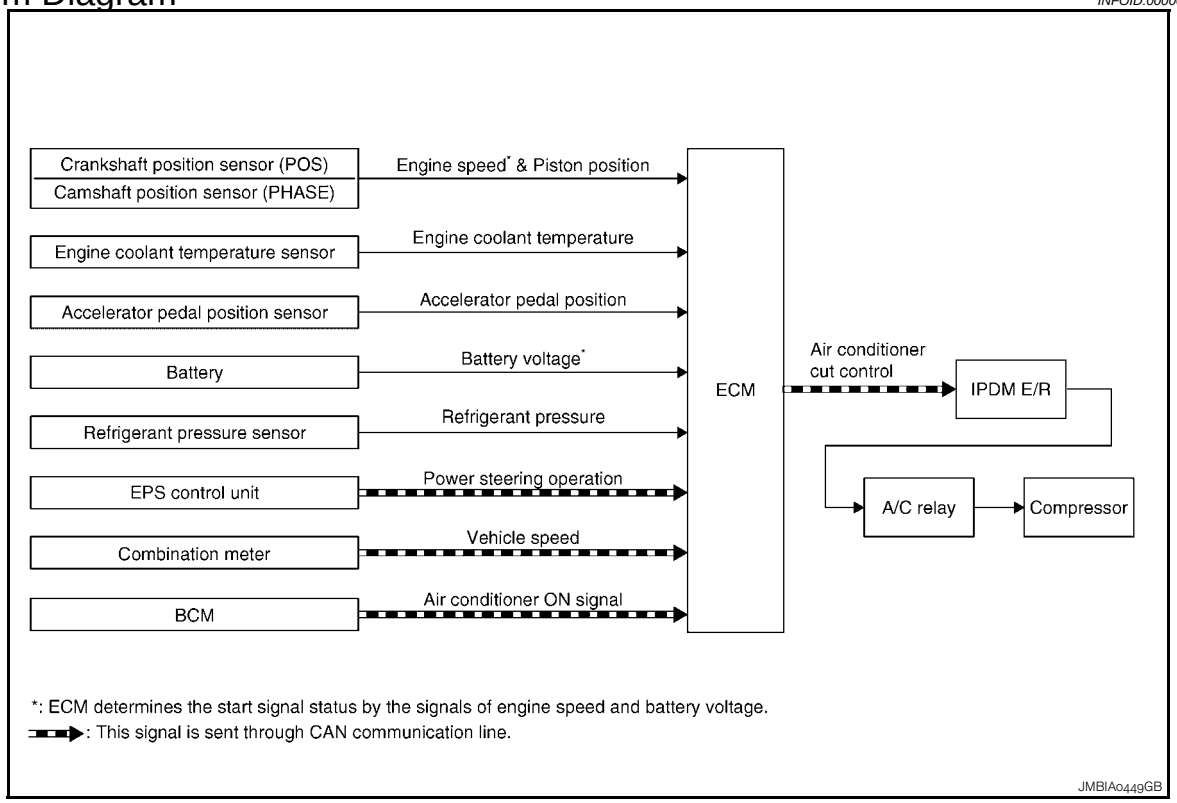
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Ignition signal	EC-929, "Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000000936616



System Description

INFOID:0000000000936617

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

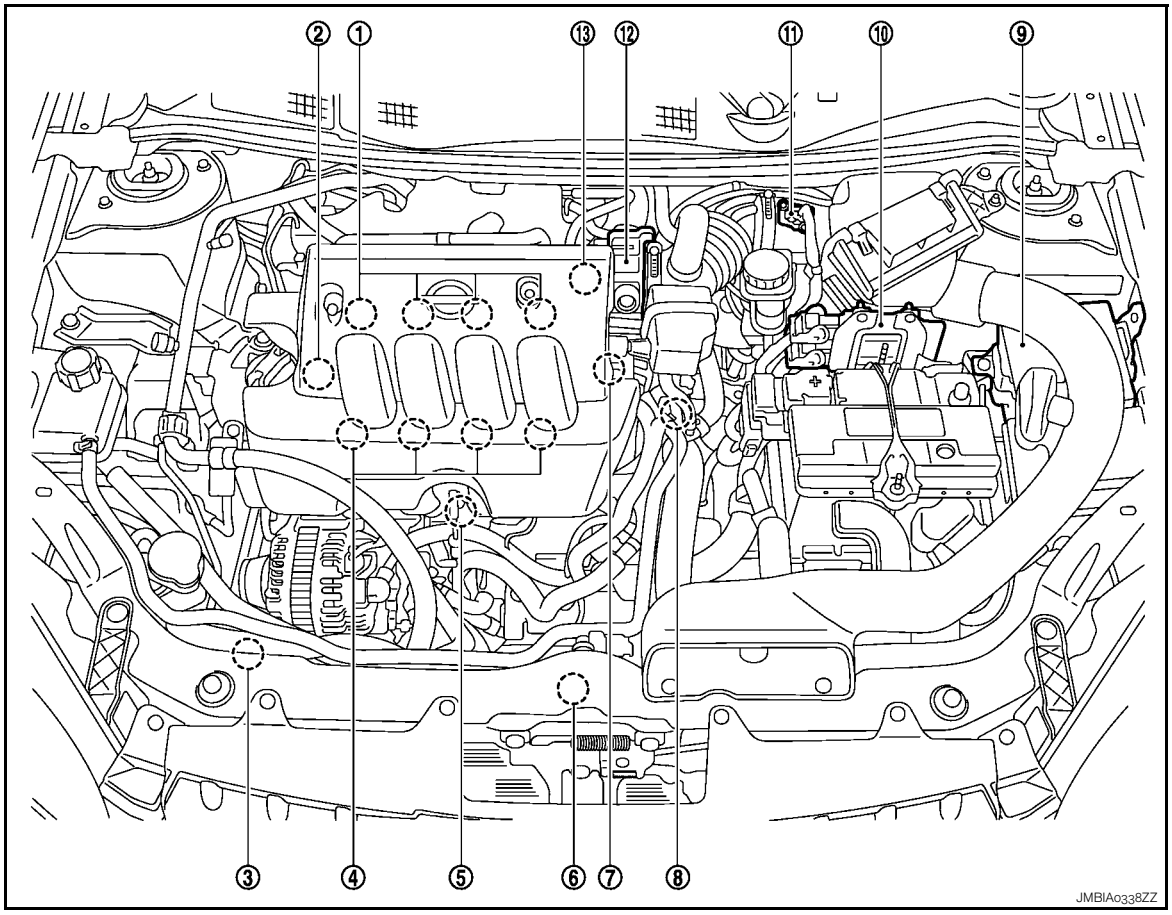
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

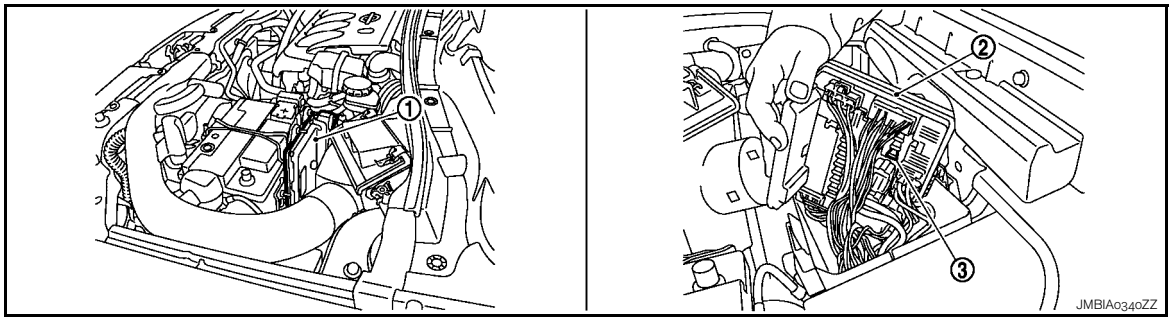
cardiagn.com

Component Parts Location

INFOID:0000000001093564

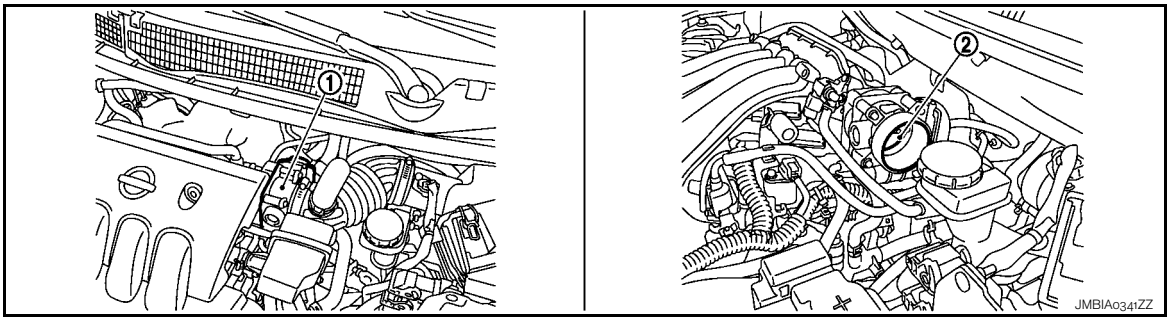


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

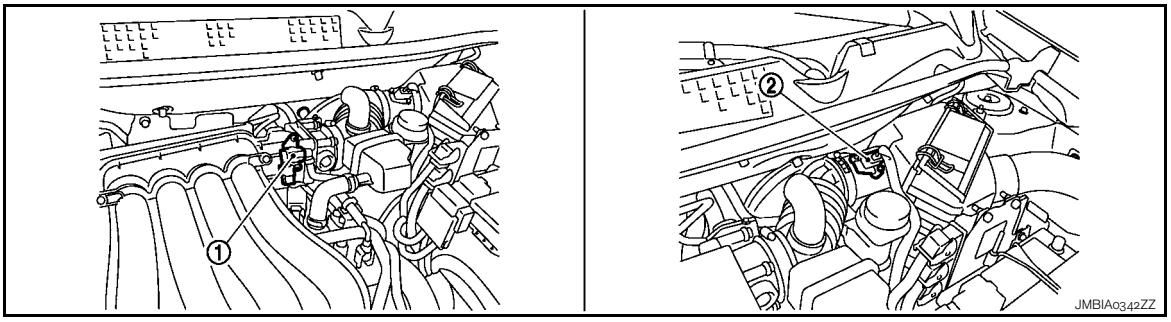


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

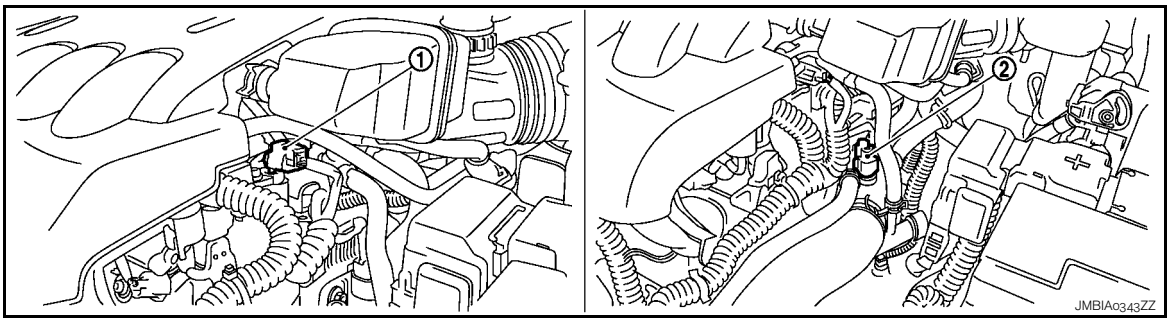
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

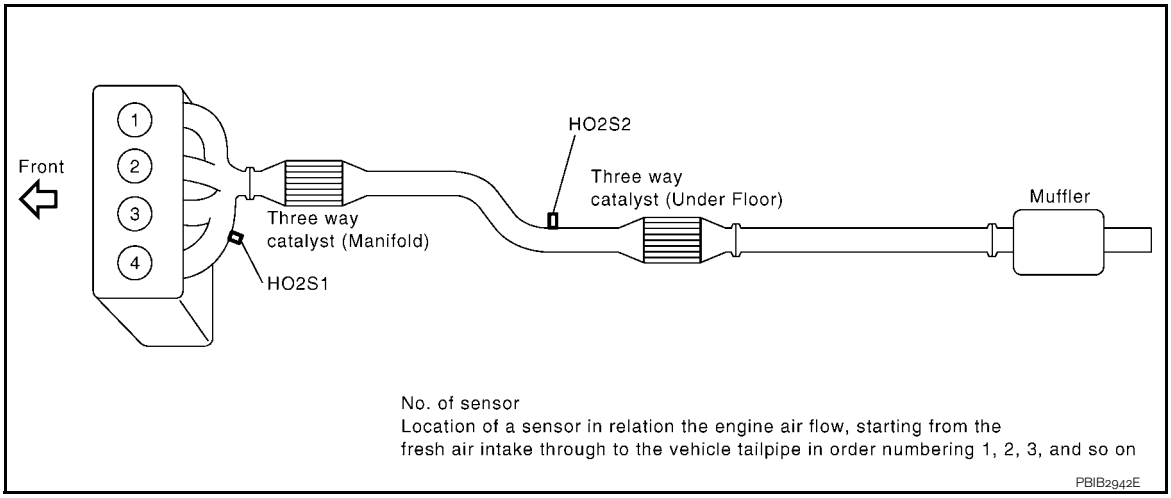


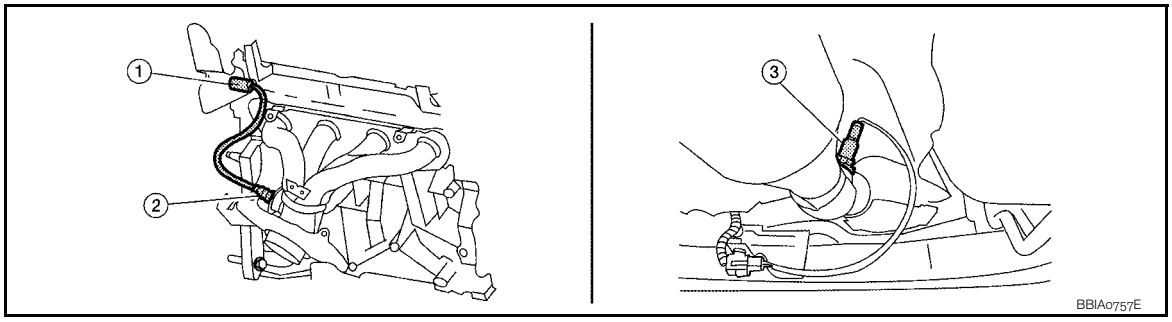
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



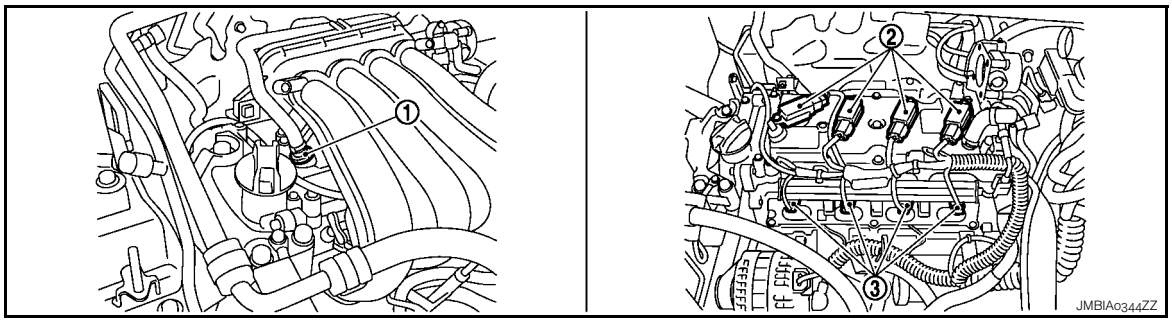
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

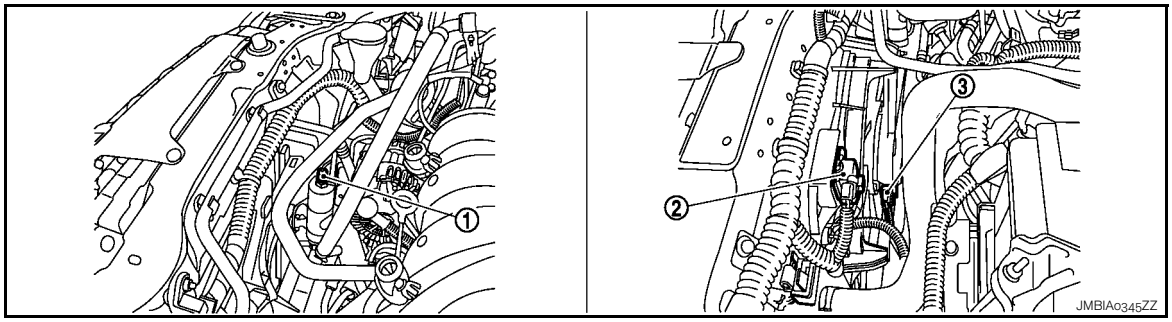




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

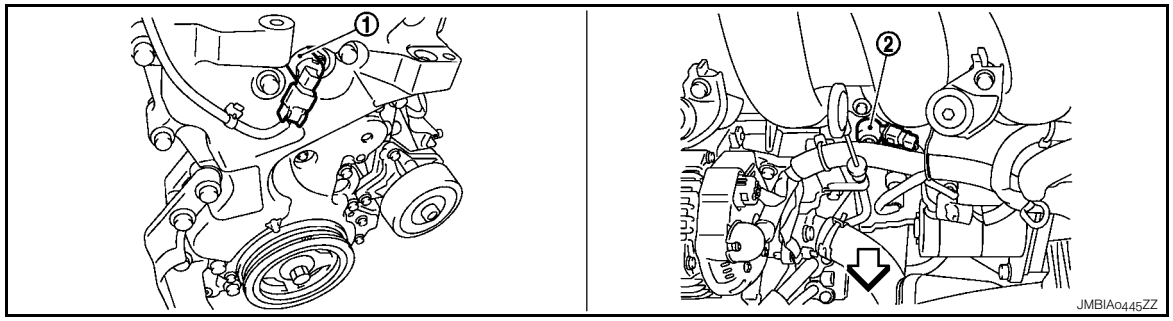


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

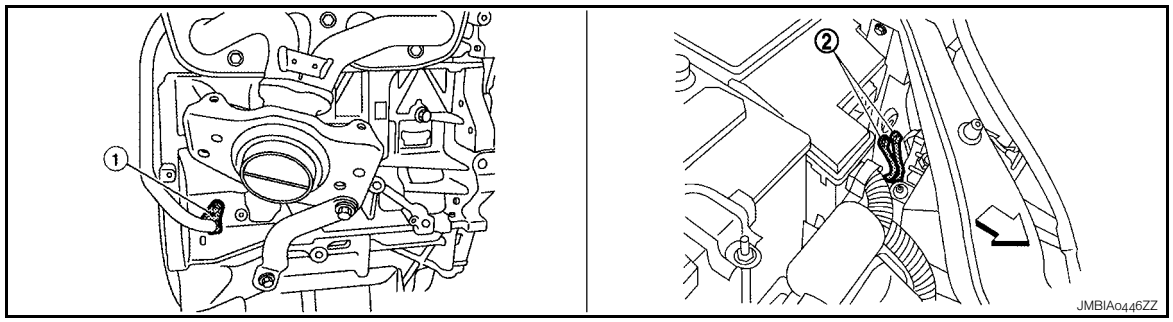


cardiagn.com

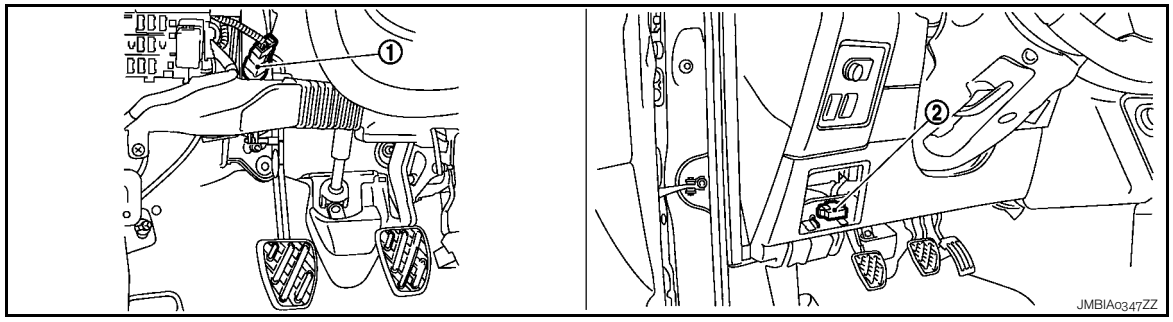
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



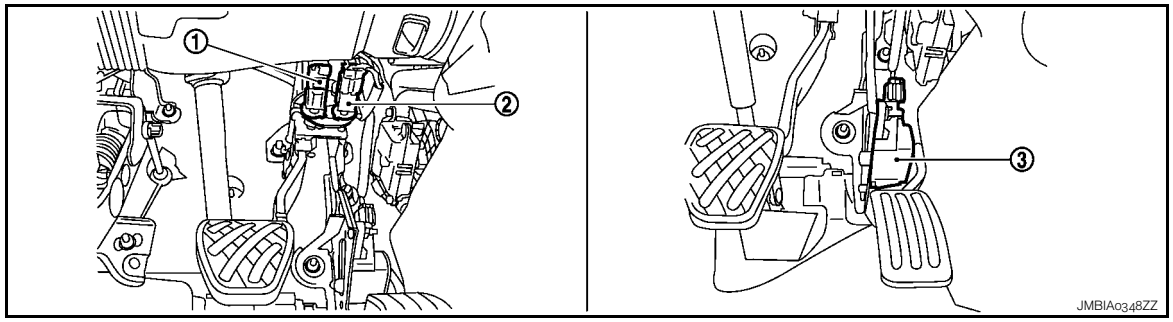
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

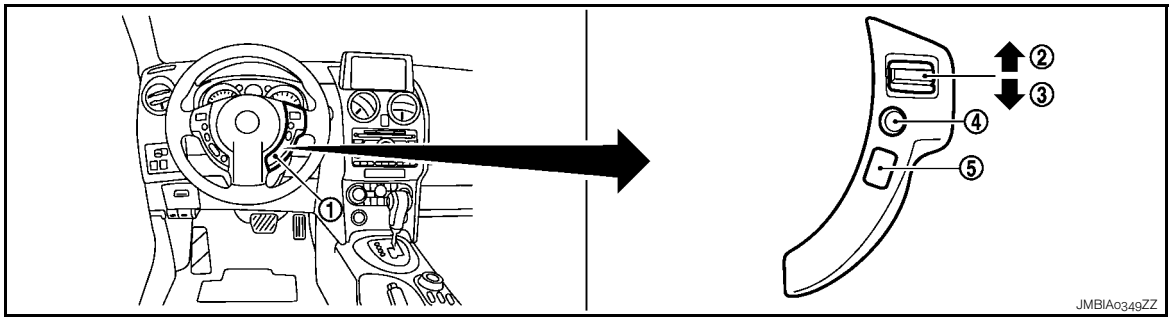


1. ASCD clutch switch 2. Data link connector

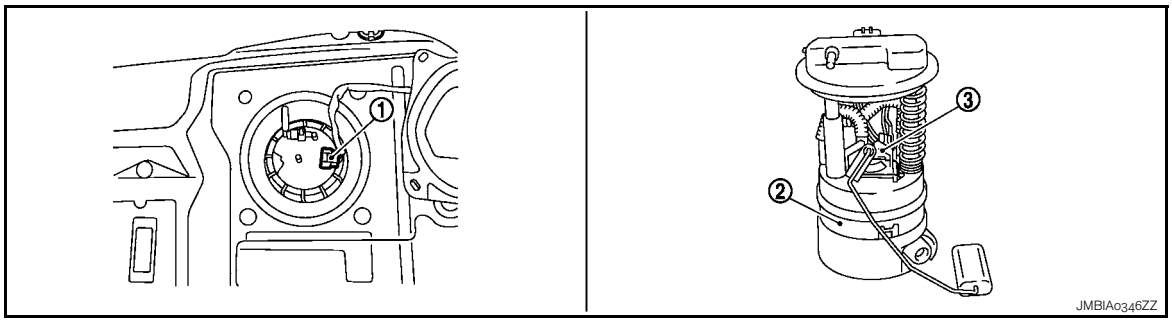


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936619

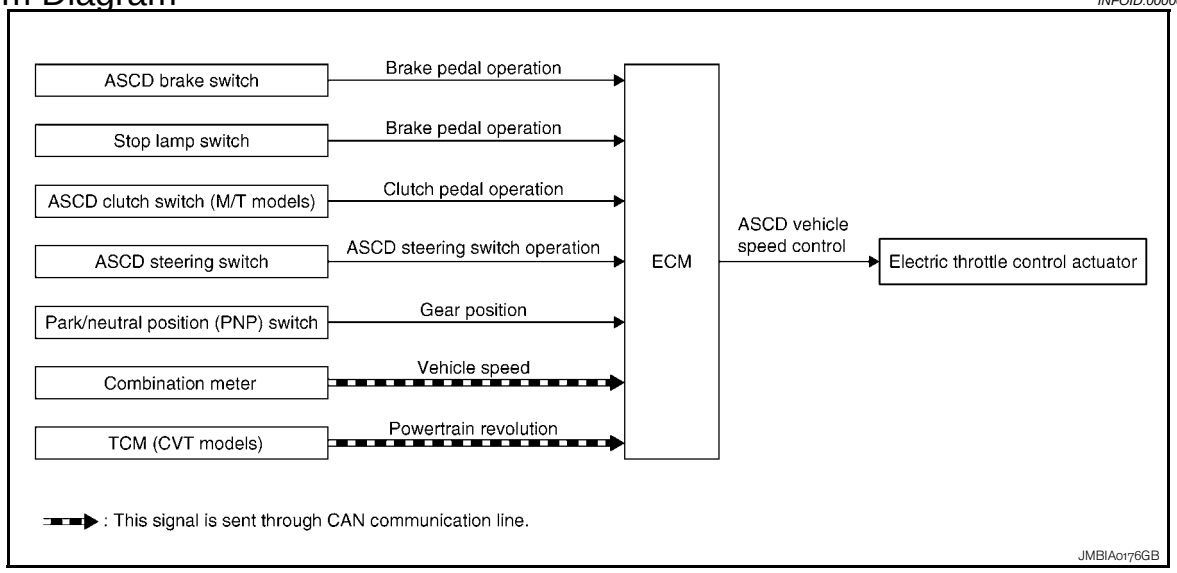
Component	Reference
Accelerator pedal position sensor	EC-899, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Refrigerant pressure sensor	EC-936, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000000936620



System Description

INFOID:0000000000936621

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch			
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch	Gear position		
Combination meter*	Vehicle speed		
TCM* (CVT models)	Powertrain revolution		

*: This signal is sent to the ECM through CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

cardiagn.com

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, R position (CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

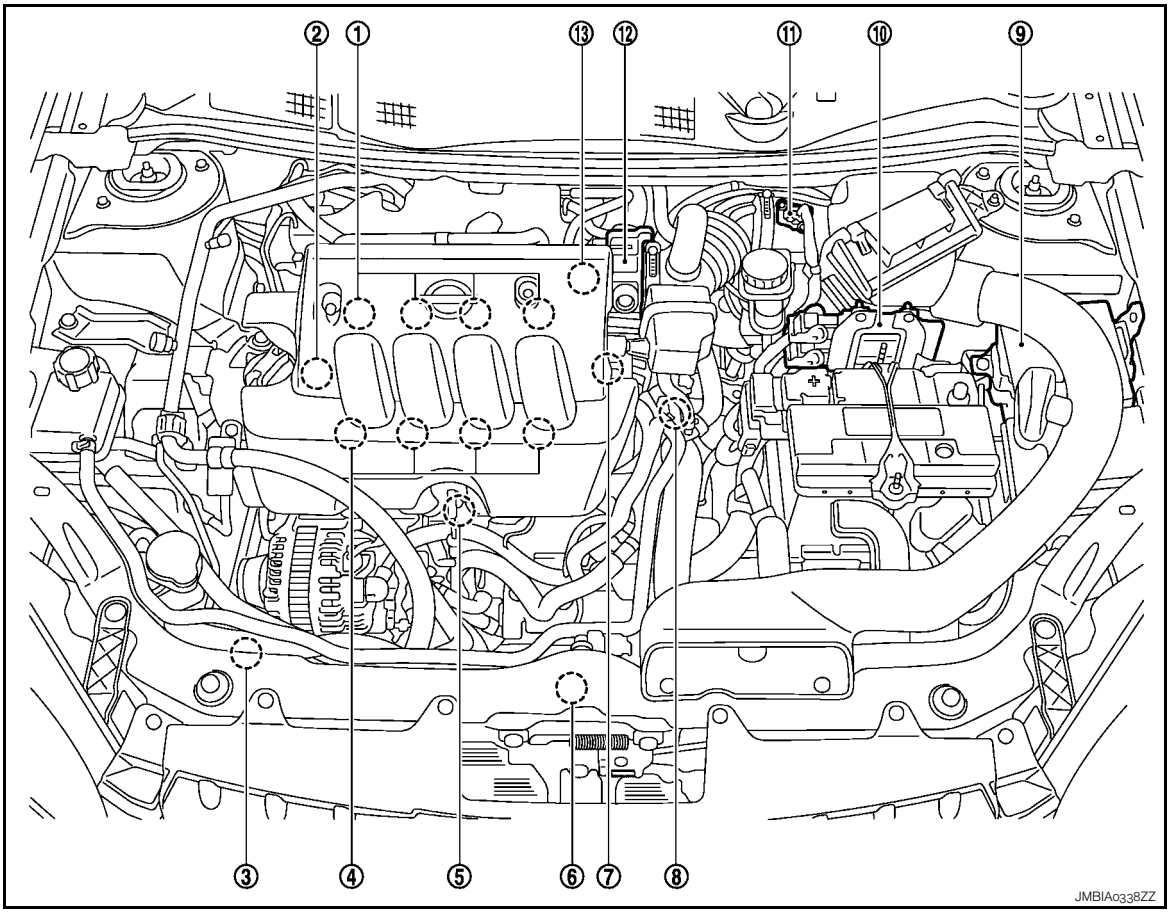
RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180 km/h (112 MPH)

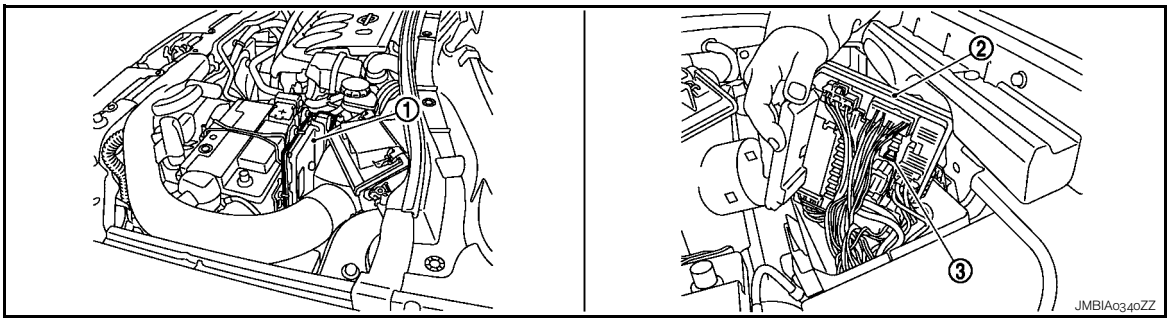
Component Parts Location

INFOID:0000000001093565

cardiagn.com

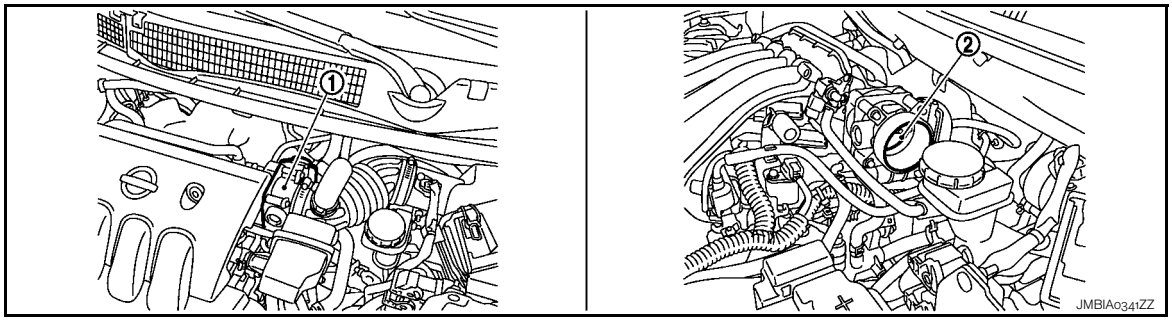


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

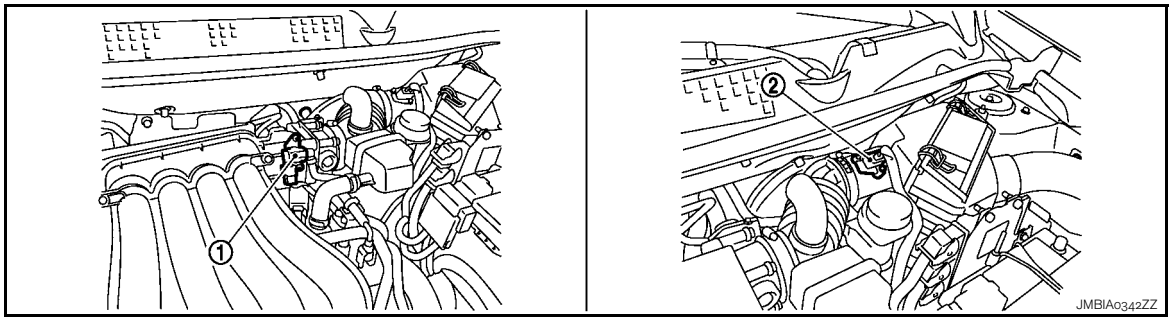


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

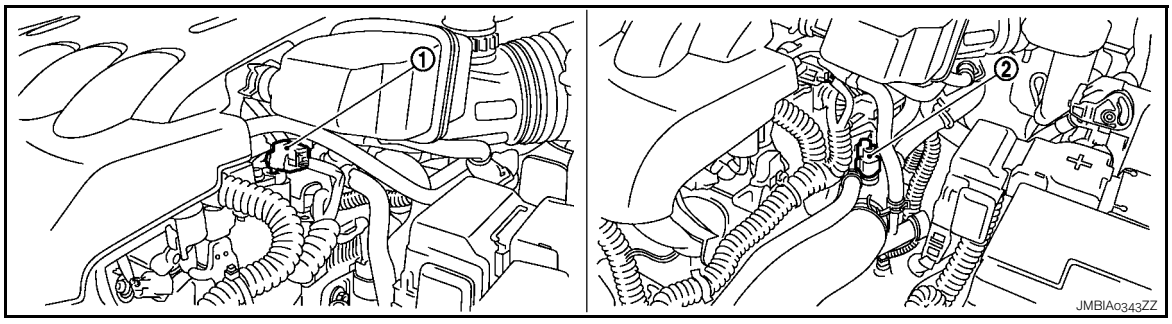
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

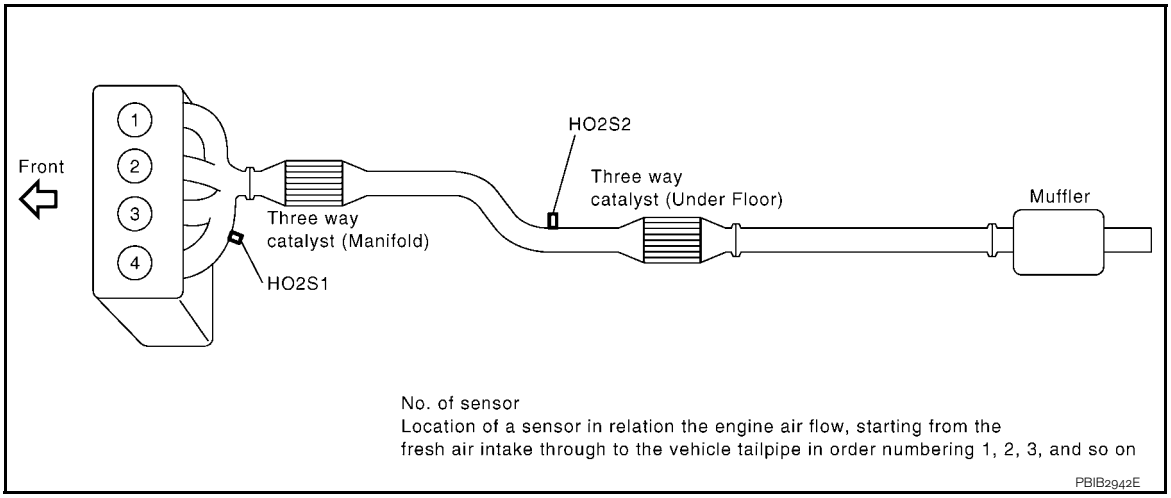


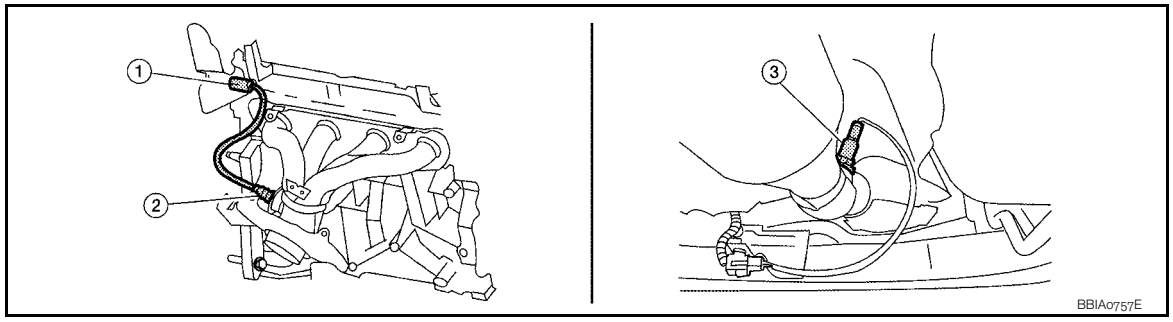
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



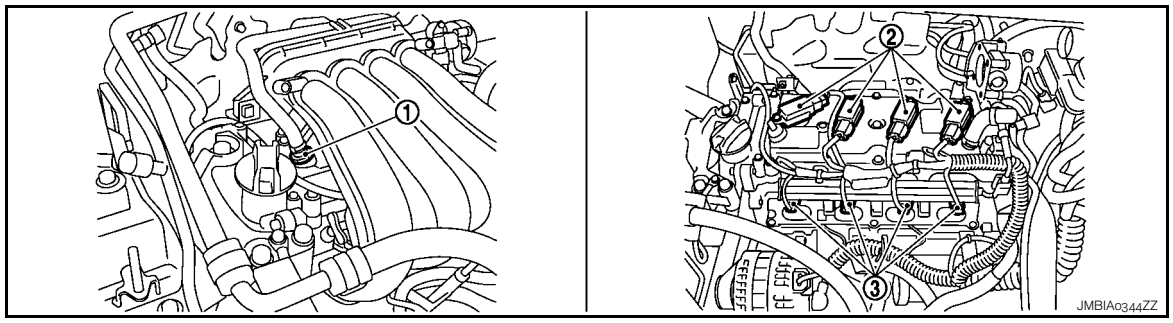
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

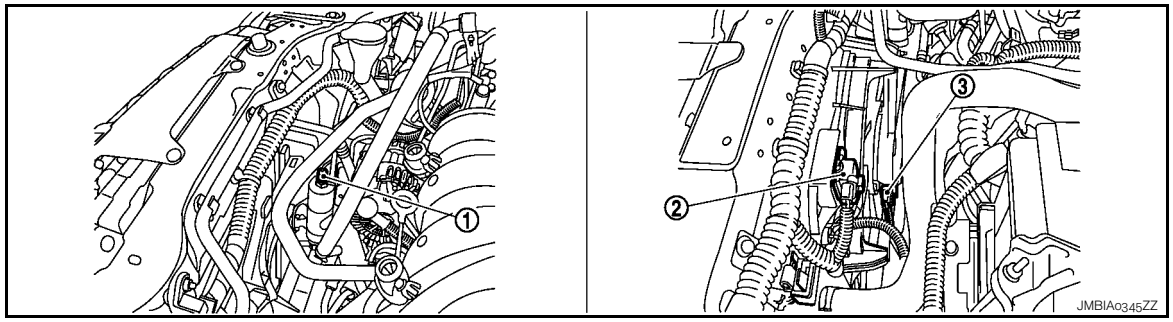




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

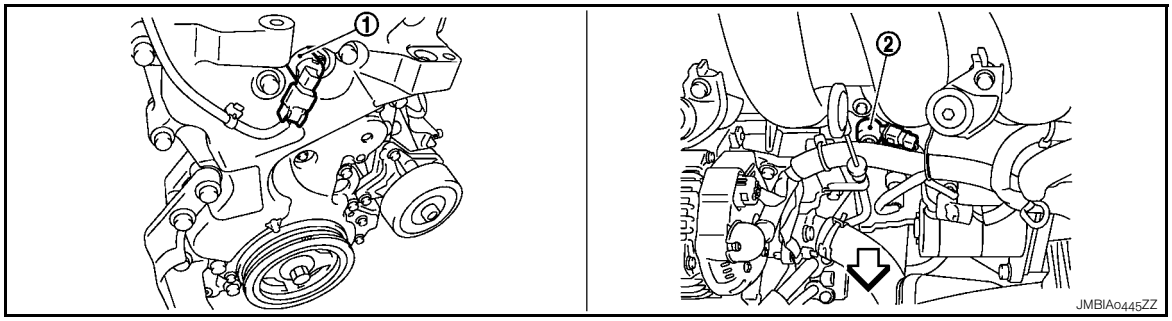


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

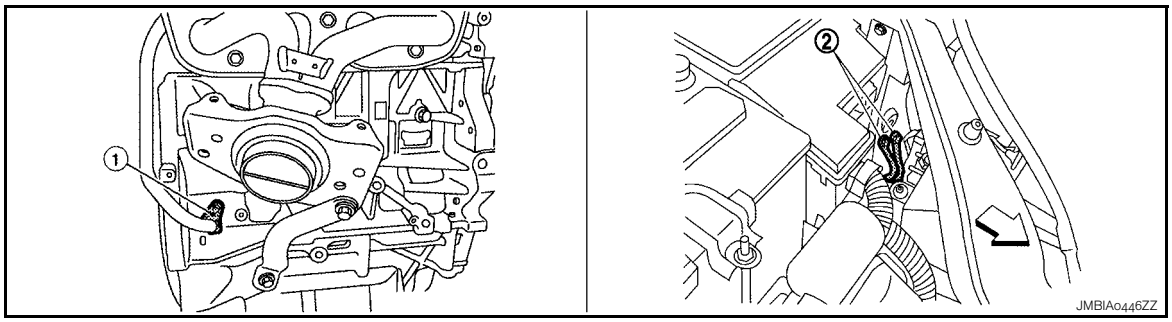


cardiagn.com

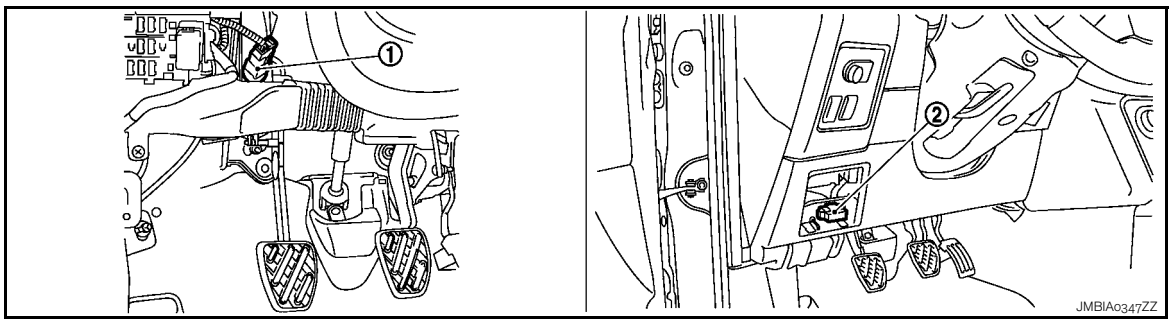
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



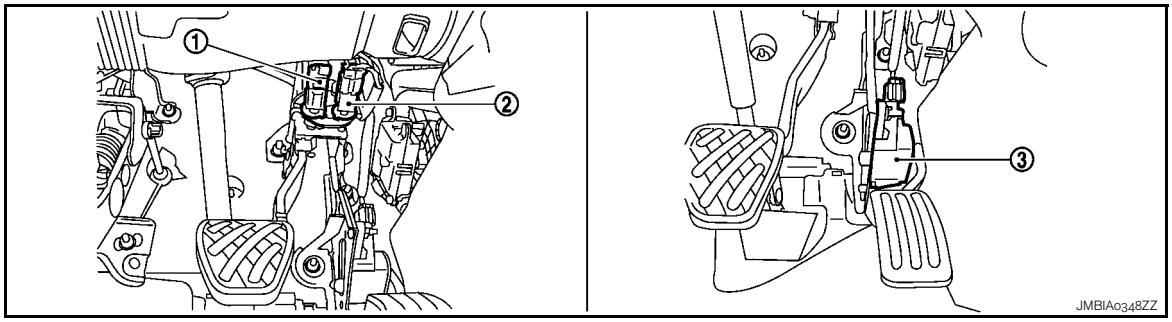
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

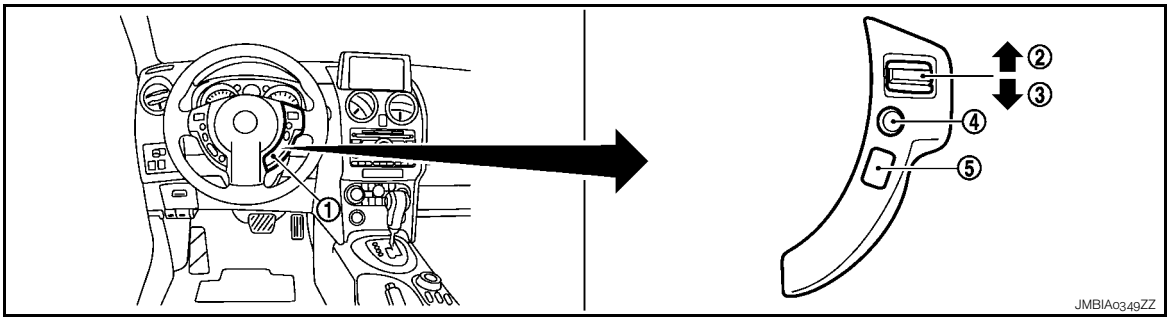


1. ASCD clutch switch 2. Data link connector

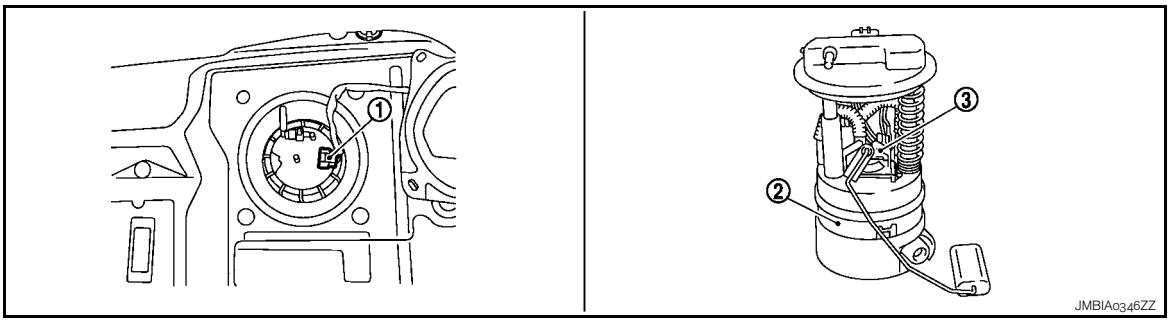


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936623

Component	Reference
ASCD steering switch	EC-880, "Description"
ASCD clutch switch	EC-883, "Description"
ASCD brake switch	EC-883, "Description"
ASCD indicator	EC-917, "Description"
Stop lamp switch	EC-896, "Description"
Electric throttle control actuator	EC-832, "Description"

cardiagn.com

CAN COMMUNICATION

System Description

INFOID:0000000000936624

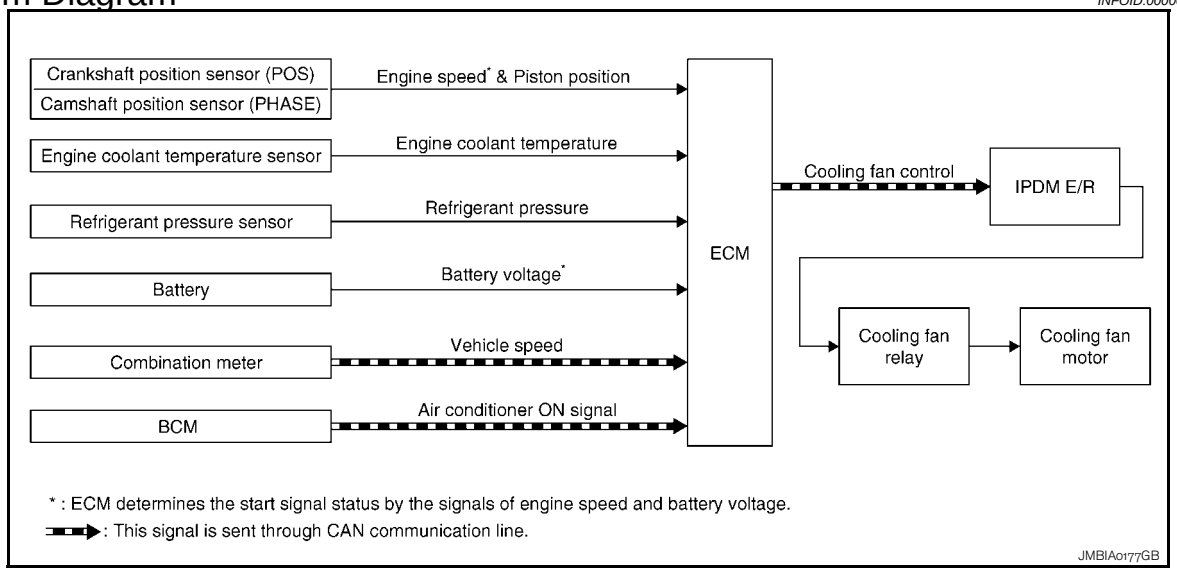
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-59, "CAN Communication Signal Chart", about CAN communication for detail..

cardiagn.com

COOLING FAN CONTROL

System Diagram

INFOID:0000000000936625



System Description

INFOID:0000000000936626

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

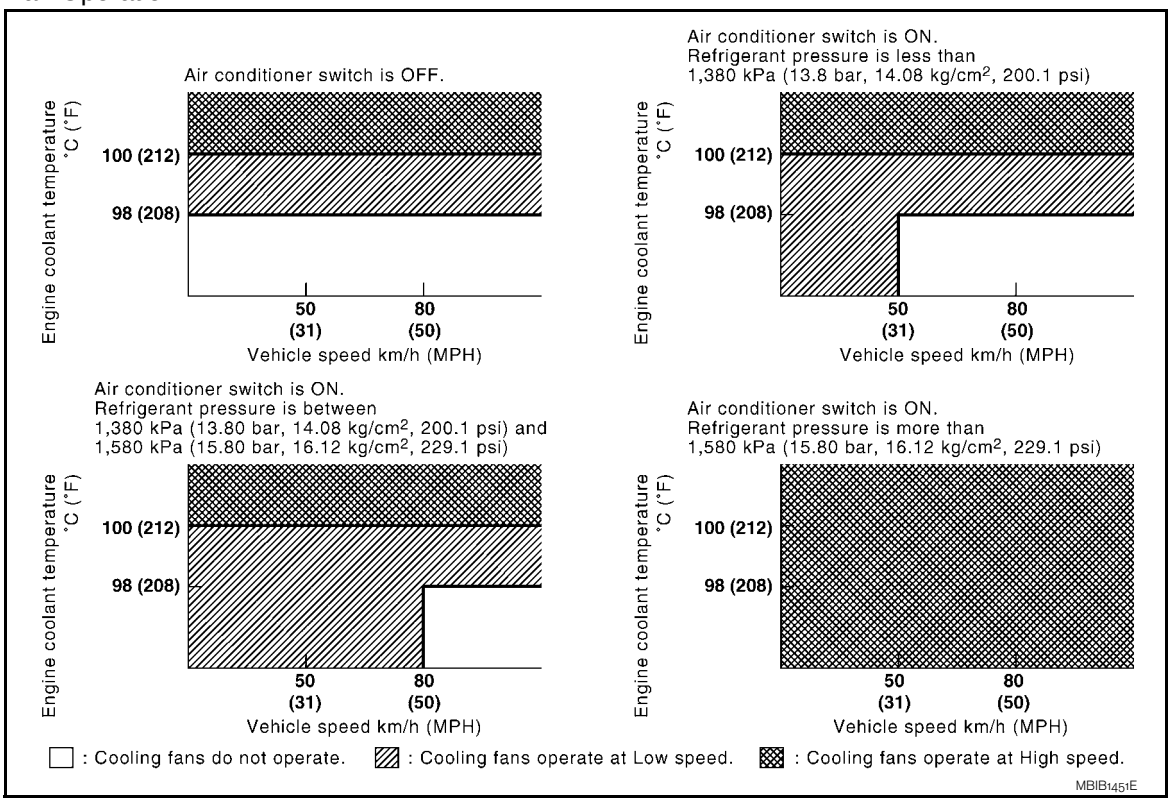
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

cardiagn.com

Cooling Fan Operation



Cooling Fan Relay Operation

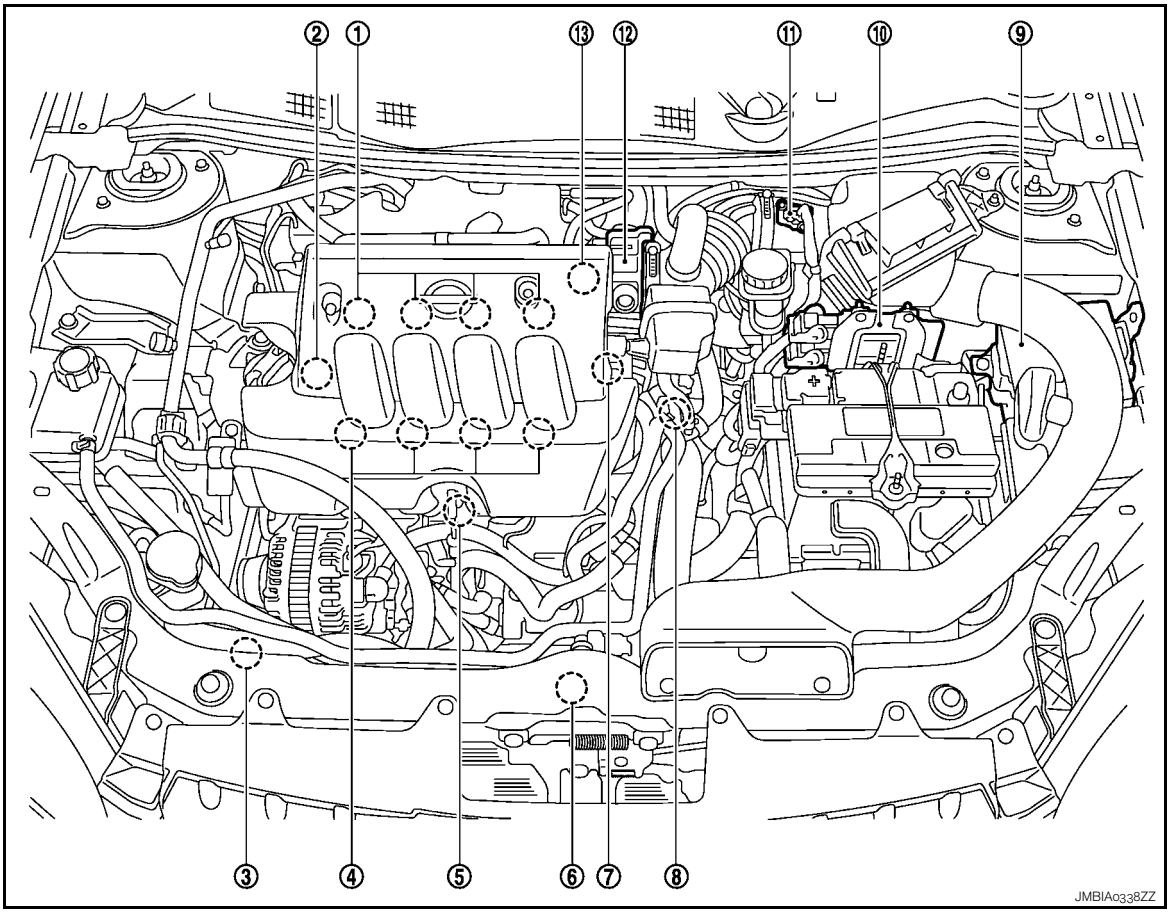
The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	3
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

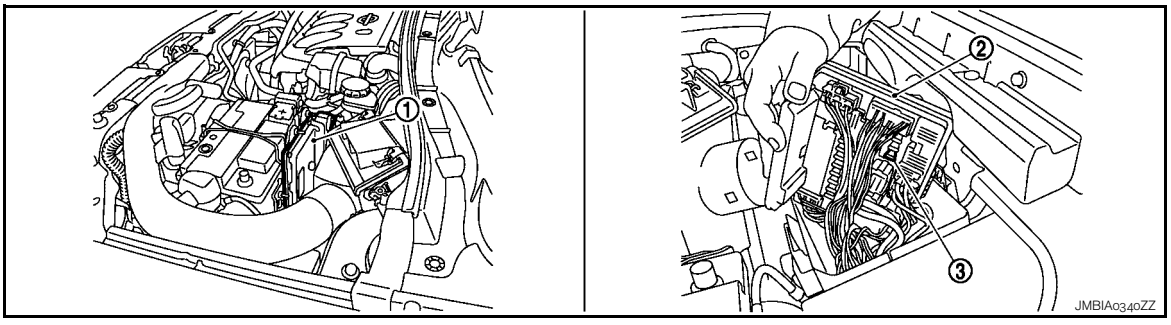
Component Parts Location

INFOID:0000000001093566

cardiagn.com

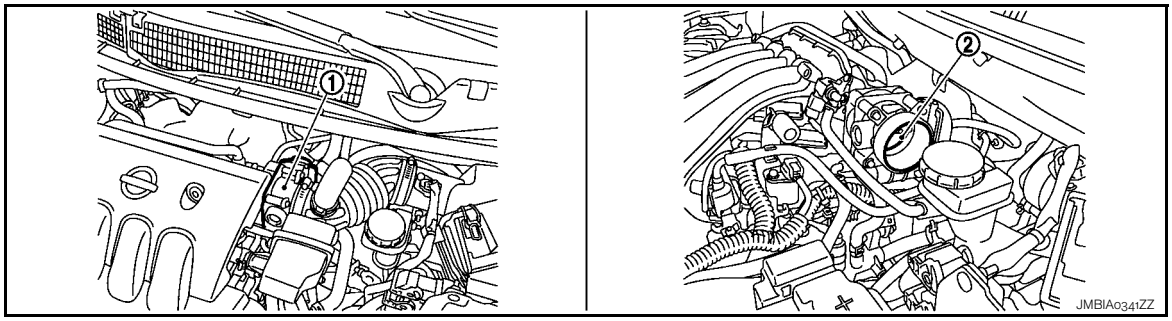


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

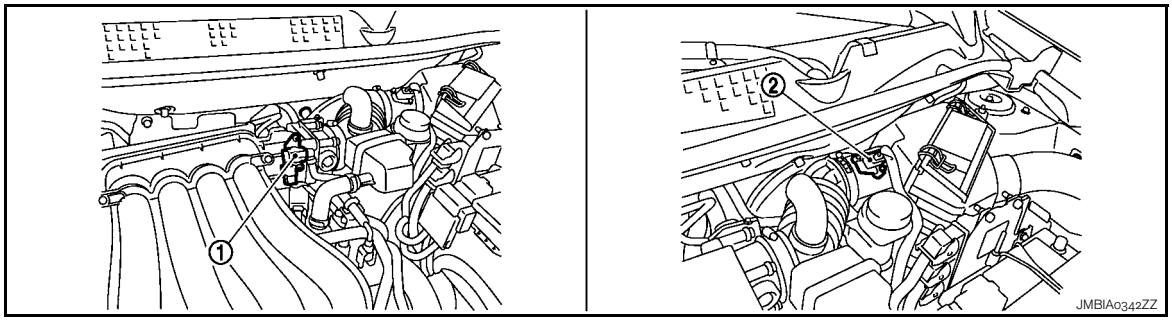


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

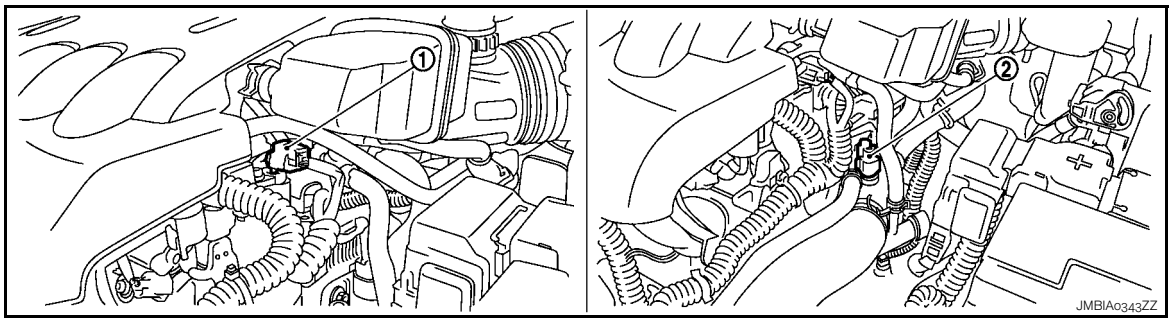
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

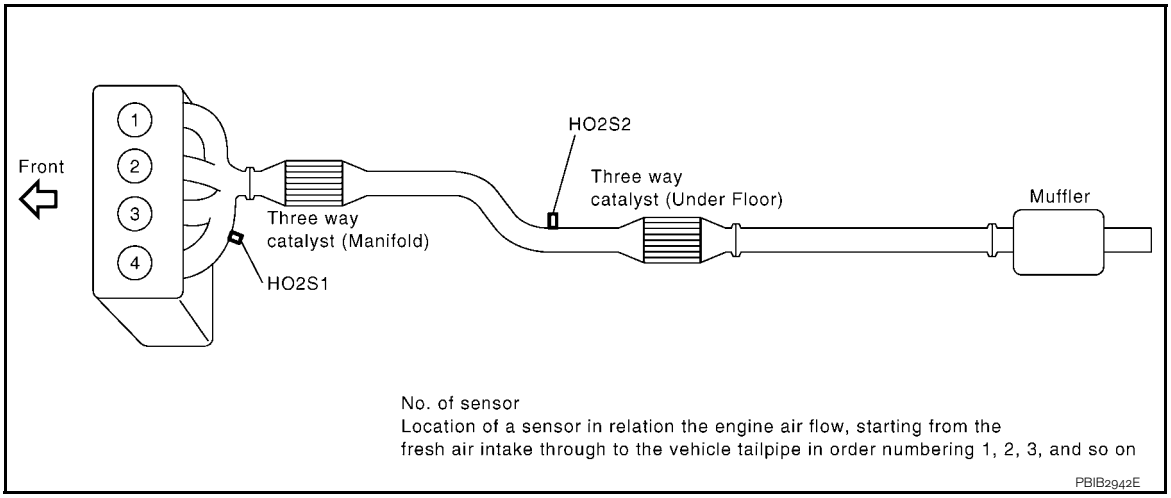


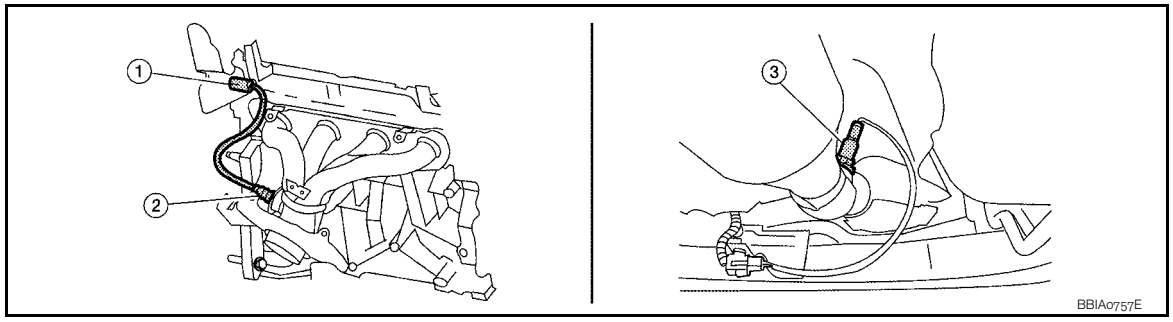
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



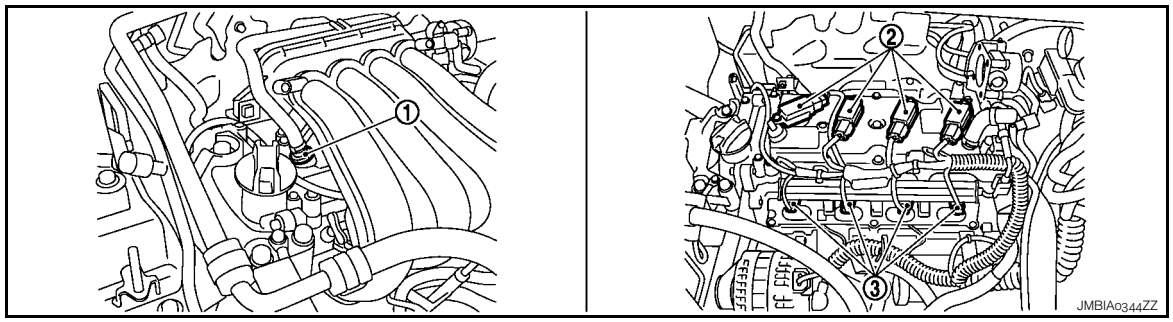
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

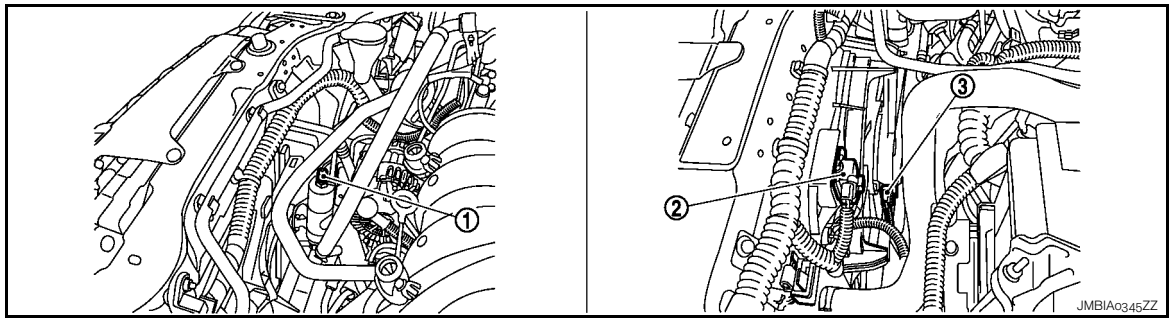




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

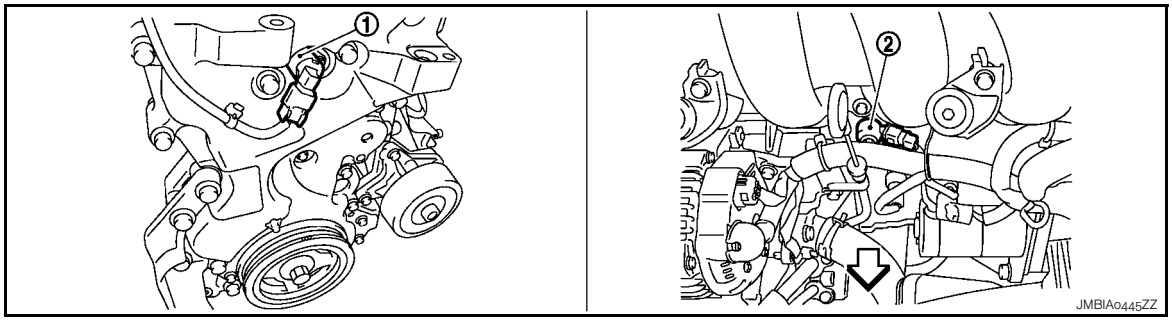


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

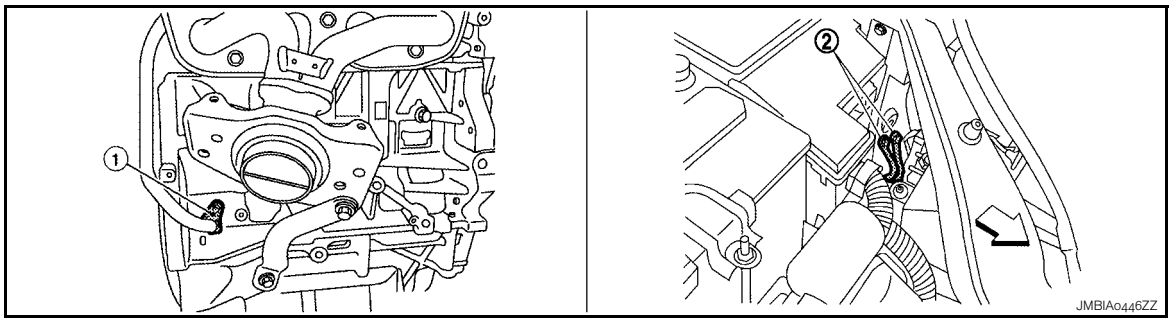


cardiagn.com

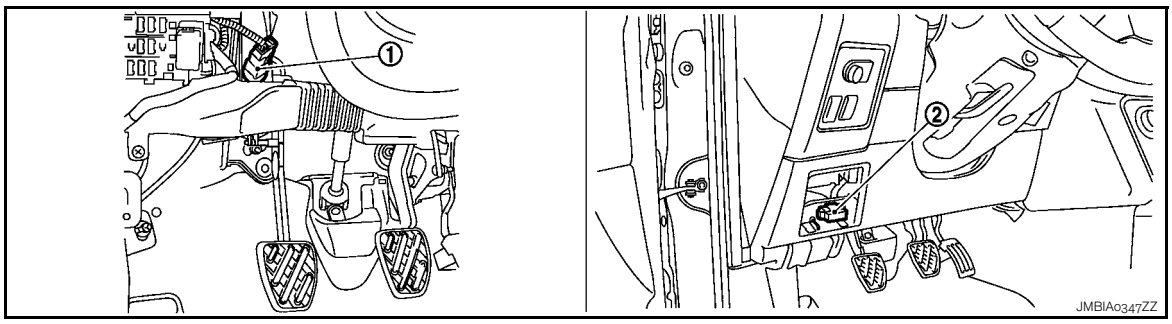
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



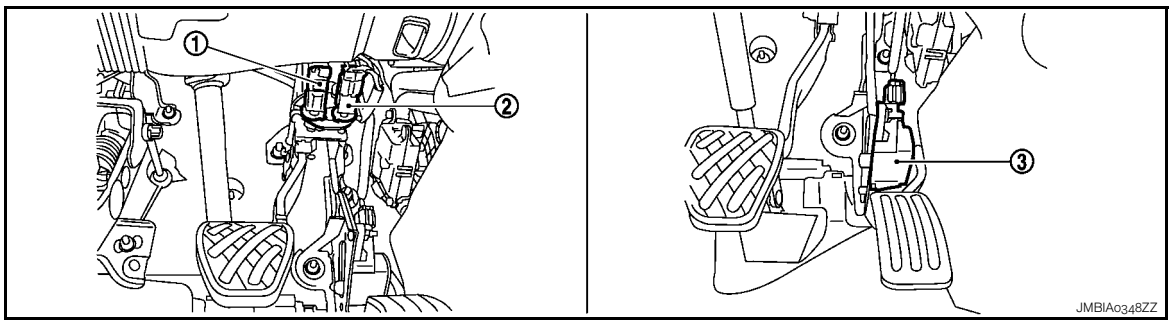
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

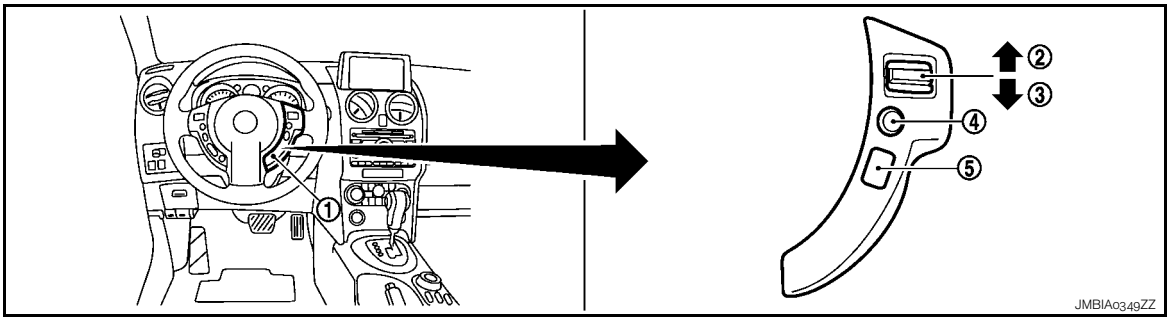


1. ASCD clutch switch 2. Data link connector

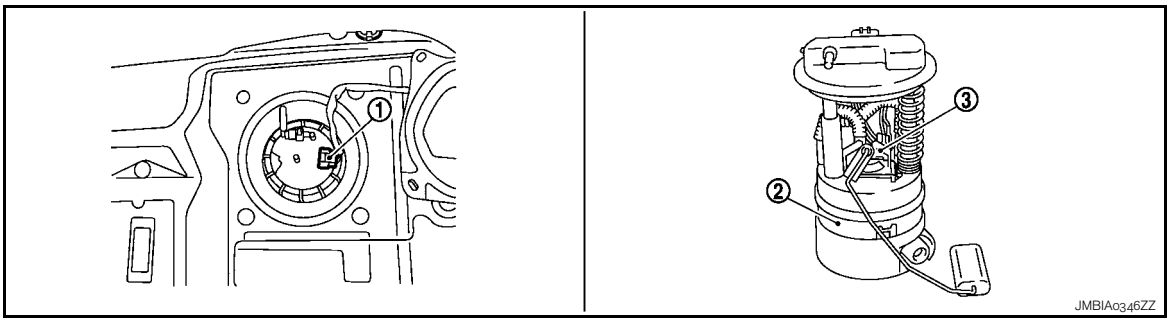


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936628

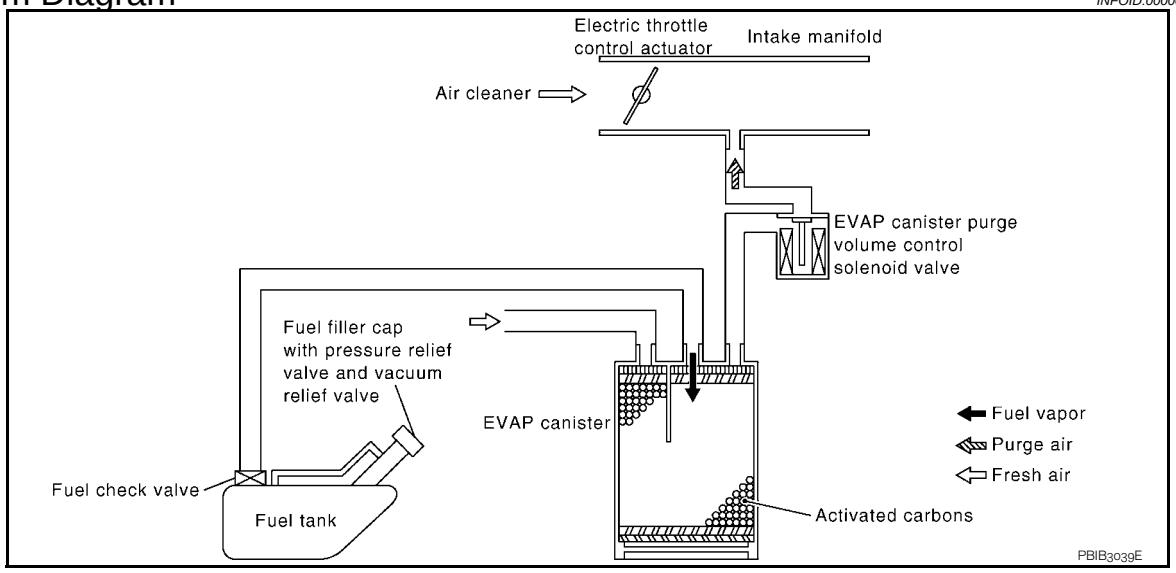
Component	Reference
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Cooling fan motor	EC-685, "System Diagram"
Engine coolant temperature sensor	EC-754, "Description"
Refrigerant pressure sensor	EC-936, "Description"

cardiagn.com

EVAPORATIVE EMISSION SYSTEM

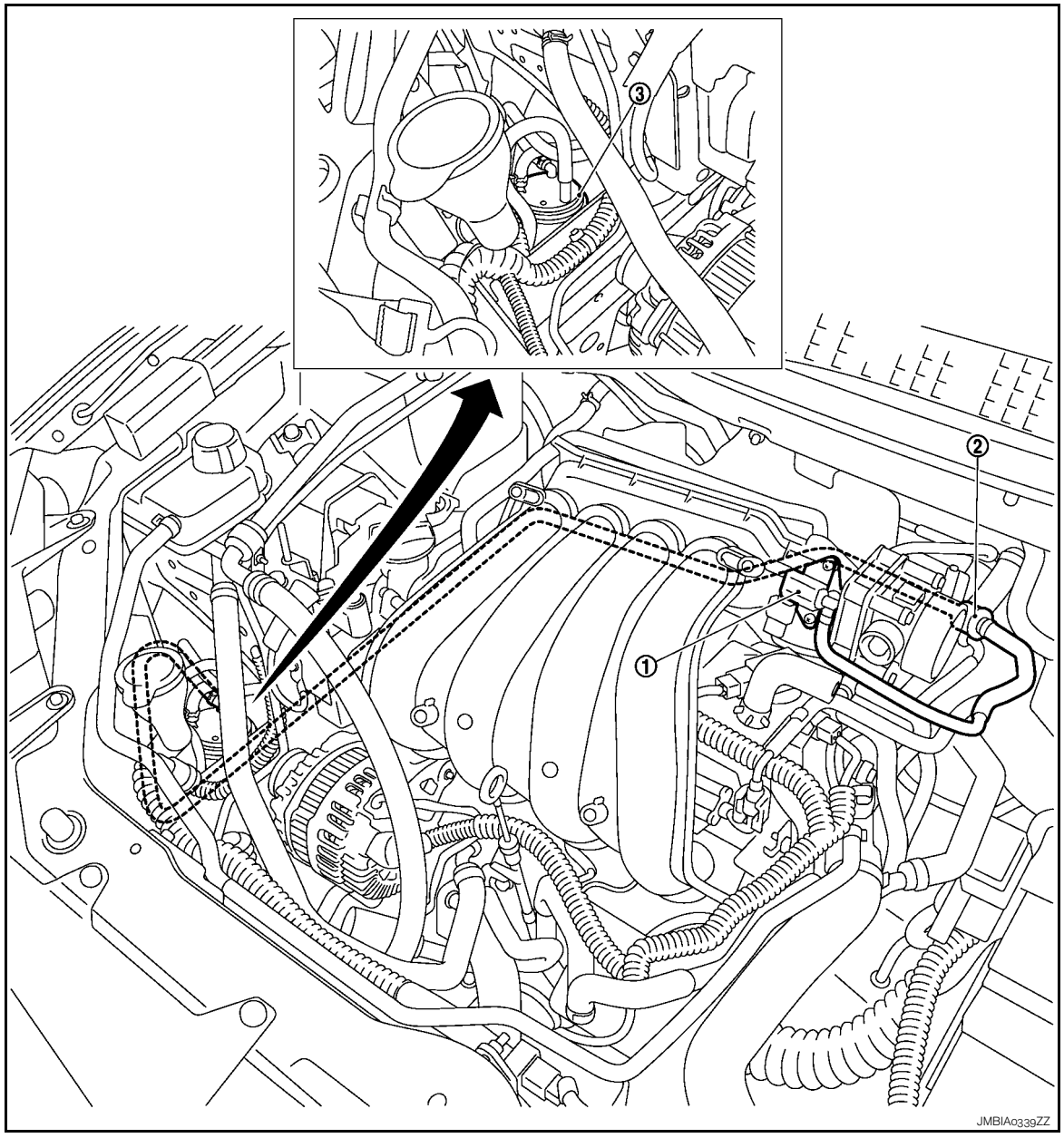
System Diagram

INFOID:0000000000936629



EVAPORATIVE EMISSION LINE DRAWING

cardiagn.com



1. EVAP canister purge volume control solenoid valve
2. EVAP purge resonator
3. EVAP canister

NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

System Description

INFOID:0000000000936630

INPUT/OUTPUT SIGNAL CHART

cardiagn.com

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor*2	Vehicle speed		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

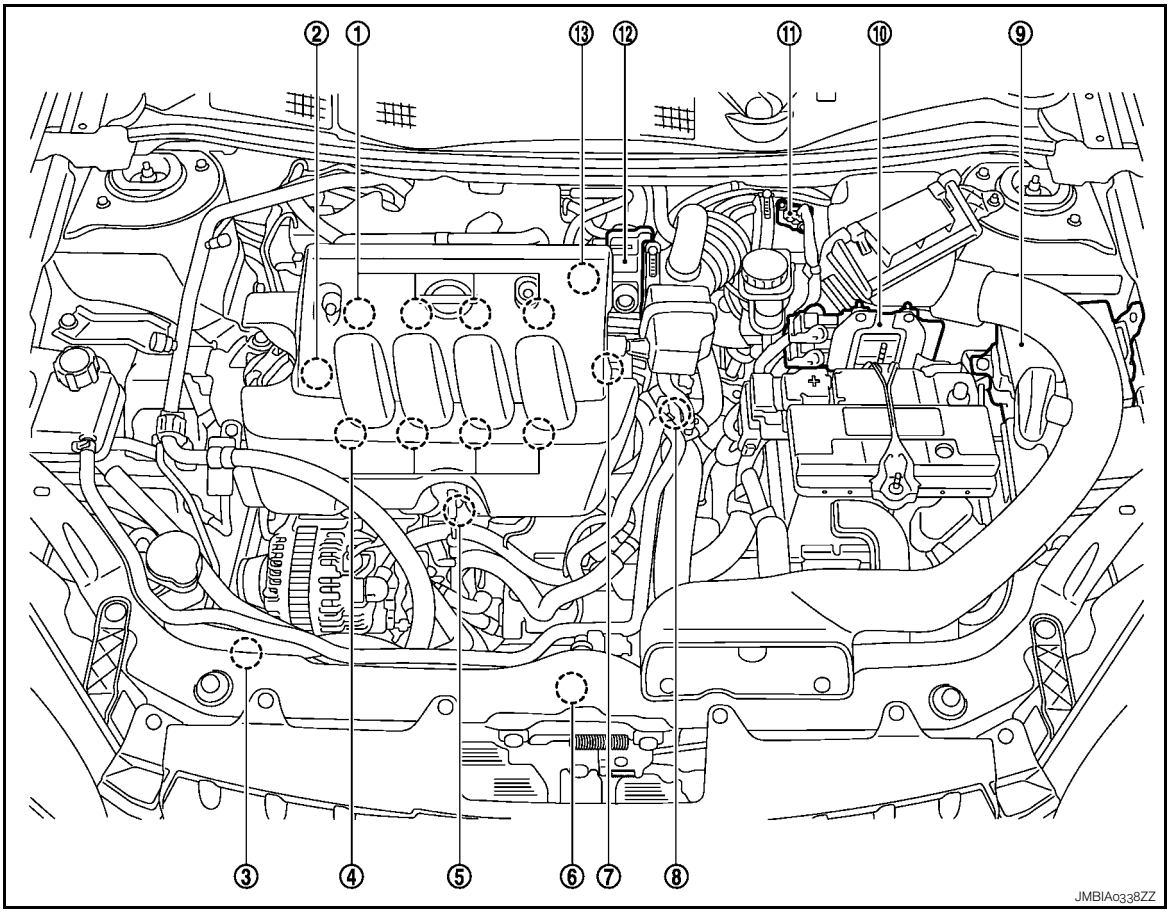
SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

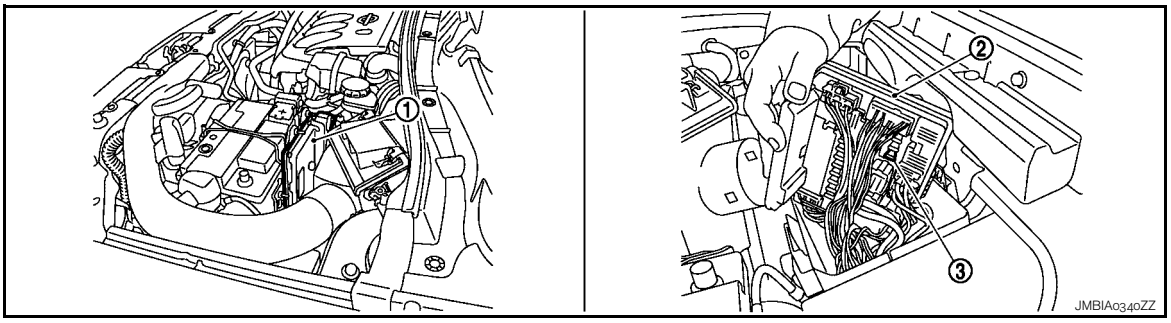
Component Parts Location

INFOID:0000000001093567

cardiagn.com

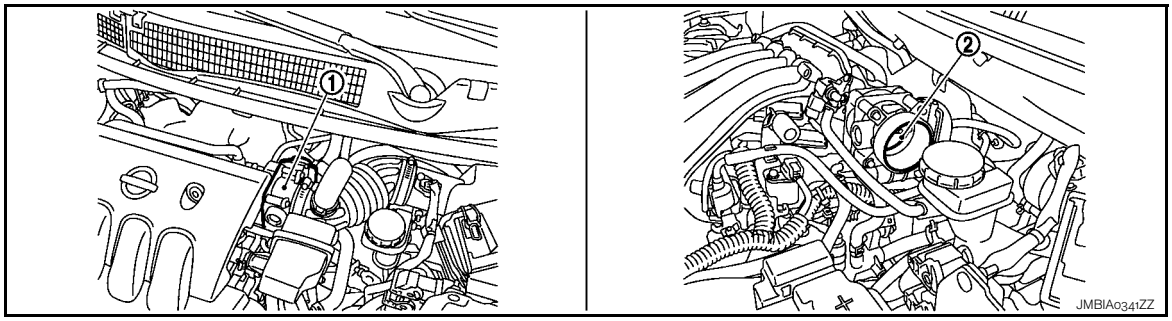


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

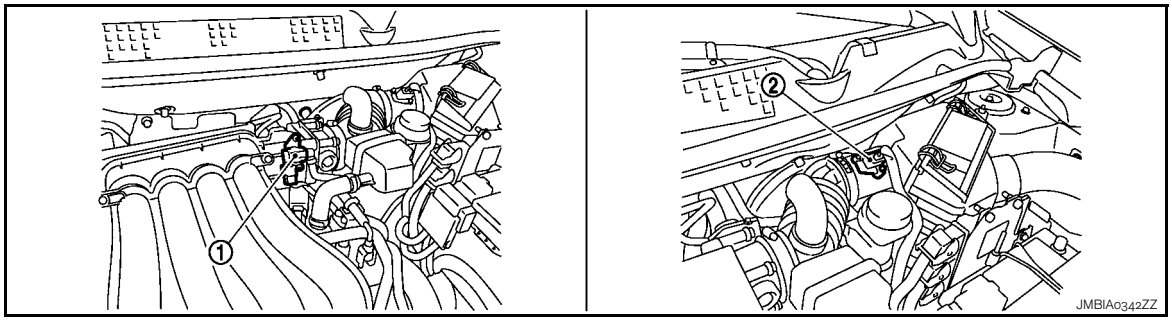


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

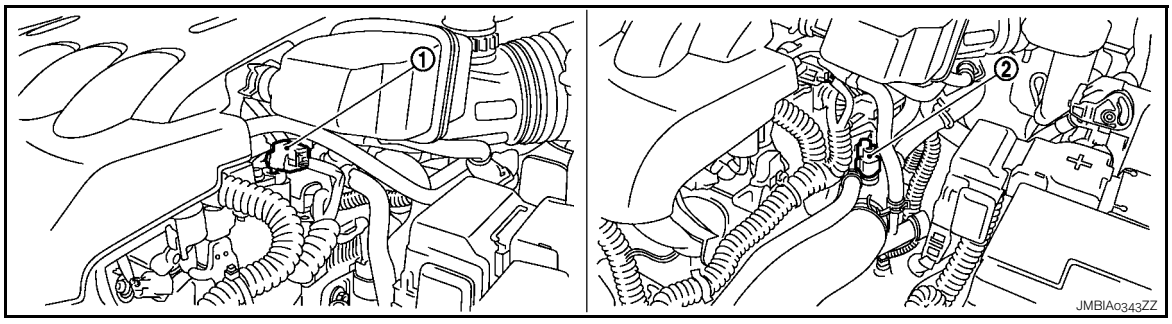
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

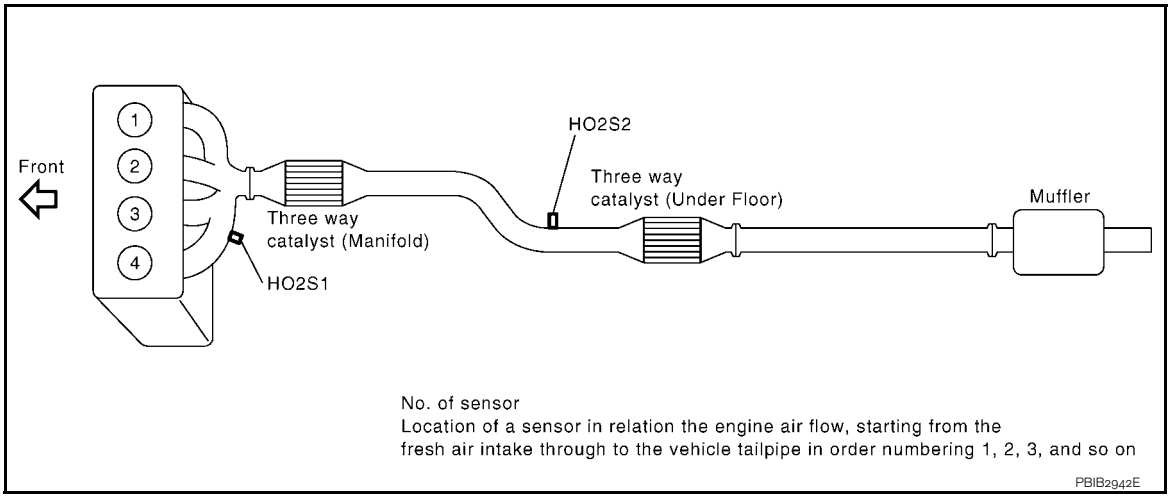


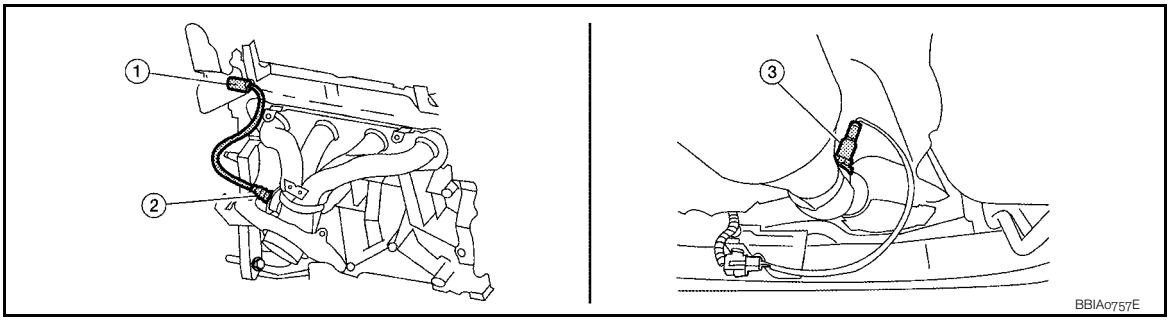
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



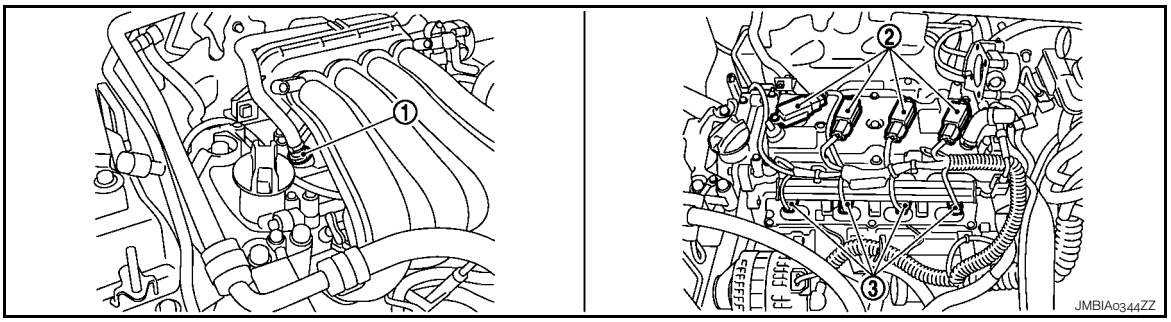
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

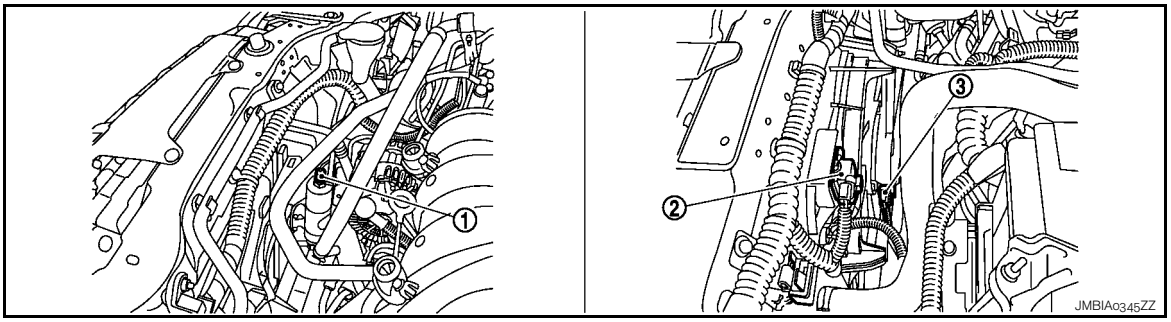




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

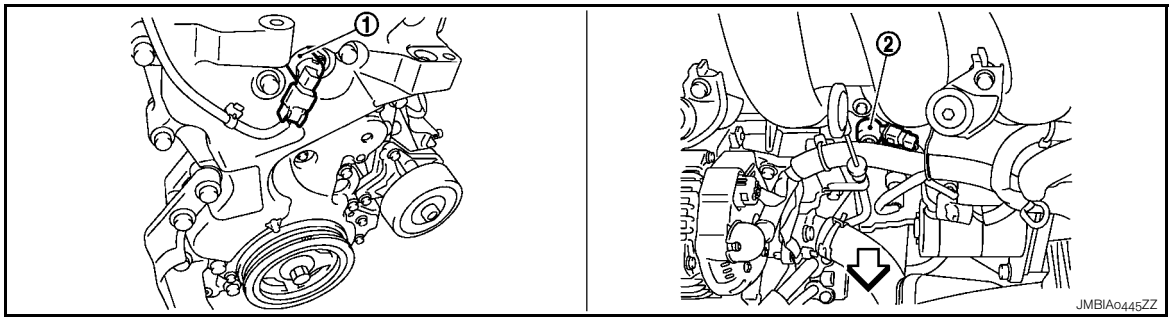


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

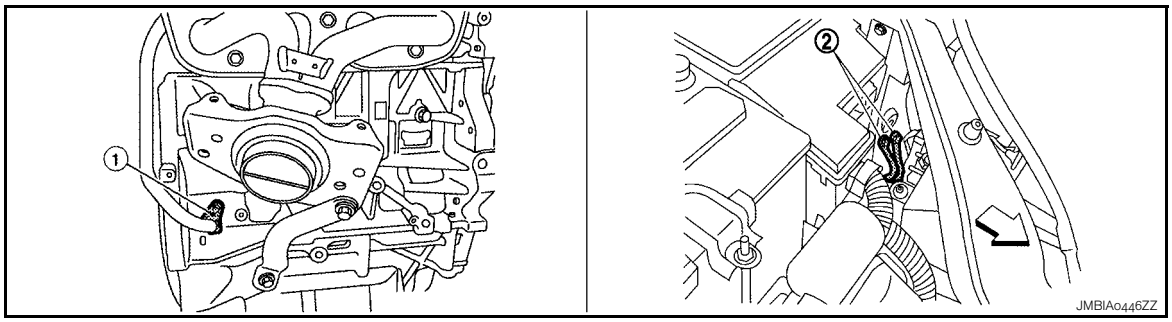


cardiagn.com

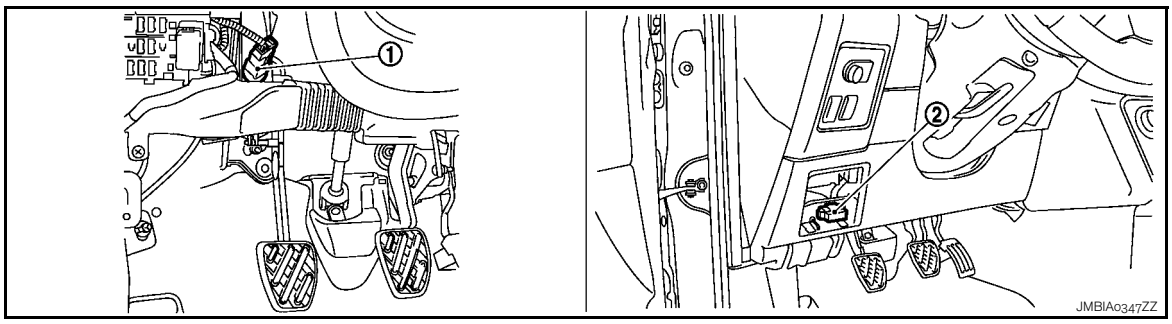
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



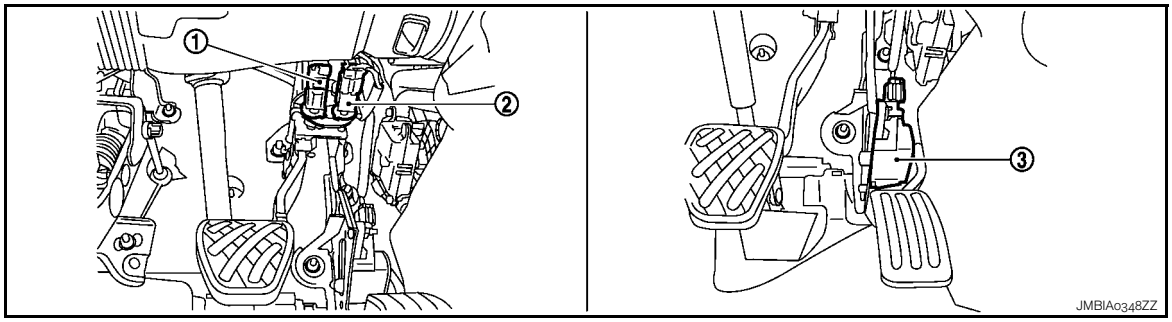
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

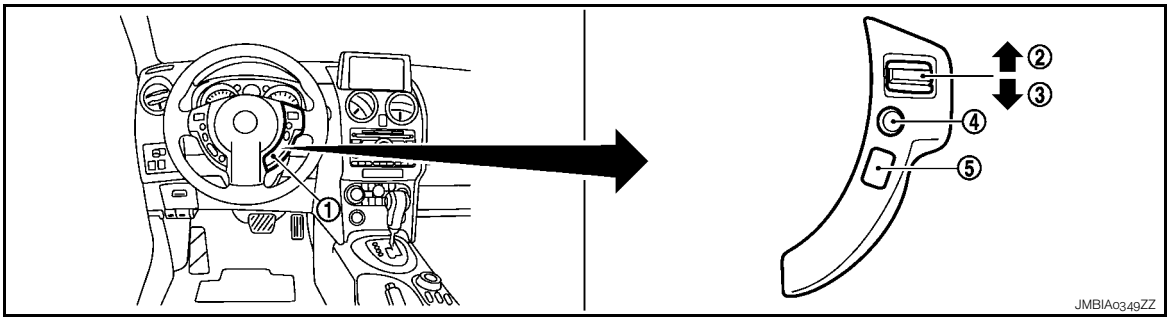


1. ASCD clutch switch 2. Data link connector

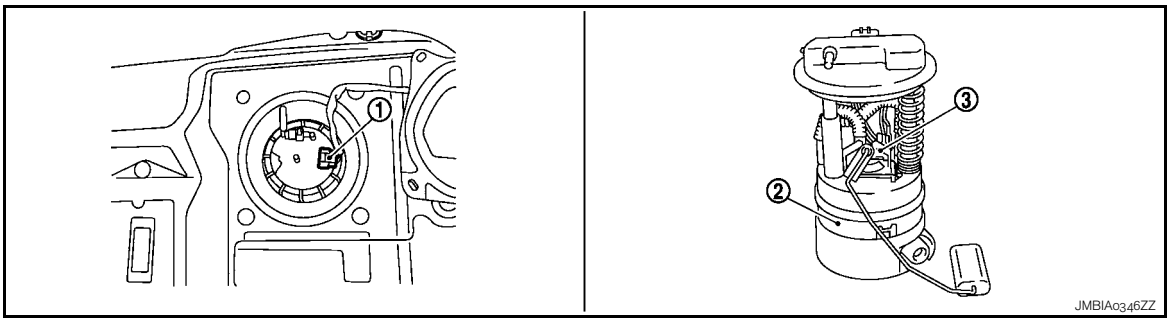


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936632

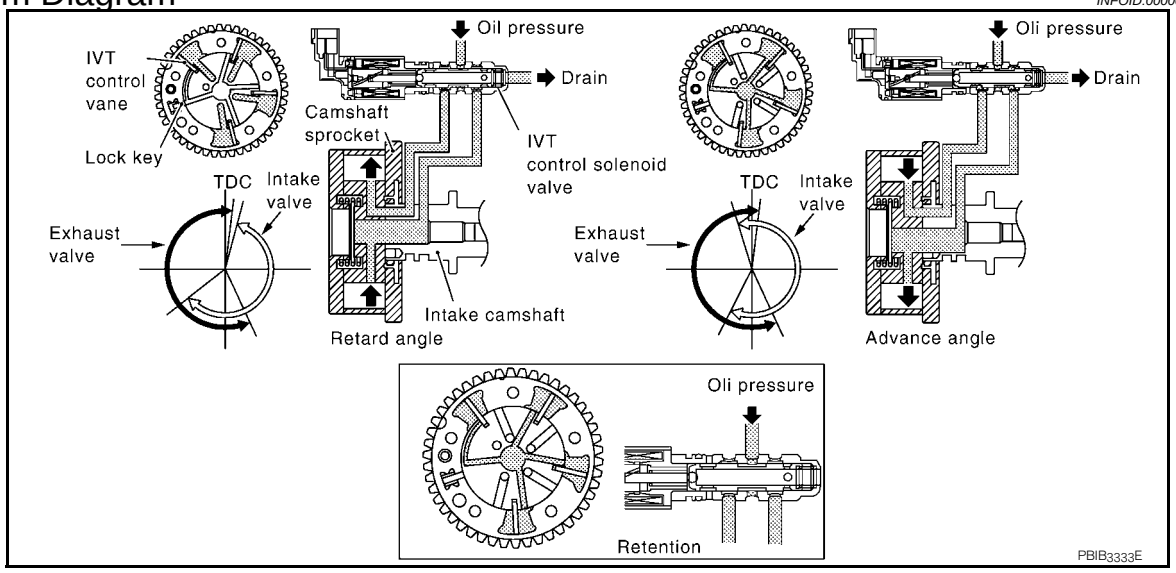
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
EVAP canister purge volume control solenoid valve	EC-822, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Mass air flow sensor	EC-746, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000000936633



System Description

INFOID:0000000000936634

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

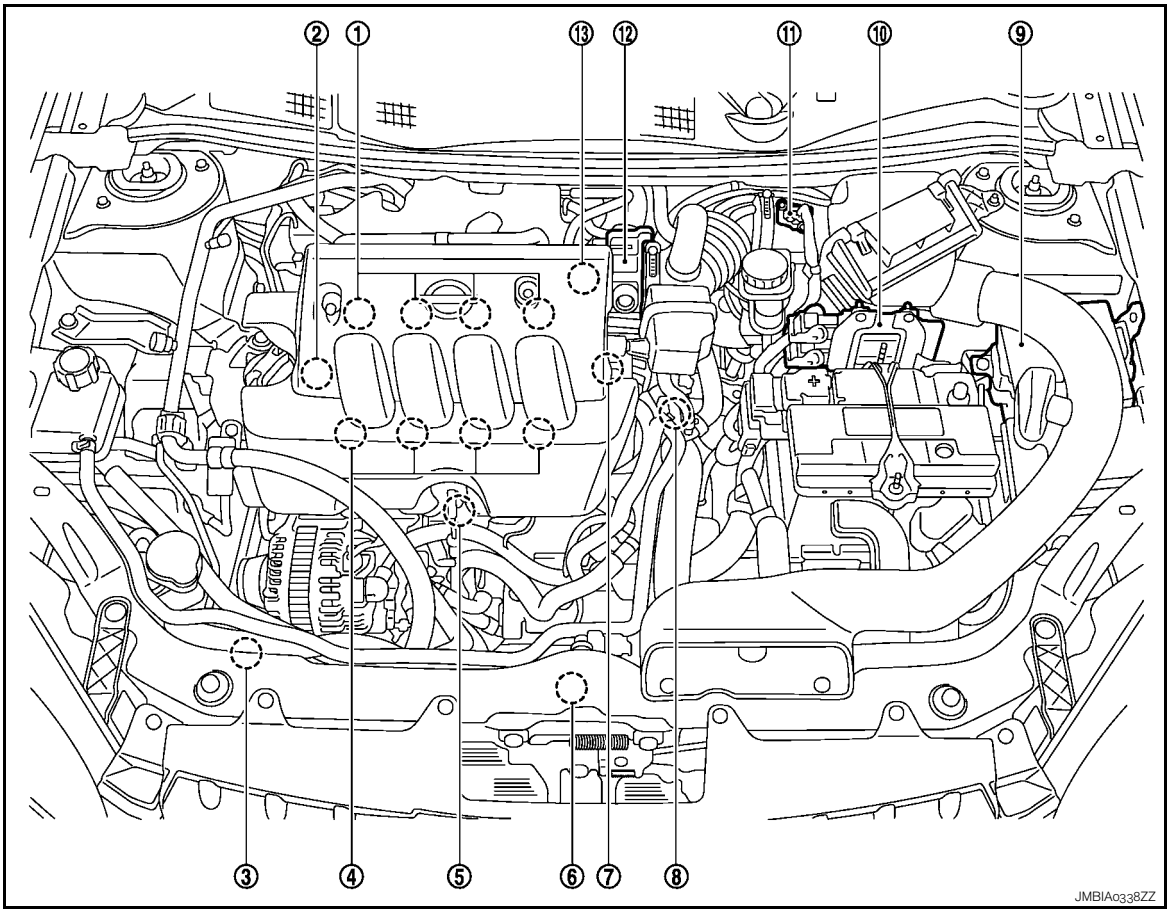
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

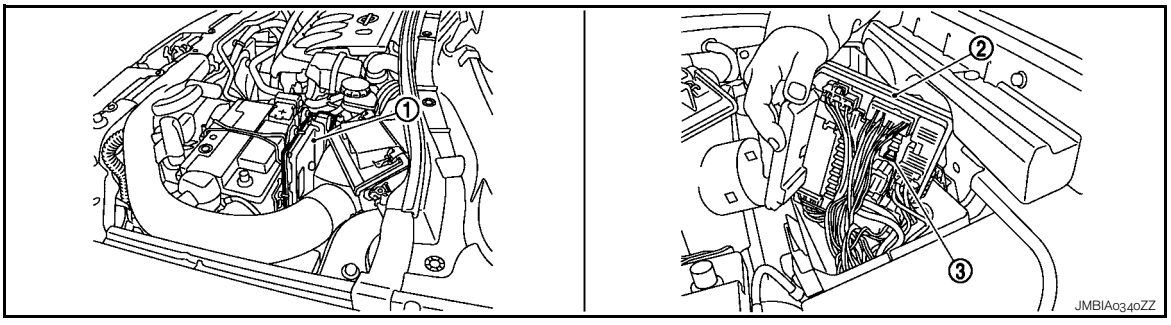
Component Parts Location

INFOID:0000000001093568

cardiagn.com

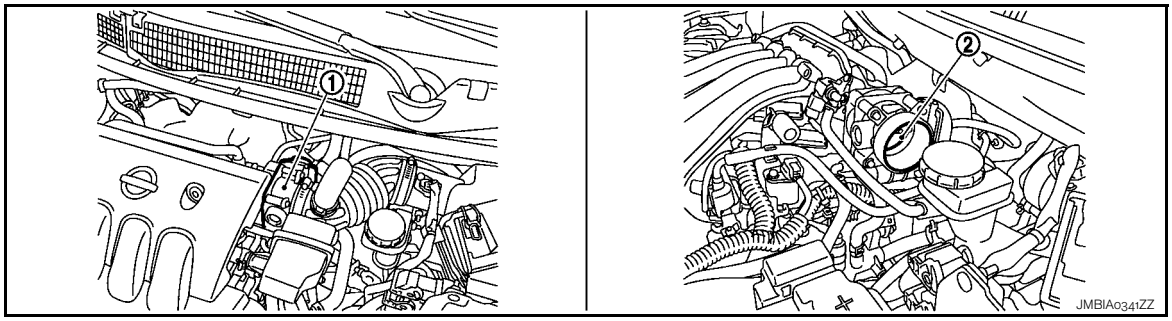


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

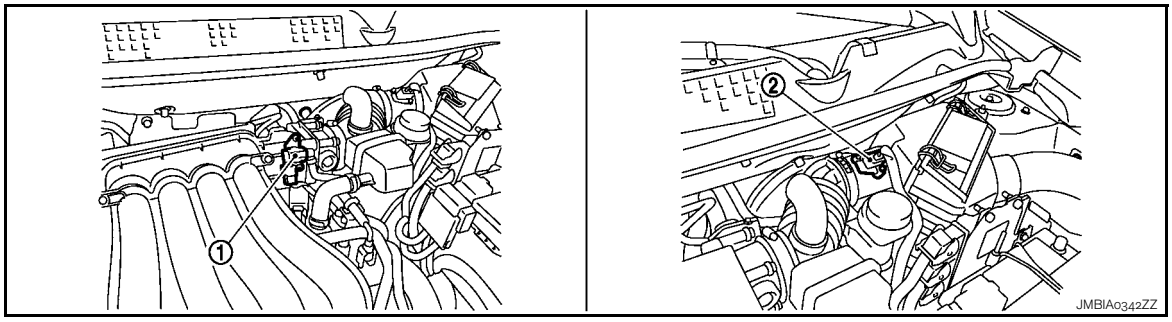


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

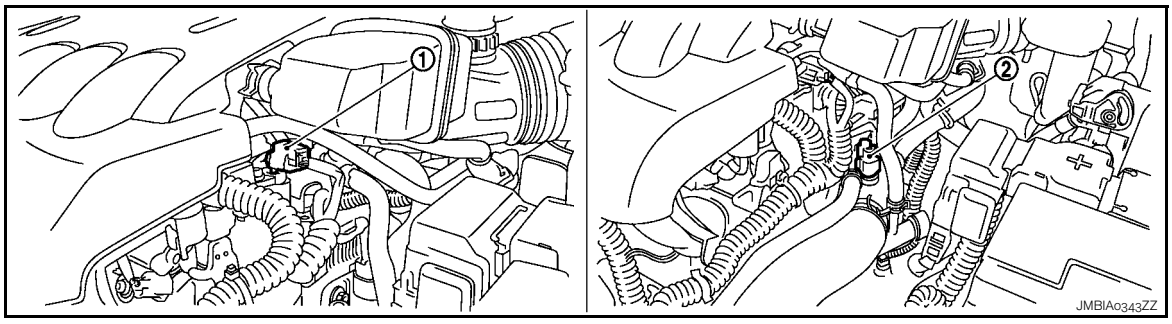
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

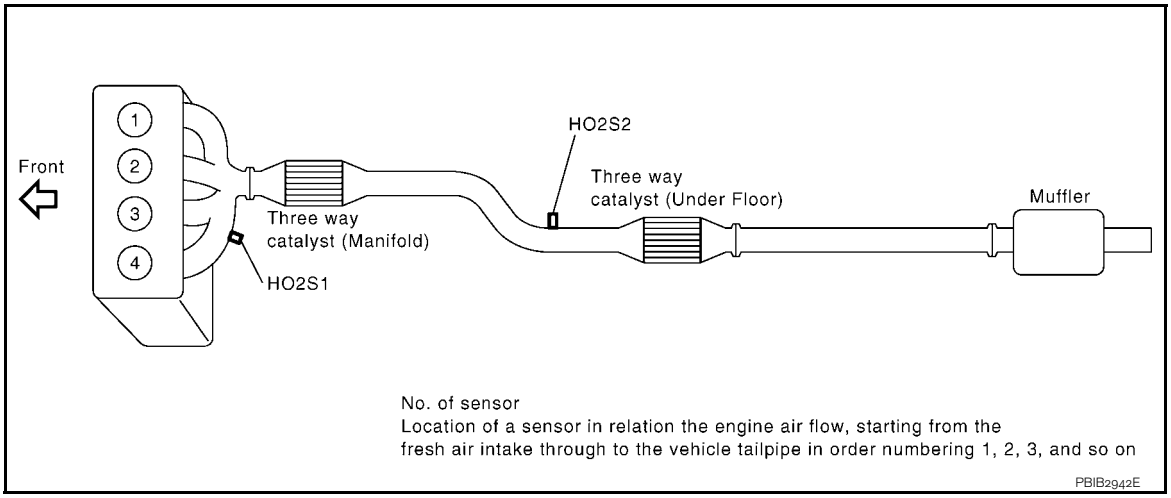


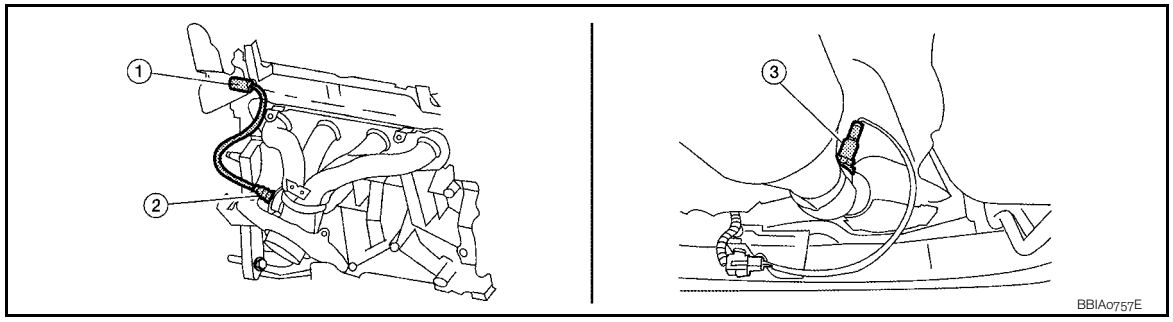
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



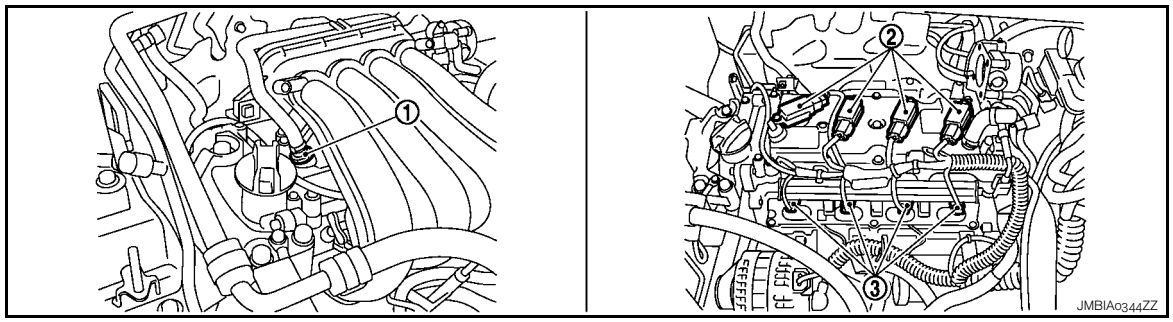
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

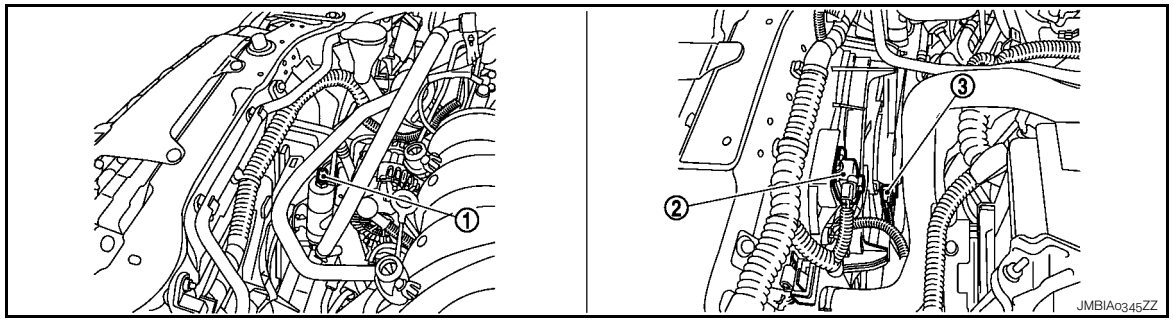




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

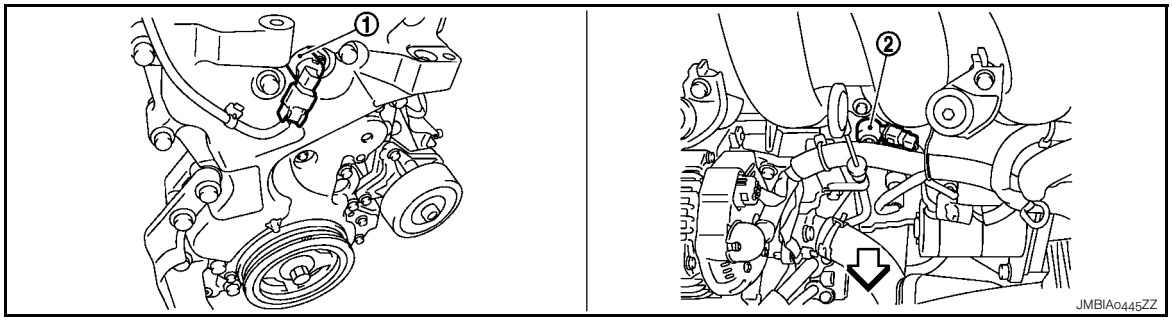


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

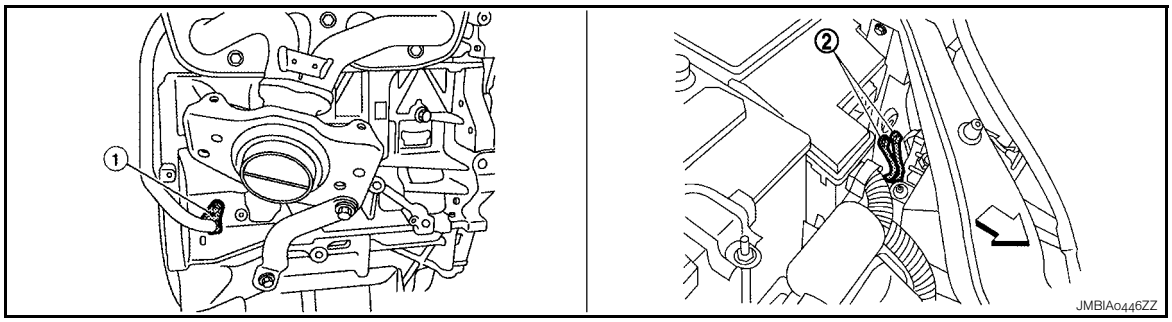


cardiagn.com

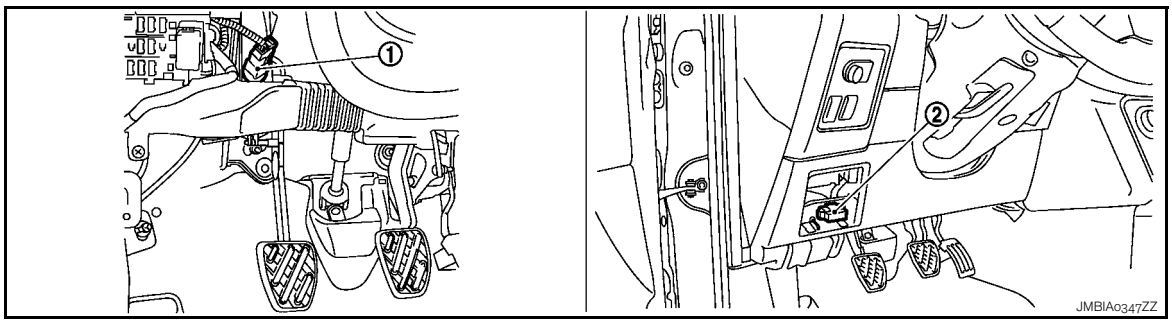
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



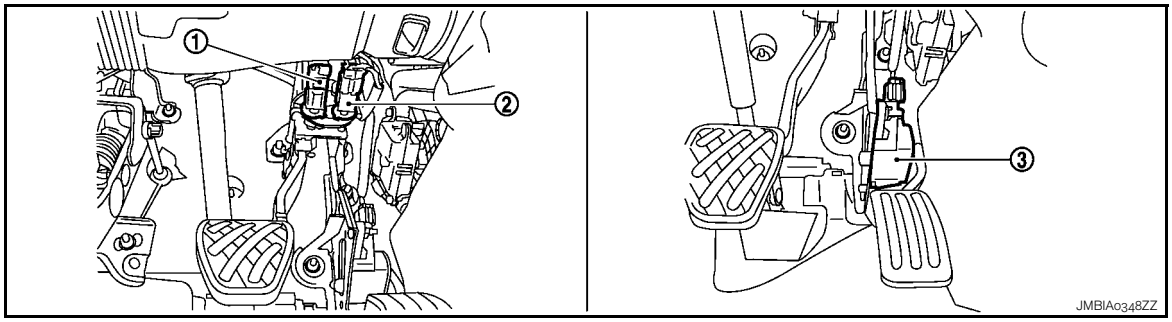
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

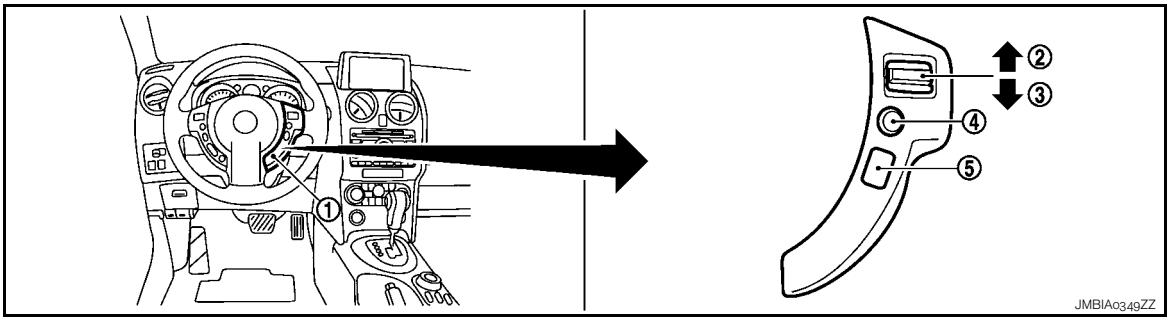


1. ASCD clutch switch 2. Data link connector

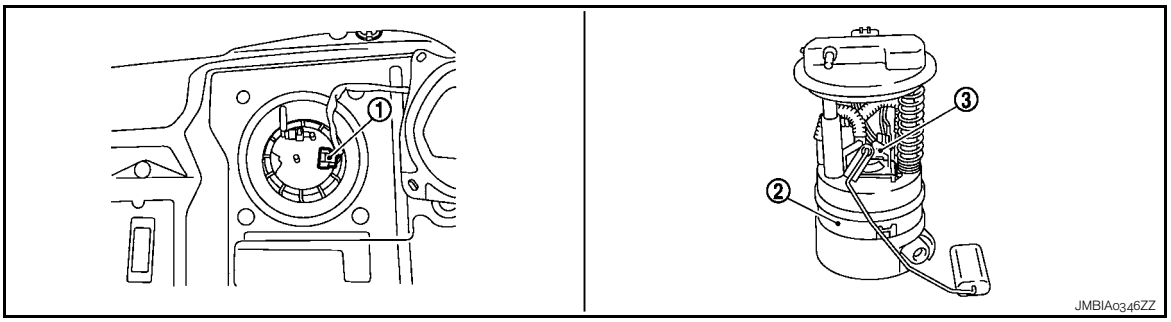


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000000936636

Component	Reference
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Intake valve timing control solenoid valve	EC-700, "System Diagram"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000000936637

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of SAE J1979
Freeze Frame data	Service $02 of SAE J1979
System Readiness Test (SRT) code	Service $01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of SAE J1979
Calibration ID	Service $09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-III	×	×	×	×	×	—
GST	×	×	×	—	×	×
ECM	×	×*	—	—	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-959, "Fail Safe".)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MI				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-962, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

cardiagn.com

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.
For malfunctions in which 1st trip DTCs are displayed, refer to “EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS”. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-638, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes CVT related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III
With GST
CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.

cardiagn.com

(CONSULT-III also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

NOTE:

If the DTC is not for CVT related items (see EC-962, "DTC Index"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform TM-214, "Diagnosis Description". (The DTC in TCM will be erased)
3. Select Service $04 with GST (Generic Scan Tool).

No Tools

NOTE:

If the DTC is not for CVT related items (see EC-962, "DTC Index"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform TM-214, "Diagnosis Description". (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:

The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

cardiagn.com

If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MI is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P1133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI ON)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

cardiagn.com

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

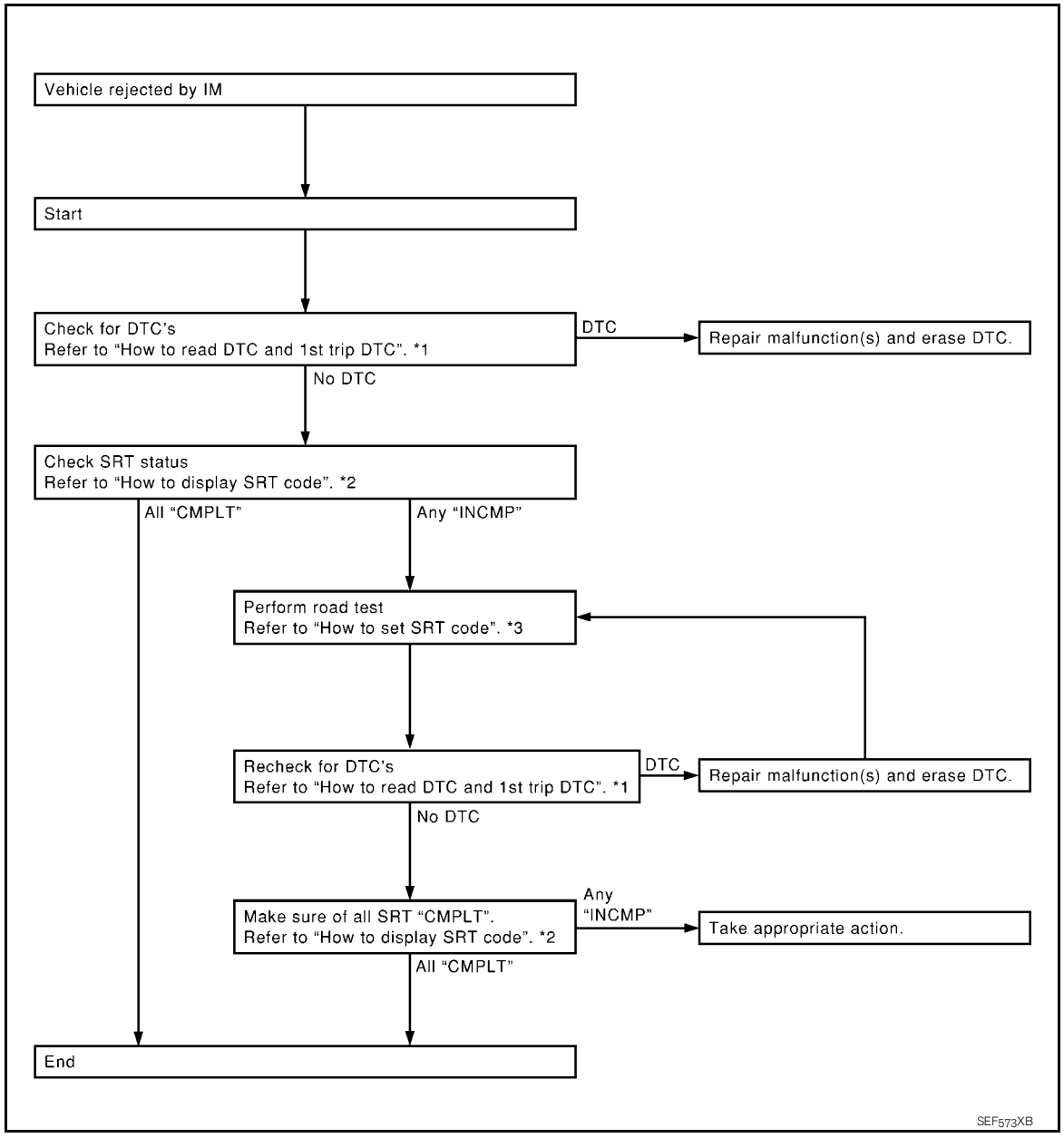
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

  NOTE:
  SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.

cardiagn.com



*1 "How to Read DTC and 1st Trip DTC" *2 "How to Display SRT Status" *3 "How to Set SRT Code"

How to Display SRT Code

WITH CONSULT-III

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.

WITH GST

Selecting Service $01 with GST (Generic Scan Tool)

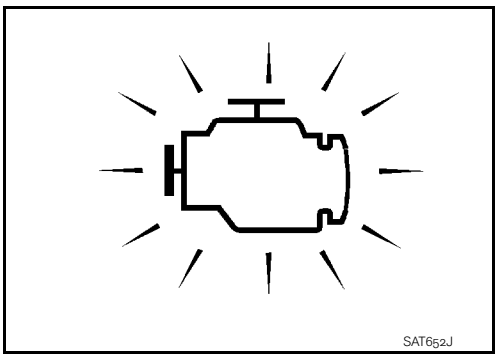
MALFUNCTION INDICATOR (MI)

Description

cardiagn.com

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function
The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

Diagnostic Test Mode I — Bulb Check
In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".

Diagnostic Test Mode I — Malfunction Warning

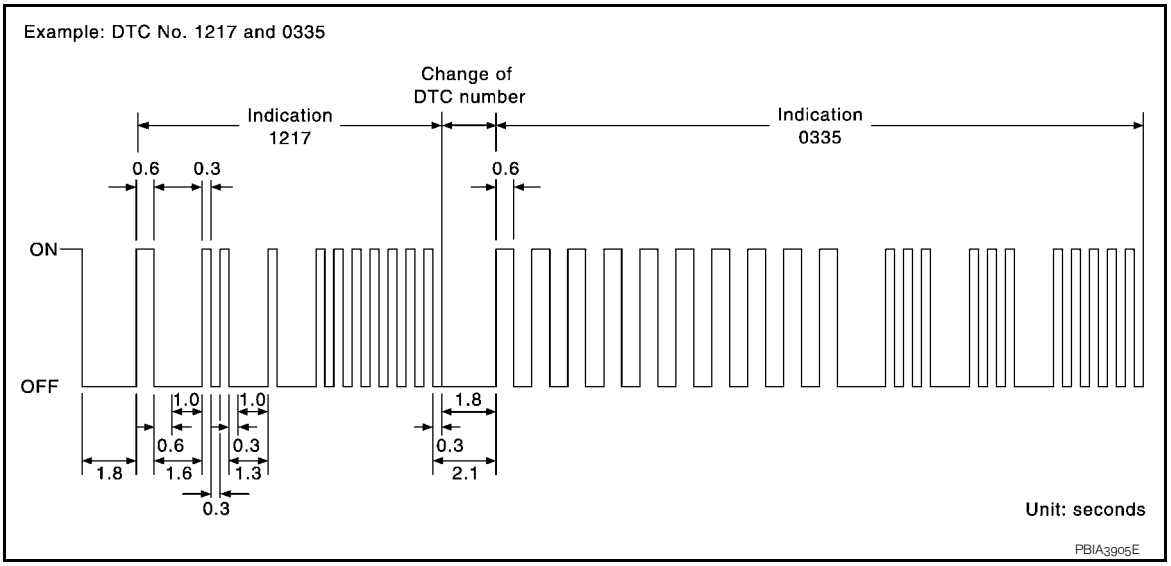
MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

cardiagn.com

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-962, "DTC Index".)
HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to “HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)”.
- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor
In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load.
MI FLASHING WITHOUT DTC
If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later. Refer to “How to Switch Diagnostic Test Mode”.
The following emission-related diagnostic information is cleared when the ECM memory is erased.
- Diagnostic trouble codes

cardiagn.com

- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

How to Switch Diagnostic Test Mode

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

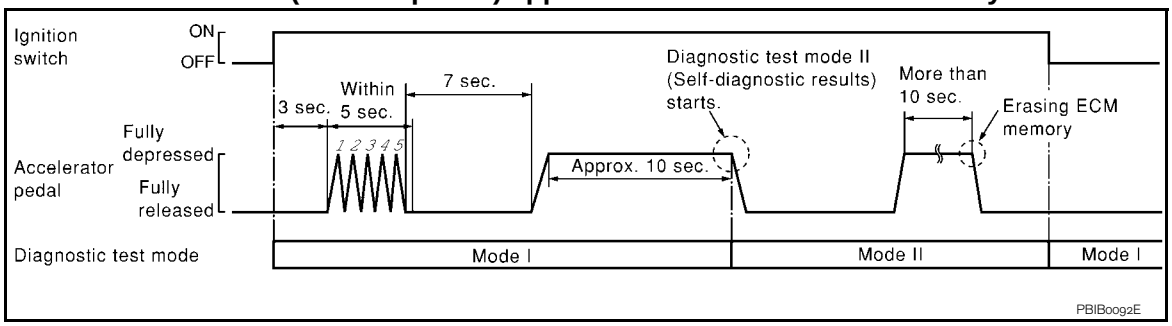
HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW to SET DIAGNOSTIC TEST MODE II (HEATED OXYGEN SENSOR 1 MONITOR)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to “HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)”.
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)”.
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

OBD System Operation Chart

Relationship Between MI, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on.
- The MI will go off after the vehicle is driven 3 times (pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.

cardiagn.com

• The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other
MI (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

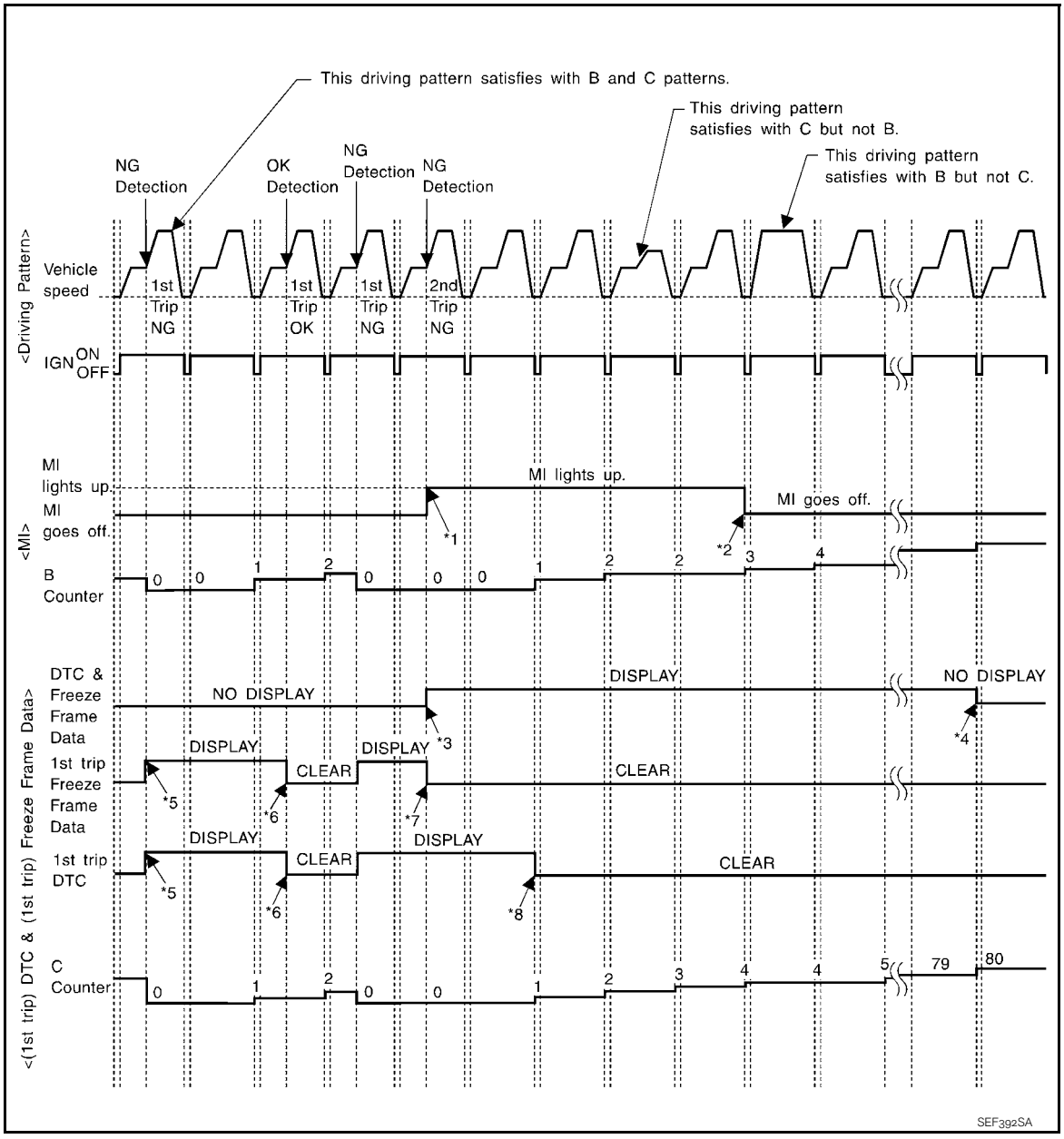
For details about patterns A and B under Other, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

cardiagn.com



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”
<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

cardiagn.com

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MI will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

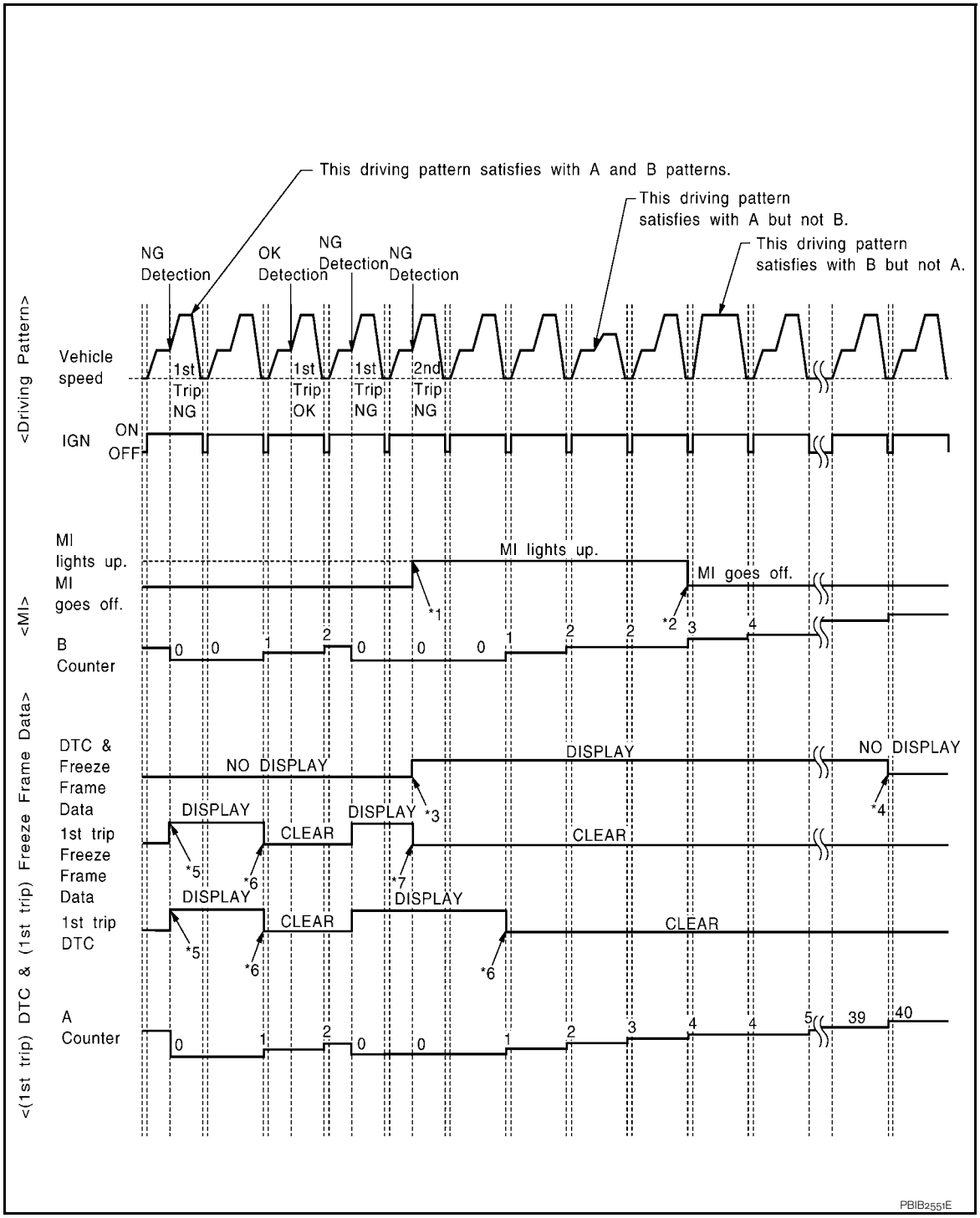
- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

Relationship Between MI, DTC, 1st Trip DTC and Driving Patterns Except For “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

cardiagn.com



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

cardiagn.com

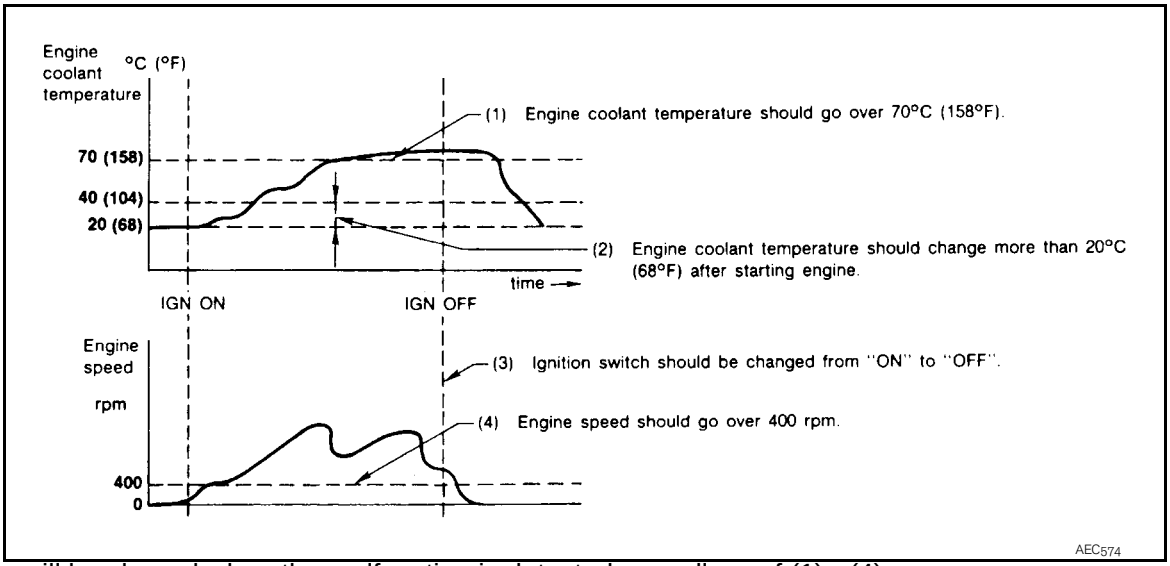
*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”
<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MI will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

INFOID:0000000000936638

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data

cardiagn.com

- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×	×	×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Wheel sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Knock sensor		×						
		EPS control unit				×	×			
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		ASCD steering switch		×		×				
		ASCD break switch		×		×				
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Intake valve timing control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

cardiagn.com

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-706, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-962, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-962, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

cardiagn.com

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
H02S1 (B1)	V	• The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: means the mixture became “lean”, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
THRTL SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2-B1			
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	

cardiagn.com

Monitored item	Unit	Description	Remarks
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from ESP control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM accordining to the input signals.	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	

cardiagn.com

Monitored item	Unit	Description	Remarks
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
02SEN HTR DTY	%	• Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	• Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	• For M/T models, always “OFF” is displayed.
AT OD CANCEL	ON/OFF	• Indicates [ON/OFF] condition of CVT O/D cancel request signal.	• For M/T models, always “OFF” is displayed.
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only “#” is displayed if item is unable to be measured. • Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

NOTE:

cardiagn.com

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Heated oxygen sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay “ON” and “OFF” using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-706, "Diagnosis Description".

SRT WORK SUPPORT Mode
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

cardiagn.com

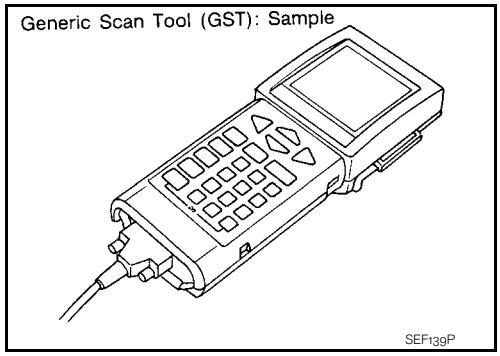
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-764
	HO2S1 (B1) P0134		EC-770
	HO2S1 (B1) P1143		EC-770
	HO2S1 (B1) P1144		EC-849
HO2S2	HO2S2 (B1) P0139		EC-782
	HO2S2 (B1) P1146		EC-854
	HO2S2 (B1) P1147		EC-861

Diagnosis Tool Function

INFOID:0000000000936639

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



FUNCTION

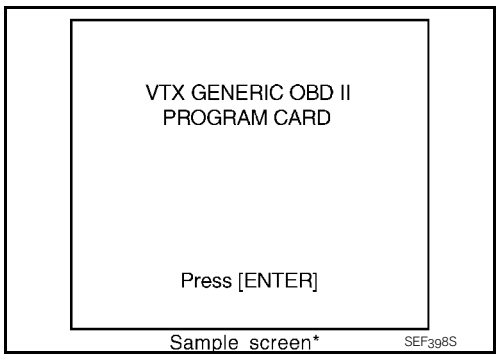
Diagnostic Service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-962, "DTC Index".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service is not applicable on this vehicle.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

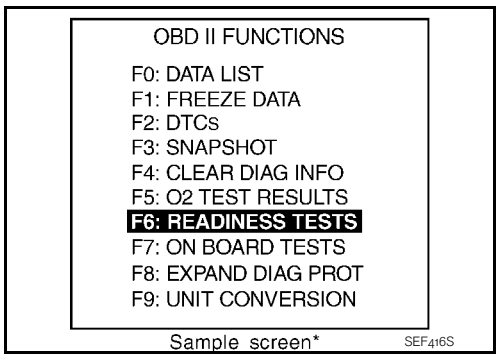
1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under LH dash panel near the hood opener handle.

cardiagn.com

3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
   (*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.
   For further information, see the GST Operation Manual of the tool maker.



cardiagn.com

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000000936640

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000000936641

1. START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-642, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

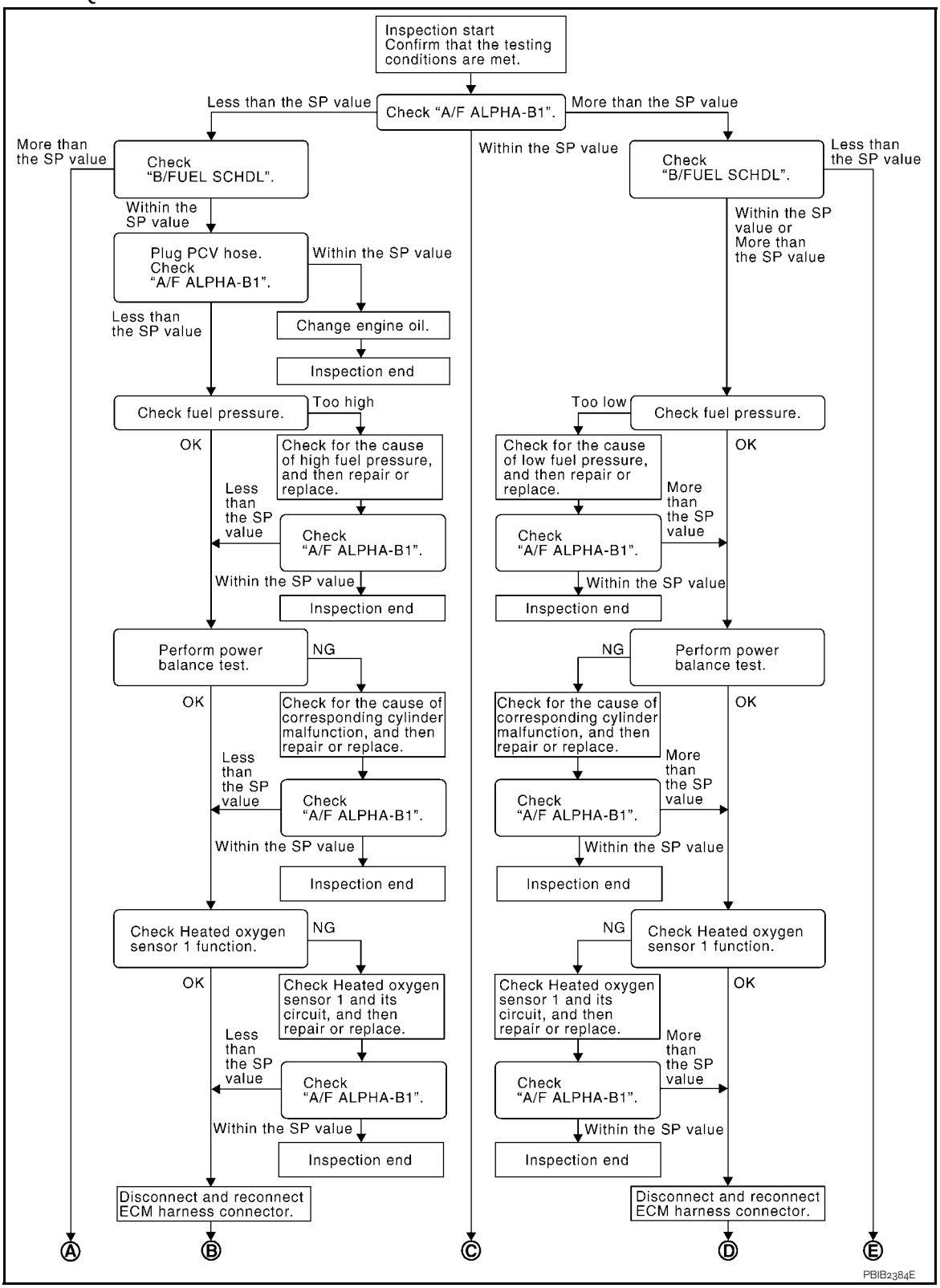
YES >> END
NO >> Go to EC-728, "Diagnosis Procedure".

Diagnosis Procedure

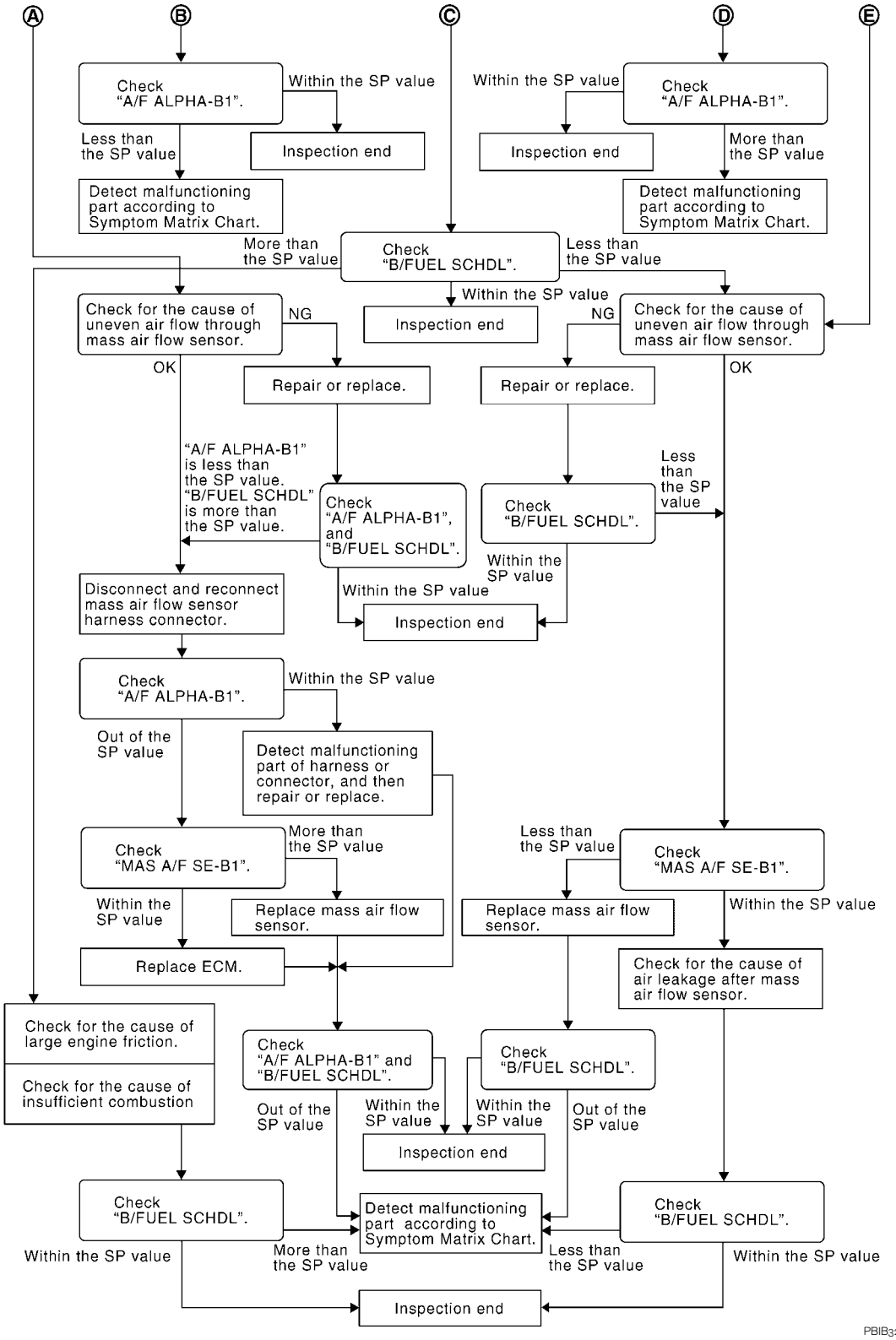
INFOID:0000000000936642

cardiagn.com

OVERALL SEQUENCE



cardiagn.com



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-728, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

cardiagn.com

NOTE:
Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-978, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

cardiagn.com

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-929, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-923, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-142, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

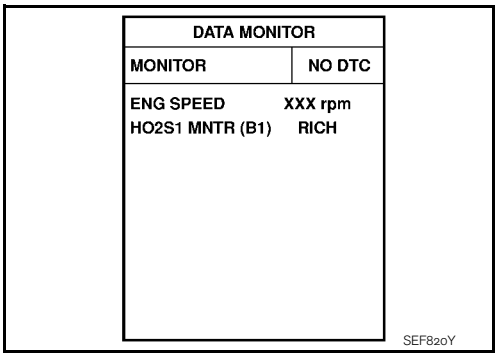
Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12.CHECK HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH



Is the inspection result more than 5 times during 10 seconds?

YES >> GO TO 15.
NO >> GO TO 13.

13.CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> GO TO 14.

14.CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

cardiagn.com

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-746, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Go to EC-645, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.
NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve

cardiagn.com

- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

cardiagn.com

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000000936643

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

cardiagn.com

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E11	10	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-929, "Diagnosis Procedure".
NO >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 14.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E11	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

cardiagn.com

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	32	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E6, F123
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 62) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

cardiagn.com

17.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

cardiagn.com

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000000936644

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000000936645

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> EC-740, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000000936646

Go to LAN-46, "Trouble Diagnosis Flow Chart".

cardiagn.com

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000000936647

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000000936648

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-741, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000000936649

1.INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-741, "DTC Logic".
5. Check DTC.

With GST
1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-741, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-645, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

cardiagn.com

P0011 IVT CONTROL

DTC Logic

INFOID:0000000000936650

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for EC-829, "DTC Logic".

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec (CVT) More than 4.2 msec (M/T)
Shift lever	P or N position (CVT) N position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-743, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III
1. Maintain the following conditions for at least 20 consecutive seconds.

cardiagn.com

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

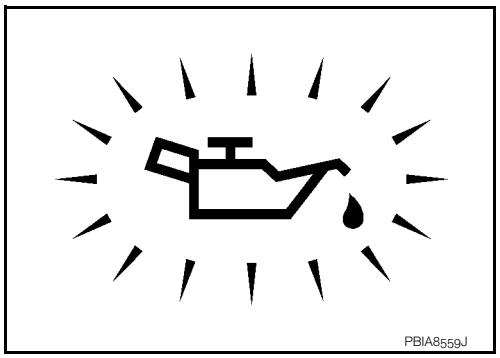
YES >> Go to EC-743, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000000936651

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



Is oil pressure warning lamp illuminated?

YES >> Go to LU-14, "Inspection".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-744, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-812, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-815, "Component Inspection".

Is the inspection result normal?

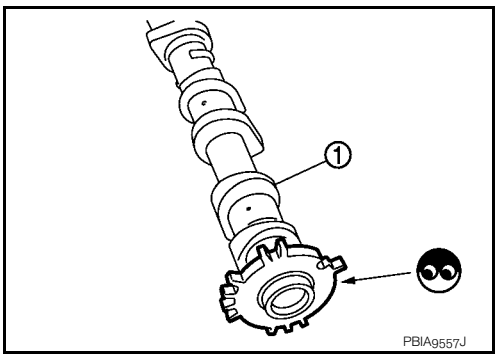
YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

cardiagn.com

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-163, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-177, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000000936652

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

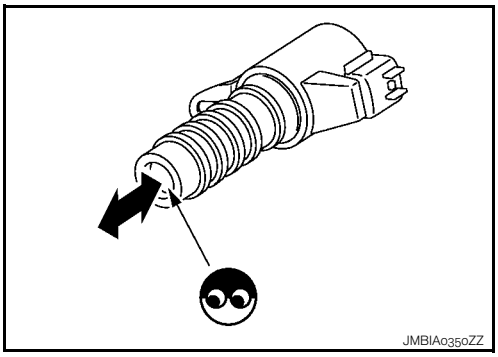
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

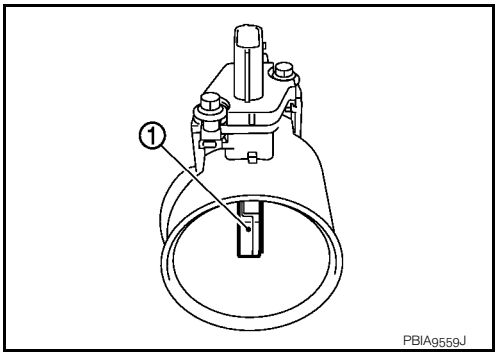
cardiagn.com

P0102, P0103 MAF SENSOR

Description

INFOID:0000000000936670

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000000936671

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-747, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-747, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-747, "Diagnosis Procedure".

cardiagn.com

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000000936672

1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

cardiagn.com

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Refer to EC-748, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000000936673

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

cardiagn.com

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.

cardiagn.com

3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

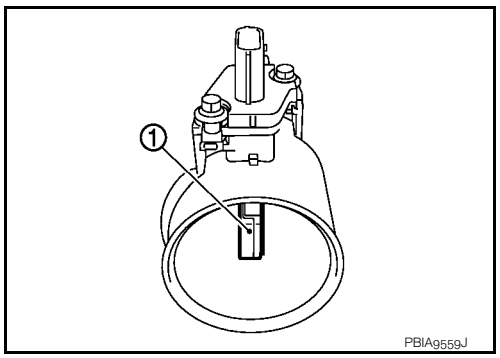
cardiagn.com

P0112, P0113 IAT SENSOR

Description

INFOID:0000000000936674

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



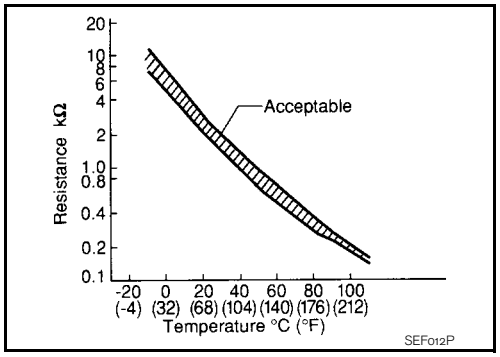
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



DTC Logic

INFOID:0000000000936675

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-752, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000000936676

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F8	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between intake air temperature sensor and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-752, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000000936677

cardiagn.com

1. CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

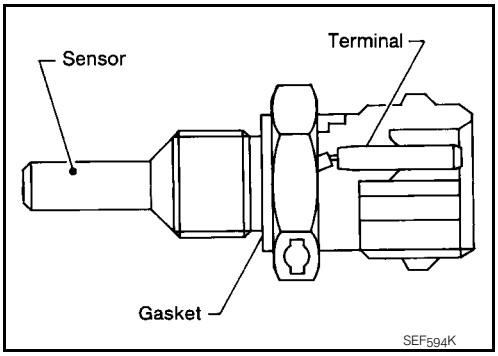
cardiagn.com

P0117, P0118 ECT SENSOR

Description

INFOID:0000000000936678

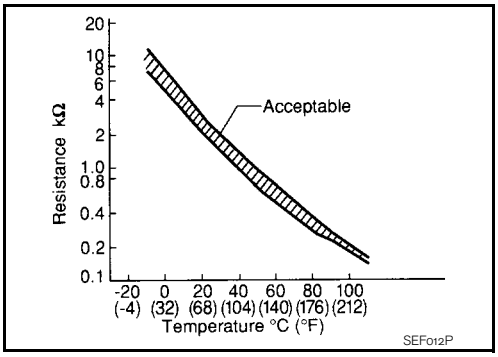
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:0000000000936679

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-755, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000000936680

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F28	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-755, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

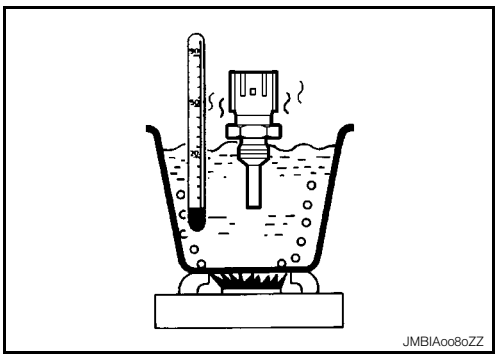
INFOID:0000000000936681

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

cardiagn.com

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

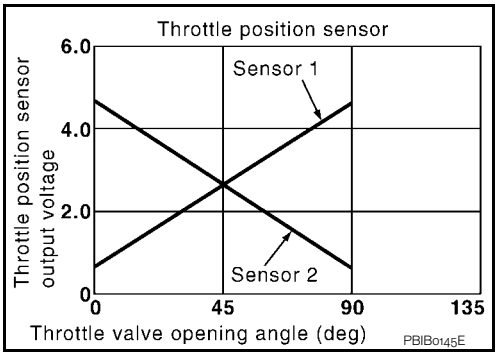
cardiagn.com

P0122, P0123 TP SENSOR

Description

INFOID:0000000000936682

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000000936683

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-757, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000000936684

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-758, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-759, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000000936685

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-759, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000000936686

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

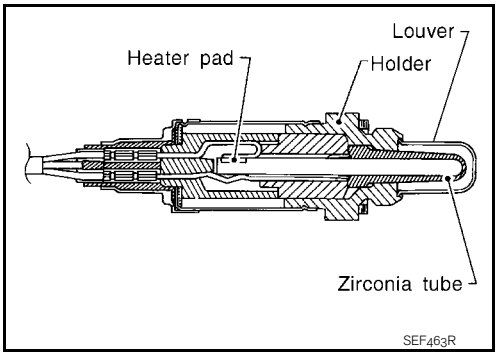
cardiagn.com

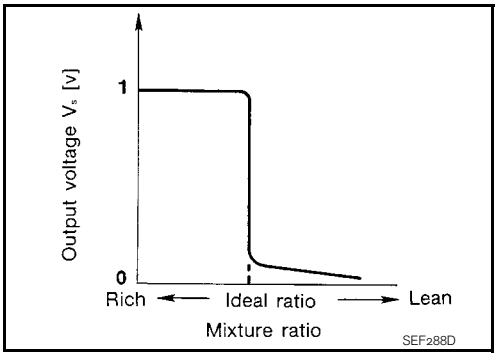
P0132 HO2S1

Description

INFOID:0000000001089335

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



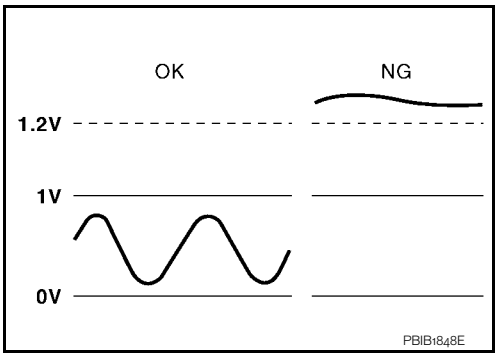


DTC Logic

INFOID:0000000001089336

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

cardiagn.com

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-761, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089337

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

cardiagn.com

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-762, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001089338

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

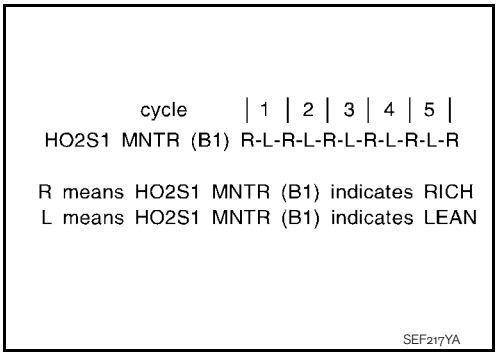
YES >> GO TO 2.
NO >> GO TO 3.

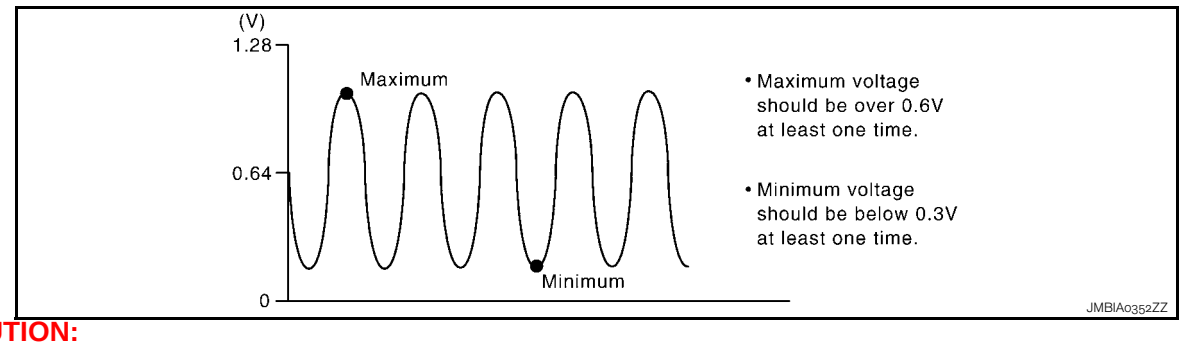
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

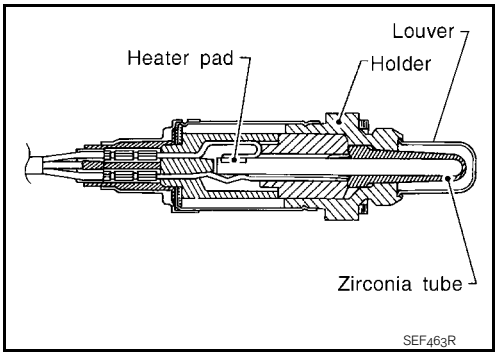
cardiagn.com

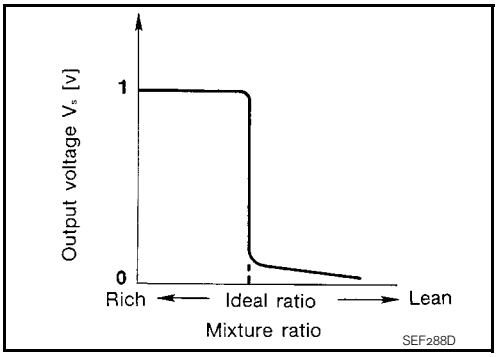
P0133 HO2S1

Description

INFOID:0000000001089339

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



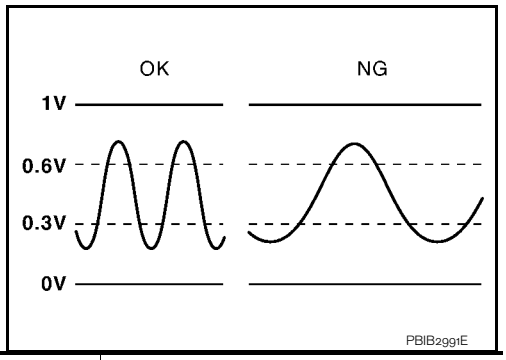


DTC Logic

INFOID:0000000001089340

DTC DETECTION LOGIC

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

cardiagn.com

TESTING CONDITION:
Always perform at a temperature above -10°C (14°F).
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	A/T: 1,300 - 3,500 rpm M/T: 1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	A/T: 3 - 15 msec M/T: 3 - 15 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-765, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 yo 0.3v and 0.6 to 1.0v more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089342

1. CHECK GROUND CONNECTION

cardiagn.com

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

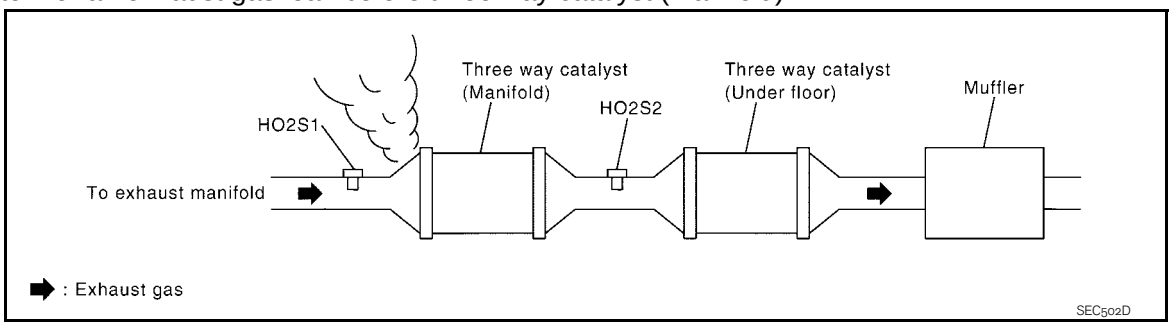
Loosen and retighten the heated oxygen sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-791, "DTC Logic" or EC-795, "DTC Logic".
NO >> GO TO 6.

6.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

cardiagn.com

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-748, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK PCV VALVE

Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace PCV valve.

9.CHECK HEATED OXYGEN SENSOR 1

Perform EC-767, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heated oxygen sensor 1.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089343

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

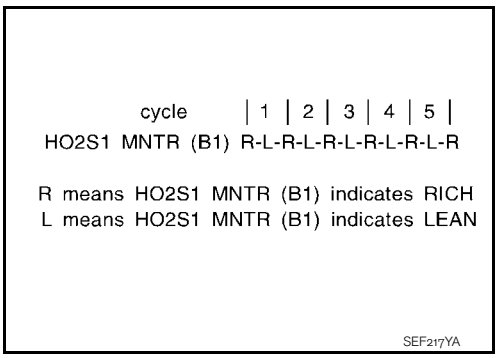
YES >> GO TO 2.
NO >> GO TO 3.

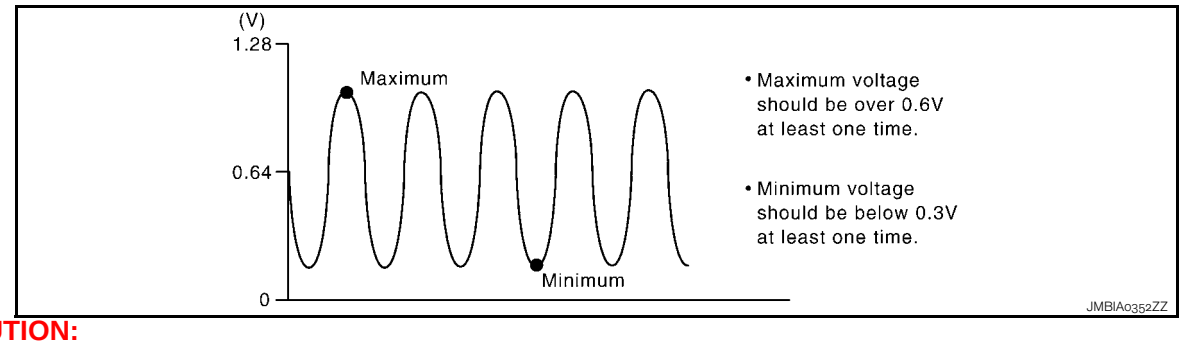
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

cardiagn.com

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

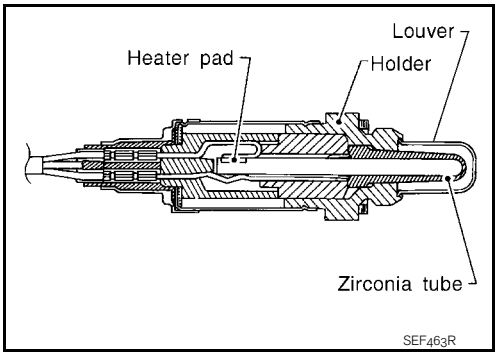
cardiagn.com

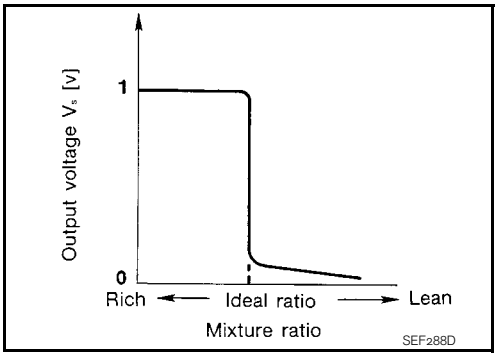
P0134 HO2S1

Description

INFOID:0000000001089344

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



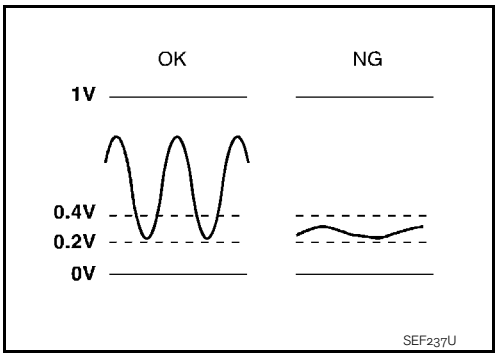


DTC Logic

INFOID:0000000001089345

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	A/T: 1,300 - 3,500 rpm M/T: 1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	A/T: 3 - 15 msec M/T: 3 - 15 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-765, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089346

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace ground connection.

2.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-772, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001089347

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

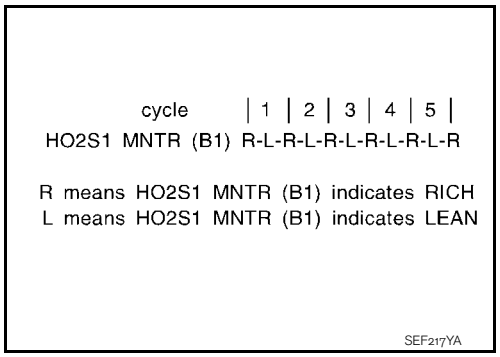
With CONSULT-III

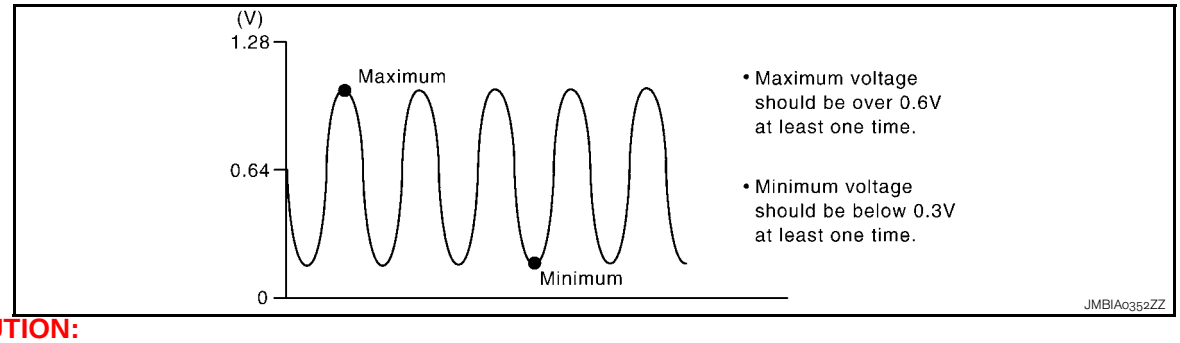
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.

cardiagn.com

5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

cardiagn.com

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0135 HO2S1 HEATER

Description

INFOID:0000000001089348

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

DTC Logic

INFOID:0000000001089349

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0135	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • Heated oxygen sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Wait at least 5 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-775, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089350

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 sensor 1 harness connector and ground.

cardiagn.com

HO2S1		Ground	Voltage
Connector	Terminal		
F30	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 56)
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F7	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-776, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000001089351

1.CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect HO2S1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

cardiagn.com

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

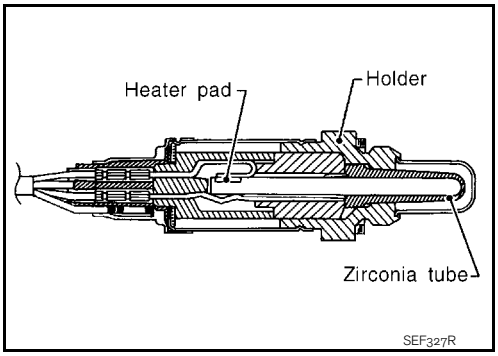
cardiagn.com

P0138 HO2S2

Description

INFOID:0000000001089352

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

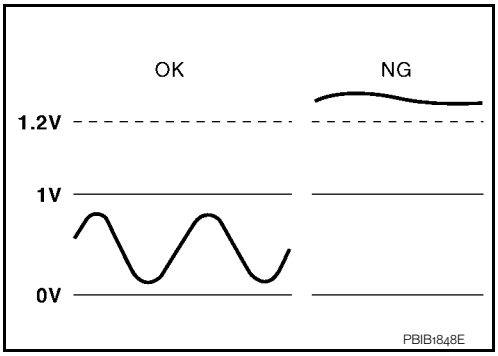


DTC Logic

INFOID:0000000001089353

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-779, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089354

cardiagn.com

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK GROUND CONNECTION

Check the following.
- Harness conectors F121, E7
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

cardiagn.com

Refer to EC-780, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089355

1. INSPECTION START

Do you have CONSULT-III?

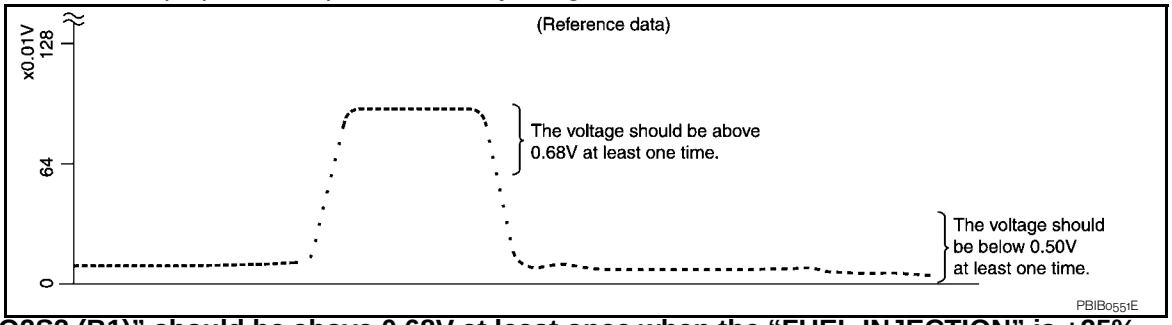
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

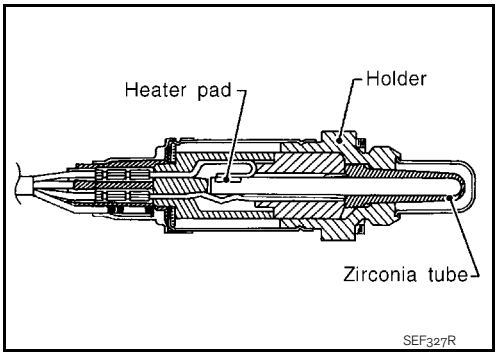
cardiagn.com

P0139 HO2S2

Description

INFOID:0000000001089356

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

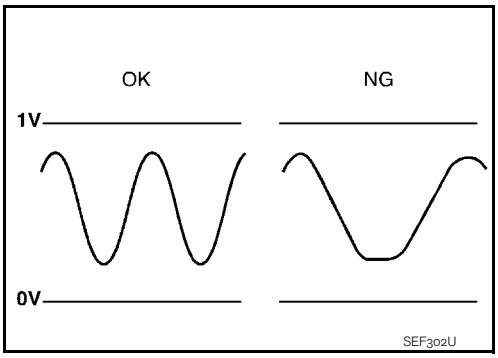


DTC Logic

INFOID:0000000001089357

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).
Never stop engine during this procedure. If the engine is stopped, retry this procedure from PERFORM PROCEDURE FOR COND1 - II.

cardiagn.com

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-III

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3-I

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9. PERFORM PROCEDURE FOR COND3-II

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-785, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

cardiagn.com

10. PERFORM PROCEDURE FOR COND3-III

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-784, "Component Function Check".
NOTE:
Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-785, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089358

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 3rd gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Go to EC-785, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089359

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-791, "DTC Logic" or EC-795, "DTC Logic".
NO >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-786, "Component Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089360

1. INSPECTION START

Do you have CONSULT-III?

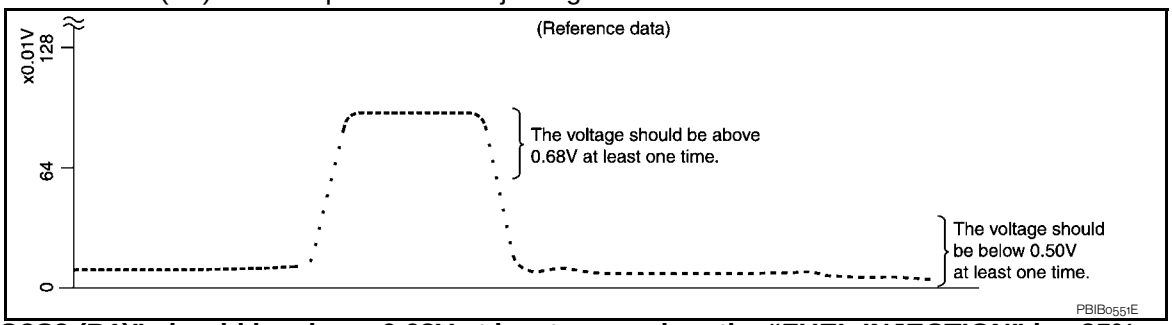
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

cardiagn.com

5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0141 HO2S2 HEATER

Description

INFOID:0000000001089361

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:0000000001089362

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0141	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st tip DTC detected?

YES >> Go to EC-788, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089363

cardiagn.com

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 56)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	3	F7	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-790, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089364

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001089365

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

Does engine start?

YES >> Go to EC-792, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-792, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

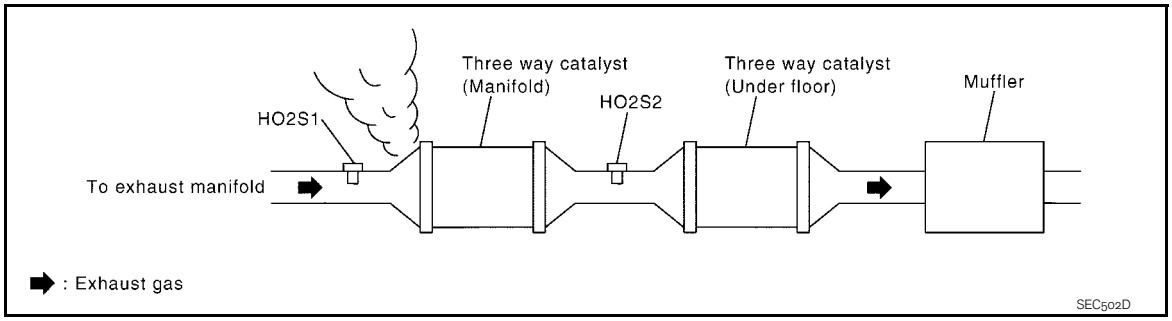
YES >> Go to EC-792, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089366

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

cardiagn.com

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-978, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-978, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-746, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

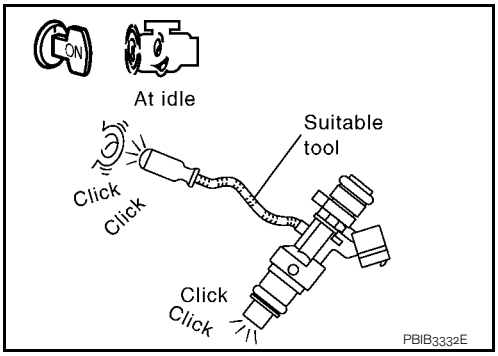
Without CONSULT-III

1. Let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



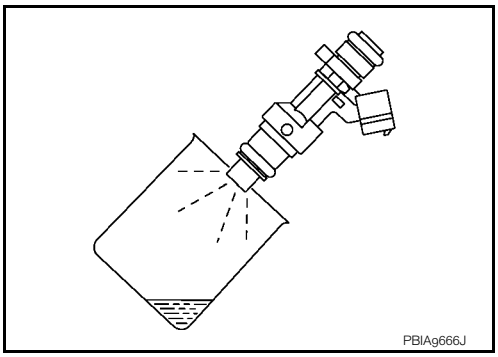
Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-923, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-155, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.



Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001089367

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

Does engine start?

YES >> Go to EC-796, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.

Is 1st trip DTC detected?

YES >> Go to EC-796, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

cardiagn.com

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

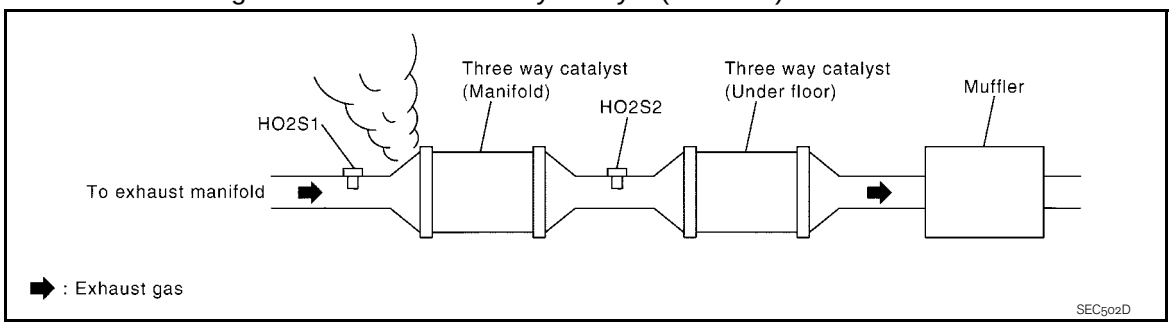
YES >> Go to EC-796, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089368

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between heated oxygen sensor 1 harness connector and ECM harness connector.

HO2S1 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1 sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

cardiagn.com

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-978, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-978, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-746, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

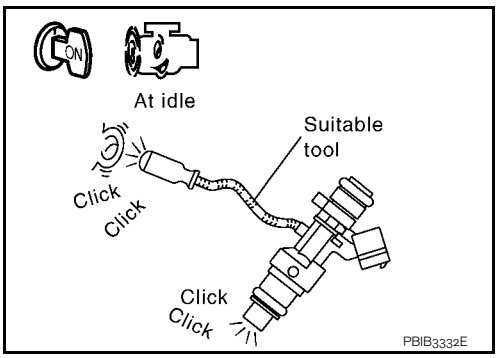
Without CONSULT-III

1. Let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-923, "Component Function Check".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-155, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

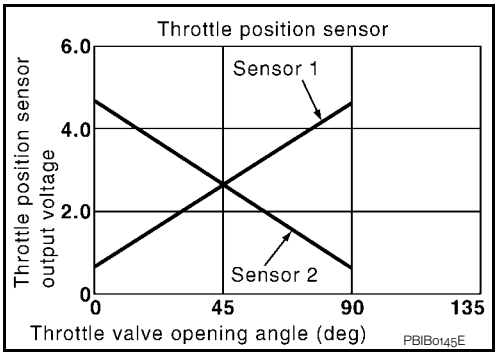
cardiagn.com

P0222, P0223 TP SENSOR

Description

INFOID:0000000001089369

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001089370

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-799, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089371

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-800, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-801, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089372

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-801, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089373

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000001089374

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • Heated oxygen sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-803, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-803, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089375

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

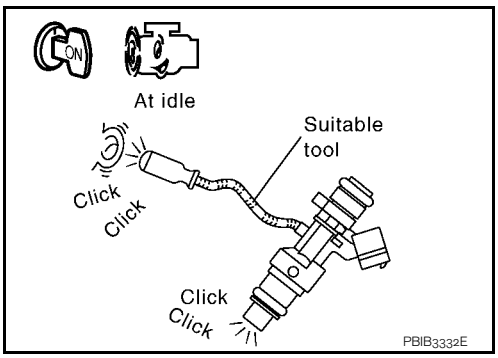
YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

cardiagn.com

2. Listen to each fuel injector operating sound.



Clicking noise should be heard.

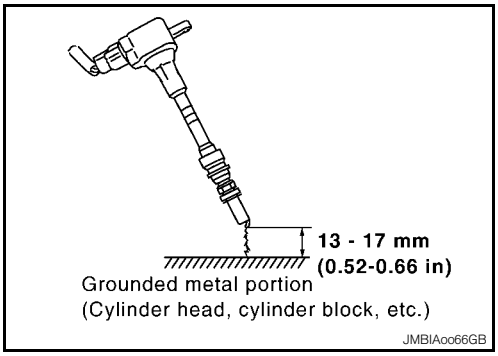
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-924, "Component Inspection".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-929, "Component Function Check".

cardiagn.com

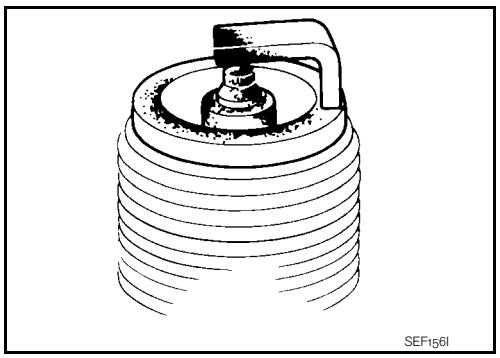
7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-160, "Removal and Installation".

NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-160, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-142, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-978, "Inspection".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-978, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.

NO >> Repair or replace.

12. CHECK IGNITION TIMING

For procedure, refer to EC-642, "BASIC INSPECTION : Special Repair Requirement".
For specification, refer to EC-981, "Idle Speed" and EC-981, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-646, "IGNITION TIMING : Special Repair Requirement".

13. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-776, "Component Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 14.
NO >> Replace heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
For specification, refer to EC-981, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 with GST.
For specification, refer to EC-981, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 15.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-746, "DTC Logic".

15. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-967, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace.

16. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-706, "Diagnosis Description".

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0327, P0328 KS

Description

INFOID:0000000001089376

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001089377

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-807, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089378

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F8	40	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to EC-808, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089379

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

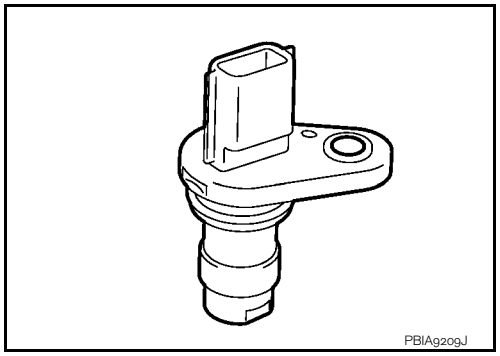
cardiagn.com

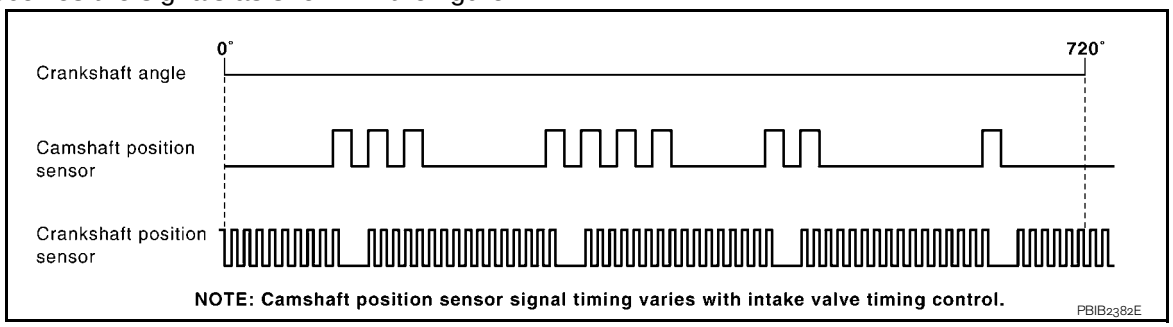
P0335 CKP SENSOR (POS)

Description

INFOID:0000000001089380

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIA9209J



NOTE: Camshaft position sensor signal timing varies with intake valve timing control.
PBIB2382E

DTC Logic

INFOID:0000000001089381

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-810, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089382

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

cardiagn.com

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-904, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-905, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F8	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F8	61	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-812, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

cardiagn.com

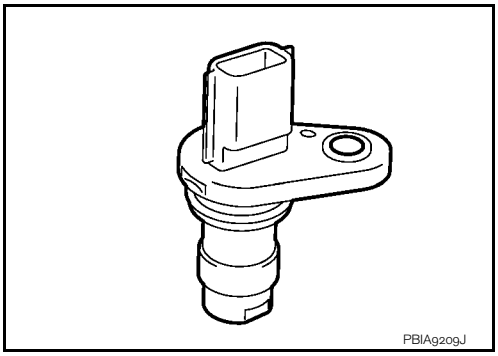
>> INSPECTION END

Component Inspection

INFOID:0000000001089383

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

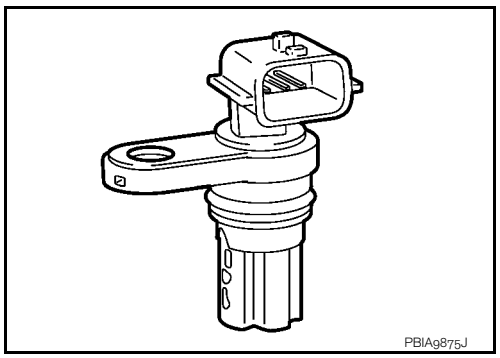
cardiagn.com

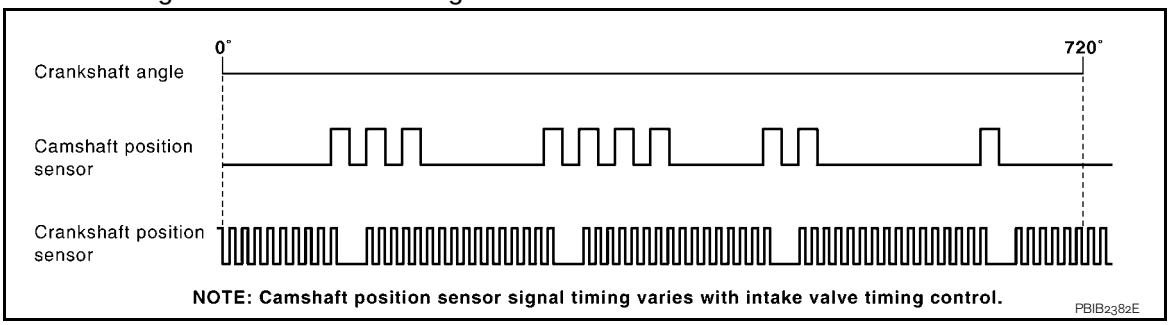
P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000001089384

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.





DTC Logic

INFOID:0000000001089385

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-814, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-814, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089386

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F8	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

cardiagn.com

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F8	65	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-815, "Component Inspection".

Is the inspection result normal?

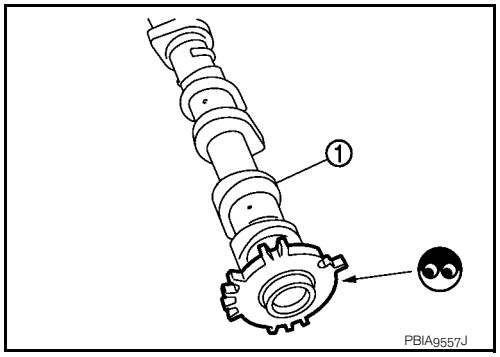
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

Check the following.
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

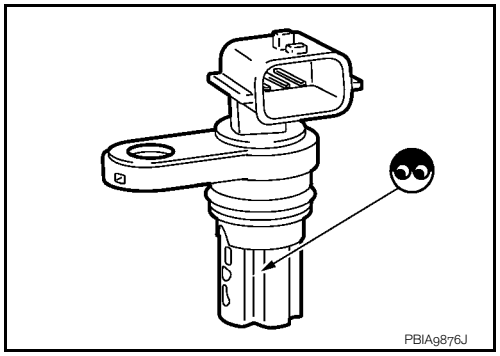
INFOID:0000000001089387

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

cardiagn.com

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

cardiagn.com

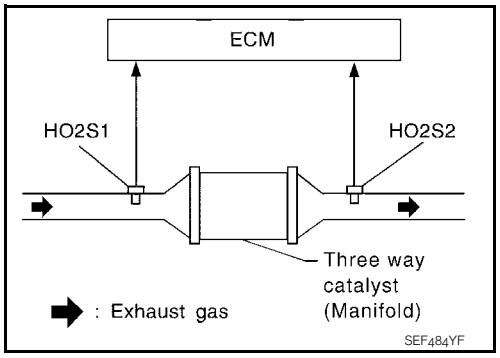
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000001089388

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-III screen?

cardiagn.com

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

YES >> GO TO 6.
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-819, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-818, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-819, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089389

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Specification
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch periodically more than 5 times within 10 seconds.

Is the inspection result normal?

YES >> GO TO 2
NO >> Go to EC-764, "DTC Logic".

2. PERFORM COMPONENT FUNCTION CHECK-II

Without CONSULT-III

1. Set voltmeter probes between ECM terminals and ground.
2. Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

cardiagn.com

ECM		Ground	Condition	Specification
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Keeping engine speed at 2,000 rpm constant under no load	Switching freqency ratio (A/B) : Less than 0.75 A : Heated oxygen sensor 2 voltage switching frequency B : Heated oxygen sensor 1 voltage switching frequency
	50 (HO2S2 signal)			

Is the inspection result normal?

YES >> INSPECTION END
NO >> If the ratio is greater than above (0.75), it means three way catalyst does not operate properly. Go to EC-819, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089390

1.CHECK EXHAUST SYSTEM

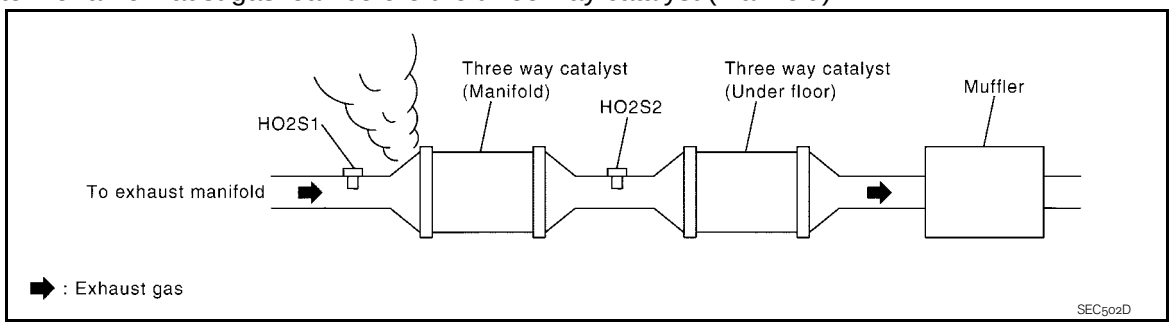
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-642, "BASIC INSPECTION : Special Repair Requirement"
For specification, refer to EC-981, "Ignition Timing", EC-981, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-646, "IGNITION TIMING : Special Repair Requirement",EC-646, "IDLE SPEED : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	25	Ground	Battery voltage
	29		
	30		
	31		

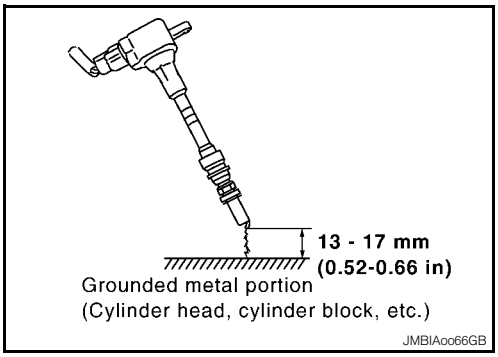
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-923, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

cardiagn.com

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-929, "Diagnosis Procedure".

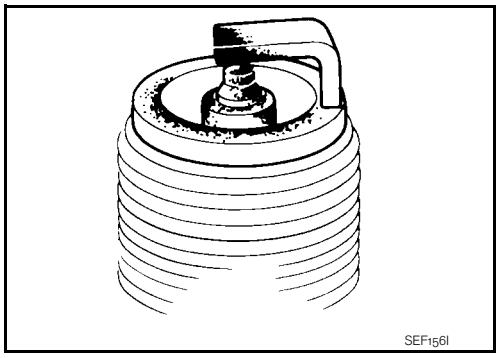
8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-160, "Removal and Installation".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-160, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-155, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END

NO >> Replace three way catalyst assembly.

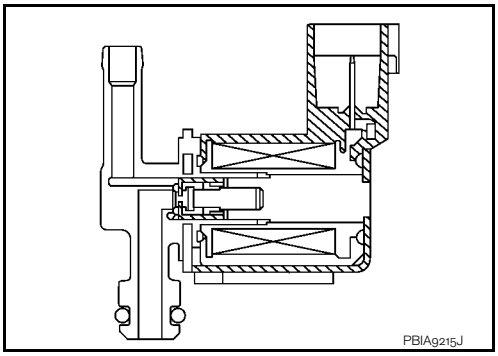
cardiagn.com

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001089391

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000001089392

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-822, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089393

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

cardiagn.com

YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the value opening?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-823, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

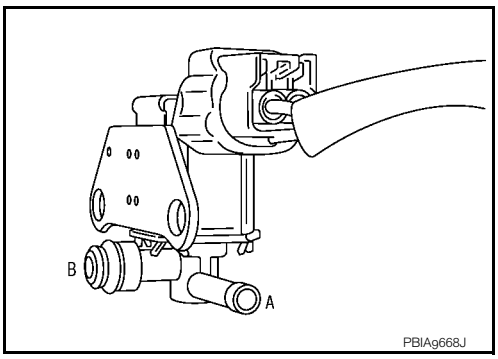
INFOID:0000000001089394

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

cardiagn.com

4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

cardiagn.com

P0500 VSS

Description

INFOID:0000000001089395

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000001089396

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001.Refer to** EC-1073, "DTC Logic".
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic"**.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK VEHICLE SPEED SENSOR FUNCTION

NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-826, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.
   CAUTION:

cardiagn.com

Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,600 - 6,000 rpm M/T: 1,600 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.2 - 31.8 msec
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-826, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-826, "Component Function Check".
Use component function check to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-826, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089397

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-826, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089398

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

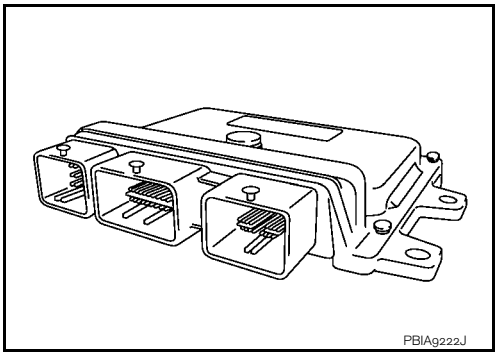
cardiagn.com

P0605 ECM

Description

INFOID:0000000001089399

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001089400

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-828, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-828, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-828, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001089401

1. INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-827, "DTC Logic".

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-827, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Go to EC-645, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

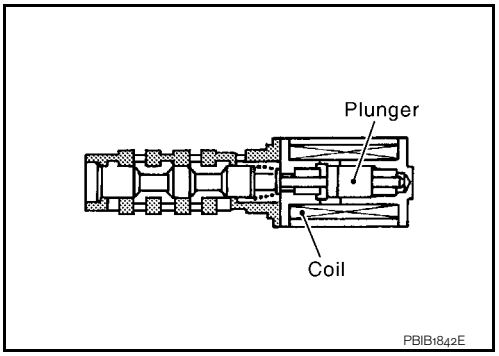
cardiagn.com

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001089402

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:0000000001089403

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-829, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089404

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F41	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTION PART

cardiagn.com

Check the following.
- Harness connectors E7, F121
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	1	F8	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-830, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089405

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

cardiagn.com

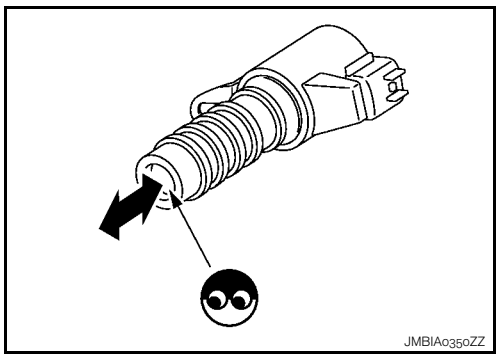
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

cardiagn.com

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001089406

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001089407

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P (CVT) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set shift lever to P (CVT) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-832, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to N, P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-832, "Diagnosis Procedure".
NO >> INSPECTION END

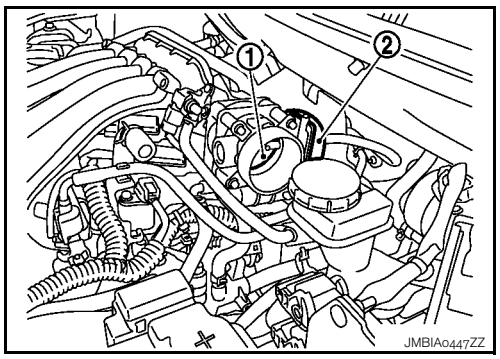
Diagnosis Procedure

INFOID:0000000001089408

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

cardiagn.com

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-833, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089409

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001089410

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001089411

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-838, "DTC Logic" or EC-832, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-834, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089412

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	25	F7	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

6. CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

7. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

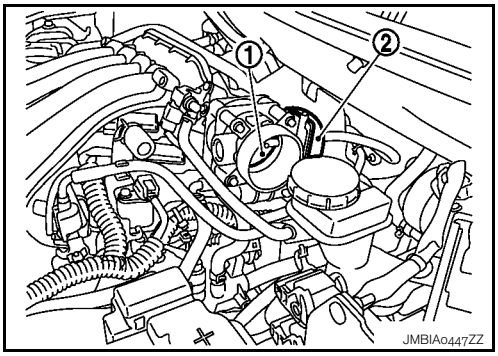
Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

2. Electric throttle control actuator



Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-837, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-837, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001089413

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-837, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089414

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001089415

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001089416

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P1126	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P1126 >> GO TO 2.
P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-838, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-838, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089417

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	25	F7	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

4. CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

cardiagn.com

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001089418

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001089419

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-841, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089420

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-842, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-842, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001089421

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-842, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089422

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

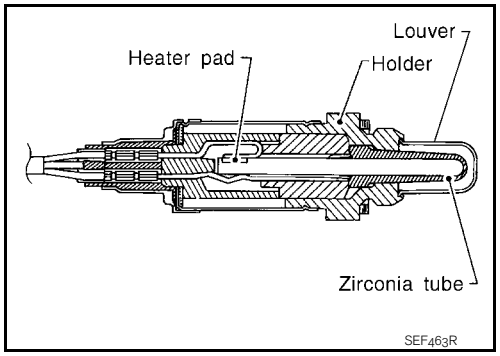
cardiagn.com

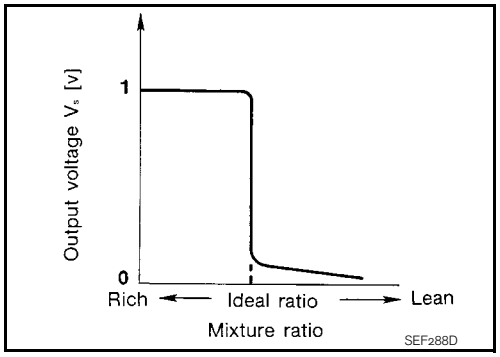
P1143 HO2S1

Description

INFOID:0000000001089423

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



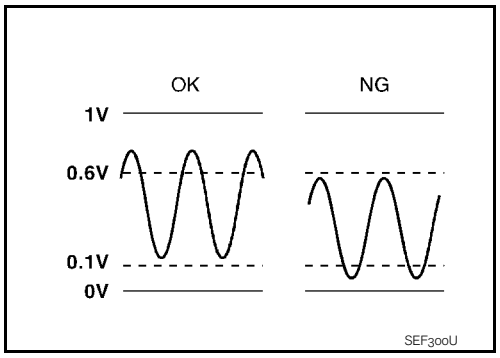


DTC Logic

INFOID:0000000001089424

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F)

cardiagn.com

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	A/T: 1,375 - 2,600 rpm M/T: 1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	A/T: 3.7 - 10.0 msec M/T: 3.7 - 10.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-845, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between EM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.6 at least 1 time. • The minimum voltage is over 0.1 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-845, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089426

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-791, "DTC Logic".
No >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-776, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

>> INSPECTION END

Component Inspection

INFOID:0000000001091321

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

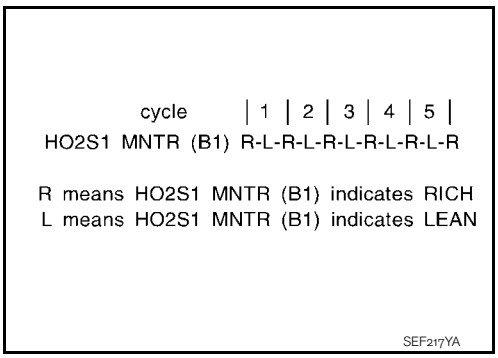
2.CHECK HEATED OXYGEN SENSOR 1

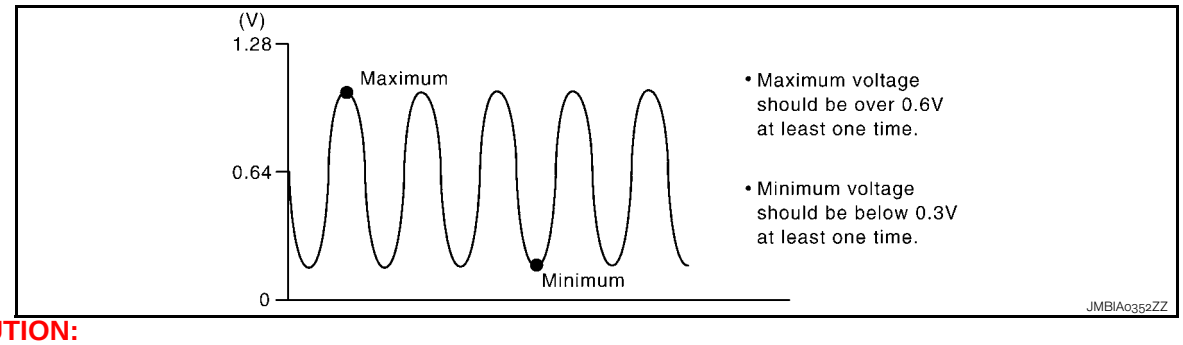
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

cardiagn.com

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
CAUTION:

cardiagn.com

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

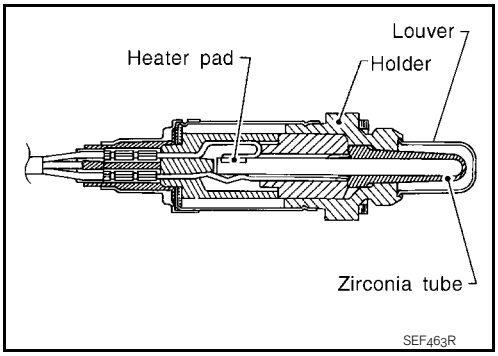
cardiagn.com

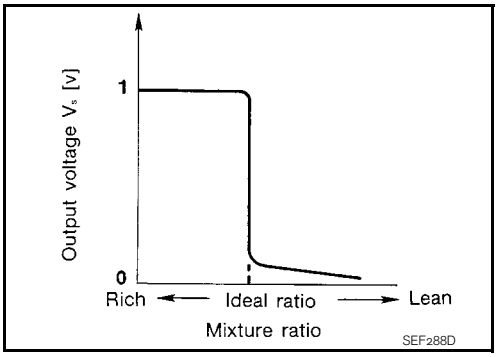
P1144 HO2S1

Description

INFOID:0000000001089428

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



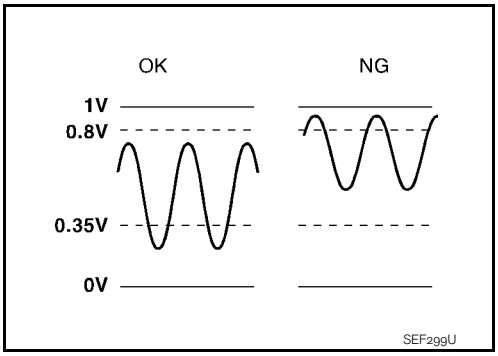


DTC Logic

INFOID:0000000001089429

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

cardiagn.com

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	A/T: 1,375 - 2,600 rpm M/T: 1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	A/T: 3.7 - 10.0 msec M/T: 3.7 - 10.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-845, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between EM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.8 at least 1 time. • The minimum voltage is over 0.35 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-845, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089431

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-791, "DTC Logic".
No >> GO TO 4

4.CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-776, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 1.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-762, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001089432

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

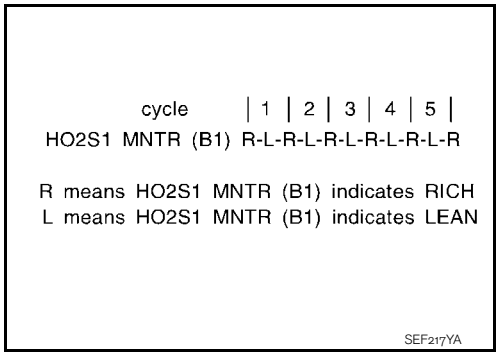
With CONSULT-III

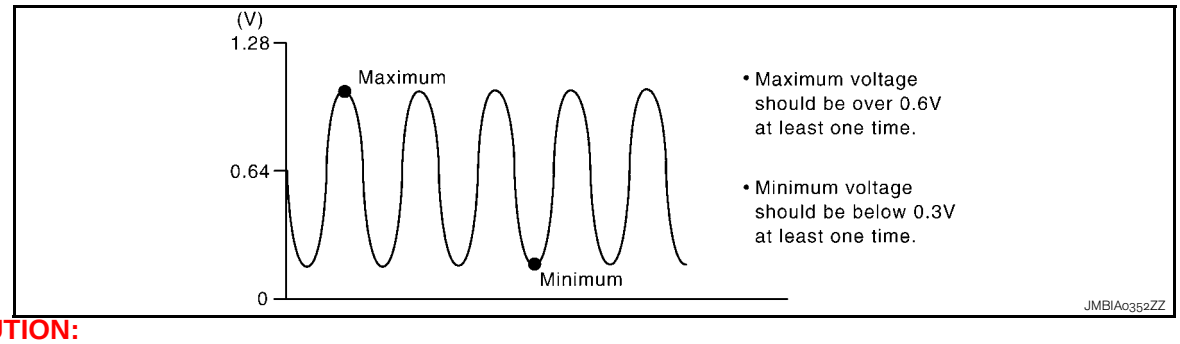
1. Start engine and warm it up to normal operating temperature.

cardiagn.com

2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

cardiagn.com

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

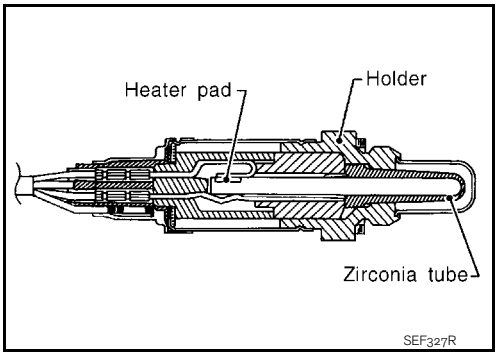
cardiagn.com

P1146 HO2S2

Description

INFOID:0000000001089433

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

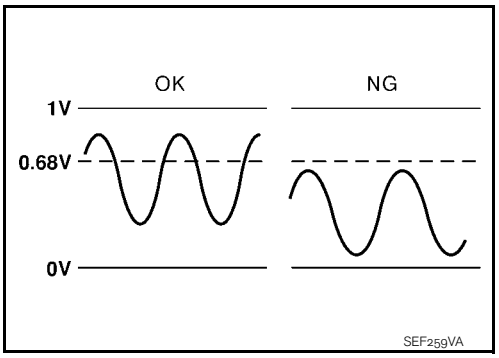


DTC Logic

INFOID:0000000001089434

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2. PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**
- **Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.**

CAUTION:

Always drive at safe speed.

cardiagn.com

>> GO TO 3.

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-IV

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7.PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9.PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-857, "Diagnosis Procedure".

cardiagn.com

CAN NOT BE DIAGNOSED>>GO TO 10.

10. PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-856, "Component Function Check".

NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-857, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089435

1. PERFORM COMPONENT FUNCTION CHECK-I

With GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure.

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-857, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089436

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-795, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 9.

8. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089437

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

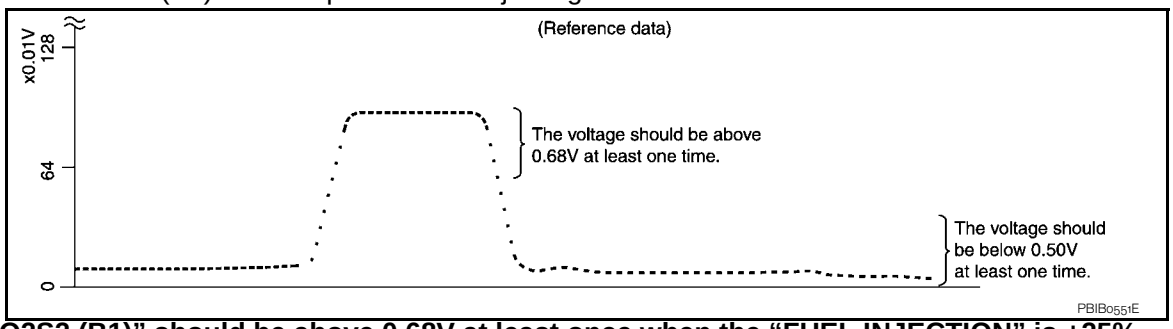
2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

cardiagn.com

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

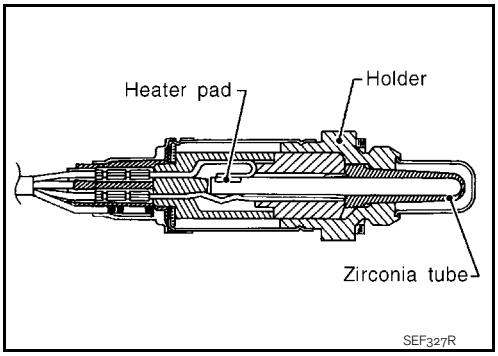
cardiagn.com

P1147 HO2S2

Description

INFOID:0000000001089438

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

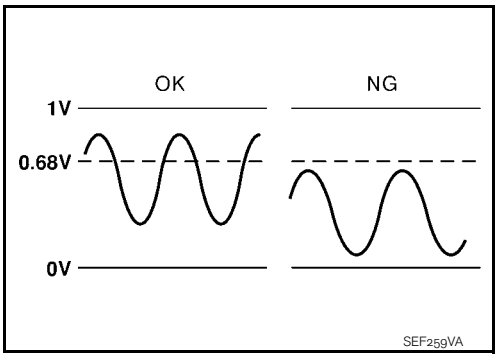


DTC Logic

INFOID:0000000001115349

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**
- **Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.**

CAUTION:

Always drive at safe speed.

cardiagn.com

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-IV

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-864, "Diagnosis Procedure".

cardiagn.com

CAN NOT BE DIAGNOSED>>GO TO 10.

10.PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-856, "Component Function Check".

NOTE:

Use component function check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-864, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089440

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure.

cardiagn.com

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-864, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001115350

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-649, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-795, "DTC Logic".
NO >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 9.

8. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089442

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

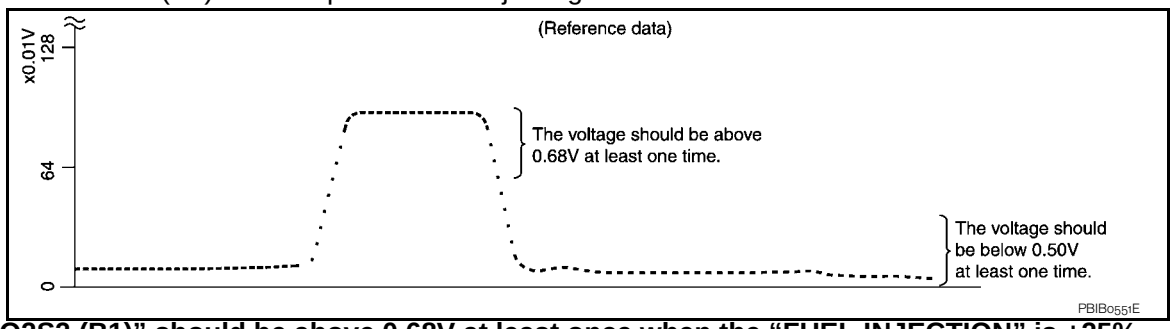
2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

cardiagn.com

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

P1211 TCS CONTROL UNIT

Description

INFOID:0000000001089443

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001089444

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from “ABS actuator and electric unit (control unit)”.	• ABS actuator and electric unit (control unit) • TCS related parts

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 60 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-868, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089445

Go to BRC-74, "Work Flow".

cardiagn.com

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001089446

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001089447

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or short-ed.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-869, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089448

Go to BRC-74, "Work Flow".

cardiagn.com

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001089449

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relay-1) • Cooling fan relay -3 • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-30, "Inspection". Also, replace the engine oil. Refer to LU-15, "Draining".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-21, "SAE Viscosity Number".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-870, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-871, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089450

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

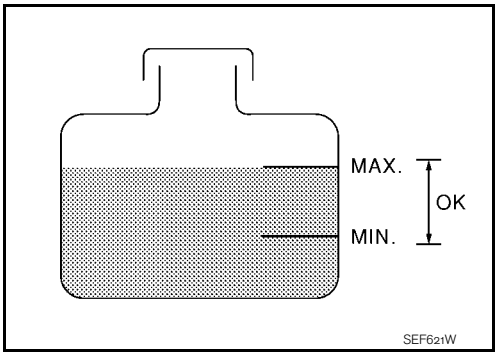
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

cardiagn.com

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-871, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-871, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-9, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-871, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089451

1.INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2.CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check cooling fan control circuit.

3.CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III
1. Touch “HIGH” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan control circuit.

4.CHECK COOLING FAN LOW SPEED OPERATION

cardiagn.com

Without CONSULT-III
1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Check cooling fan low speed control circuit.

5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-III
1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan high speed control circuit.

6. CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-30, "Inspection".

Is leakage detected?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak. Refer to CO-30, "Inspection".
- Hose
- Radiator
- Water pump
- Reservoir tank

>> Repair or replace.

8. CHECK RESERVOIR TANK CAP

Check radiator cap. Refer to CO-33, "RESERVOIR TANK CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace radiator cap.

9. CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor.

Is the inspection result normal?

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, check the following.

cardiagn.com

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-21, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-30, "Inspection"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-35, "Removal and Installation"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-30, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-41, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-920, "Component Inspection (Cooling Fan Motor)"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-30, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-30, "Inspection"
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-44, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-186, "Removal and Installation"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-191, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-26, "Troubleshooting Chart".

>> INSPECTION END

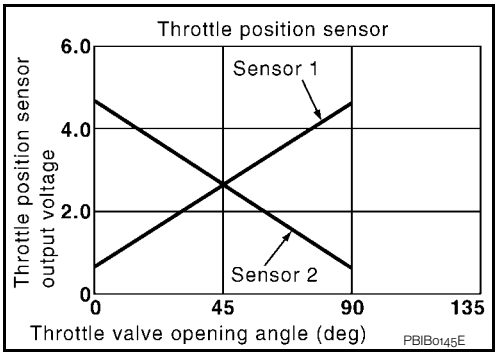
cardiagn.com

P1225 TP SENSOR

Description

INFOID:0000000001089453

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001089454

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-874, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

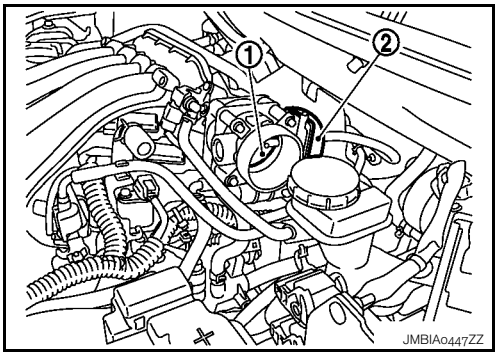
INFOID:0000000001089455

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-875, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089456

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

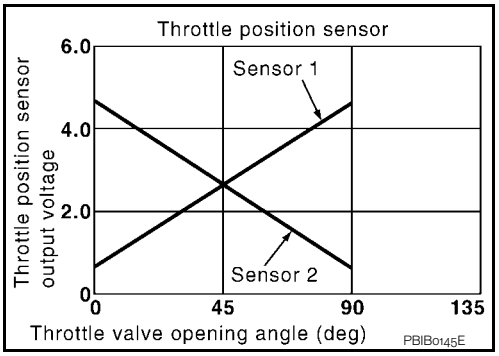
cardiagn.com

P1226 TP SENSOR

Description

INFOID:0000000001089457

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001089458

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-876, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

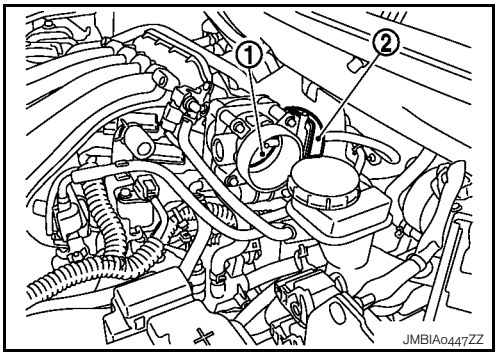
INFOID:0000000001089459

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-875, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089460

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001089461

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-878, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089462

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

cardiagn.com

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	72	Electric throttle control actuator	F29	1
	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	4

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMSHAFT PSITION SENSOR

Refer to EC-815, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-833, "Special Repair Requirement".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-901, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001089463

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-677, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001089464

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to EC-880, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089465

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

cardiagn.com

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	94 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector M352.
4. Check the continuity between ASCD steering switch and ECM harness connector.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Check the continuity between ECM harness connector and ASCD steering switch.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
14	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-882, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089466

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M325	14 and 15	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch

cardiagn.com

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001089467

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-677, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001089468

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572	ASCD brake switch	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T) • Stop lamp switch • ASCD brake switch • ASCD clutch switch (M/T) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation (M/T) • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

cardiagn.com

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-884, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-884, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089469

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO-1 >> CVT models: GO TO 3.
NO-1 >> M/T models: GO TO 7.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III
Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III
Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 14.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM ASCD harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-888, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD Clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 8.

8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to EC-888, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ASCD brake switch harness connector.

ECM		ASCD brake switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	100	E112	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to EC-888, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD clutch switch.

14. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

cardiagn.com

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E114 (M/T) E115 (CVT)	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.
NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK STOP LAMP SWITCH

Refer to EC-889, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace stop lamp switch.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001089470

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001089471

cardiagn.com

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001089472

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

cardiagn.com

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001089473

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-677, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001089474

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-825, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic"**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (CVT models) • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-890, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089475

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-214, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

cardiagn.com

P1706 PNP SWITCH

Description

INFOID:0000000001089476

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001089477

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-893, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,500 - 6,375 rpm M/T: 1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

cardiagn.com

B/FUEL SCHDL	CVT: 2.4 - 31.8 msec M/T: 3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-893, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-893, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-893, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001089478

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	69 (PNP switch signal)	Ground	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
				Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-893, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089479

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F21 (CVT)	7	Ground	Battery voltage
F46 (M/T 2W)	2		
F48 (M/T 4W)	2		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123

cardiagn.com

• Harness for open or short between PNP switch and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	6	E10	102	Existed
F46 (M/T 2W)	3			
F48 (M/T 4W)	1			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO-1 >> Repair open circuit or short to ground or short to power in harness or connectors. (M/T)
NO-2 >> GO TO 4. (CVT)

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	7	E11	14	Existed

2. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM		Continuity
Connector	Terminal	Connector	Terminal	
F8	69	E11	14	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PNP SWITCH

Refer to TM-227, "Component Inspection" (CVT) or TM-54, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000001089480

ECM receives primary speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000001089481

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC U1001 first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-809, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-813, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Primary speed sensor circuit is open or shorted) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-895, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089482

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-214, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

cardiagn.com

P1805 BRAKE SWITCH

Description

INFOID:0000000001089483

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001089484

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-896, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089485

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

YES >> GO TO 4
NO >> GO TO 2

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114 (M/T)	1	Ground	Battery voltage
E115 (CVT)			

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connector.

3.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E114 (M/T)	2	Existed
		E115 (CVT)		

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to EC-897, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001089486

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to EC-897, "Component Inspection (Stop Lamp Switch)".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> Replace stop lamp switch.

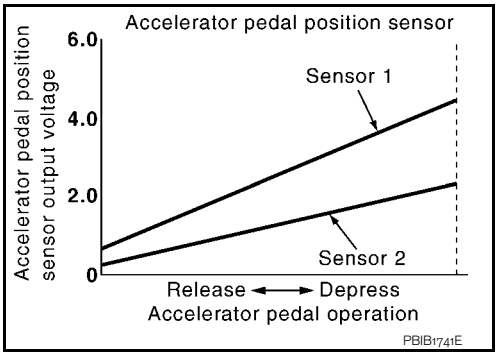
cardiagn.com

P2122, P2123 APP SENSOR

Description

INFOID:0000000001089487

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001089488

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-899, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089489

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	9	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-901, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-901, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection

INFOID:0000000001089490

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-901, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089491

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

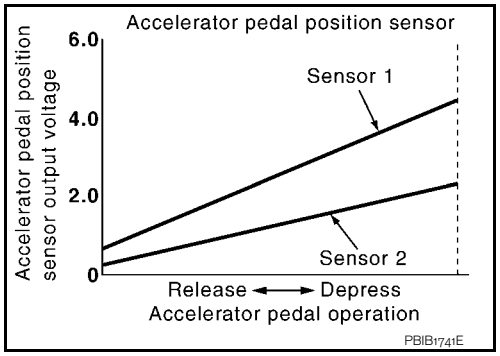
cardiagn.com

P2127, P2128 APP SENSOR

Description

INFOID:0000000001089492

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001089493

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-902, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089494

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-812, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

cardiagn.com

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-904, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-905, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089495

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-905, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089496

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

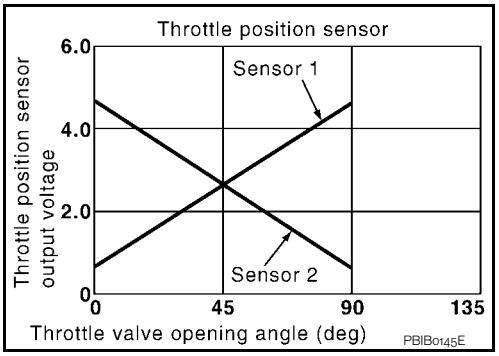
cardiagn.com

P2135 TP SENSOR

Description

INFOID:0000000001089497

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001089498

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-906, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089499

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F8	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

cardiagn.com

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-908, "Special Repair Requirement"

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089500

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-908, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-908, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089501

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

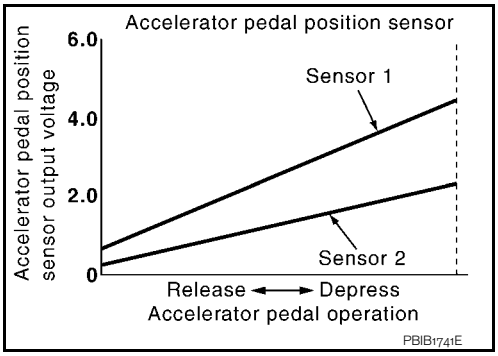
cardiagn.com

P2138 APP SENSOR

Description

INFOID:0000000001089502

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001089503

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-909, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001089504

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

cardiagn.com

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

cardiagn.com

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-812, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed
	1		104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-911, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-912, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089505

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E110	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-912, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001089506

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

ASCD BRAKE SWITCH

Description

INFOID:0000000001089507

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-677, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001089508

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-913, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089509

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

cardiagn.com

- Junction block connector M77, E105
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH

Refer to EC-915, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 7.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

cardiagn.com

Check the following.
- Junction block connector M77,E105
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD CLUTCH SWITCH

Refer to EC-888, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD clutch switch.

11.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK ASCD BRAKE SWITCH

Refer to EC-888, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

13.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001089510

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

cardiagn.com

3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD miodels) orBR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001089511

1. CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

cardiagn.com

ASCD INDICATOR

Description

INFOID:0000000001089512

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-677, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001089513

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-917, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089514

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

COOLING FAN

Description

INFOID:0000000001089515

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-685, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001089516

1.CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fans operates at low speed.

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check cooling fan low speed control circuit.

2.CHECK COOLING FAN HIGH SPEED FUNCTION

With CONSULT-III

1. Touch “HI” on the CONSULT-III screen.
2. Make sure that cooling fans operates at higher speed than low speed.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit.

Diagnosis Procedure

INFOID:0000000001089517

1.CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector and cooling fan relay-3 harness connector.
3. Check the voltage between IPDM E/R harness connector or cooling fan relay-3 harness connector and ground.

IPDM E/R		cooling fan relay-3		Ground	Voltage
Connector	Terminal	Connector	Terminal		
E14	53	E59	1	Ground	Battery voltage
			3		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

cardiagn.com

- 50A fusible link (letter M)
- Harness for open or short between IPDM E/R cooling fan relay-3 and battery

>> Repair or replace malfunctioning part.

3. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector or cooling fan relay-3 harness connector and cooling fan motor harness connector.

Cooling fan relay-3		IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	Connec-tor	Terminal	
E59	2	E14	52	E3	1	Existed

3. Check the continuity between cooling fan relay-3 harness connector and IPDM E/R harness connector.

Cooling fan relay-3		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E59	4	E13	48	Existed

4. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E10	5	Ground	Existed
			6		

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and cooling fan relay
- Harness for open or short between cooling fan relay-3 and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground
- Resistor E57

>> Repair or replace malfunctioning part.

5. CHECK GROUND CONNECTION

Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace ground connection.

6. CHECK COOLING FAN RELAYS

Refer to EC-920, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning cooling fan relay.

cardiagn.com

7. CHECK COOLING FAN MOTOR

Refer to EC-920, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning cooling fan motor.

8. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001089518

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fans operates .

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

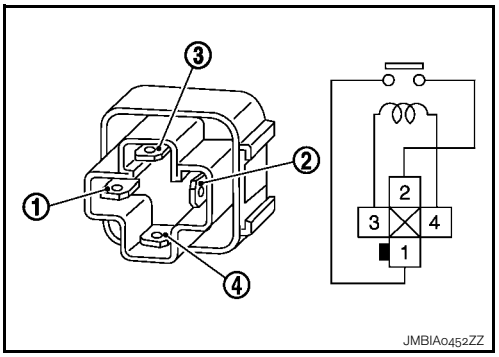
Component Inspection (Cooling Fan Relay)

INFOID:0000000001089519

1. CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay-3.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
1 and 2	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



JMBIA0452ZZ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

cardiagn.com

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001089520

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001089521

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-921, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-921, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-921, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089522

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-921, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-4, "System Diagram".

cardiagn.com

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-11, "System Diagram" (XENON TYPE) or EXL-191, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

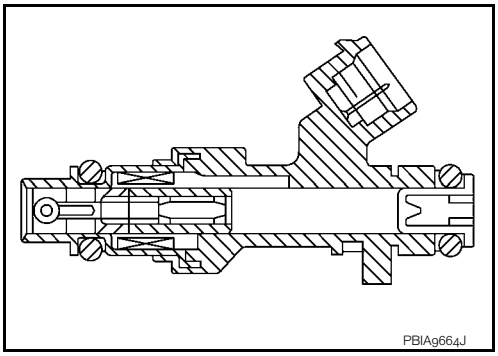
cardiagn.com

FUEL INJECTOR

Description

INFOID:0000000001089523

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000001089524

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-923, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

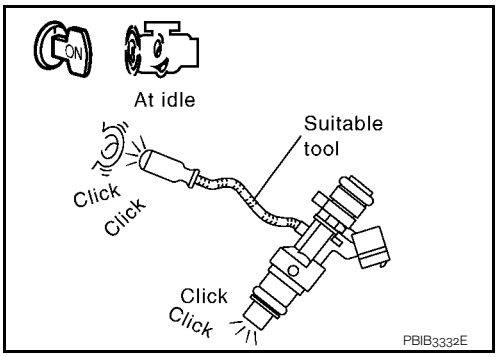
Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-923, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000001089525

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

cardiagn.com

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 58)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	2	F7	31	Existed
2	F38	2		30	
3	F39	2		29	
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-924, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001089526

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

cardiagn.com

Terminals	Resistance [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

cardiagn.com

FUEL PUMP

Description

INFOID:0000000001089527

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

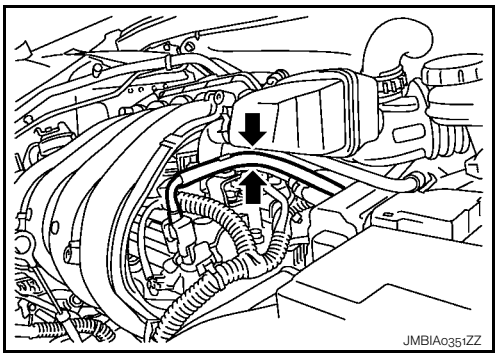
Component Function Check

INFOID:0000000001089528

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-926, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089529

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	23	E13	33	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E6, F123.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 10A fuse (No. 57) from IPDM E/R.
3. Check 10A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F13	42	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

cardiagn.com

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK FUEL PUMP

Refer to EC-928, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001089530

1. CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

cardiagn.com

IGNITION SIGNAL

Description

INFOID:0000000001089531

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001089532

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-929, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

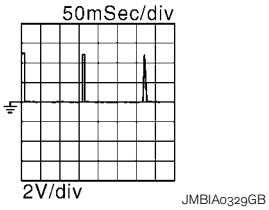
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-929, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal
Connector	Terminal		
F7	17	Ground	
	18		
	21		
	22		

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-929, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089533

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

cardiagn.com

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-736, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E11	9	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-736, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER

Refer to EC-932, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

cardiagn.com

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F7	17	Existed
2	F34	1		18	
3	F35	1		22	
4	F36	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-932, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001089534

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

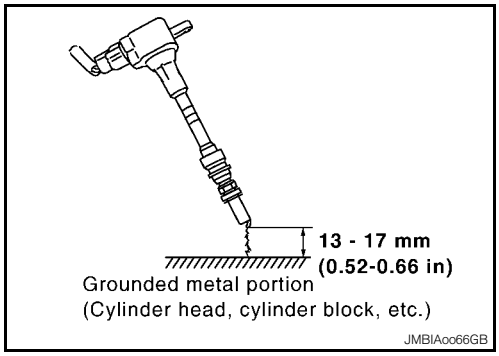
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001089535

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

cardiagn.com

3. Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

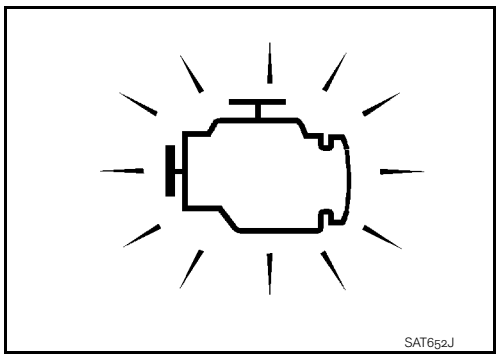
cardiagn.com

MALFUNCTION INDICATOR

Description

INFOID:0000000001089536

The Malfunction Indicator (MI) is located on the combination meter. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-934, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001089537

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-934, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089538

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-740, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

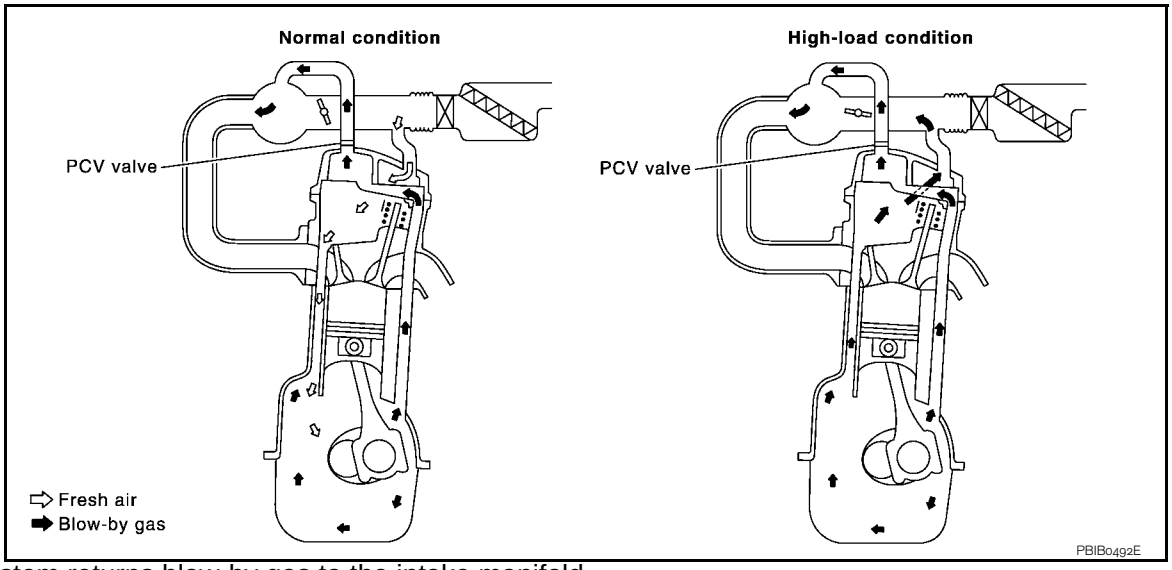
YES >> Replace combination meter.
NO >> Repair or replace.

cardiagn.com

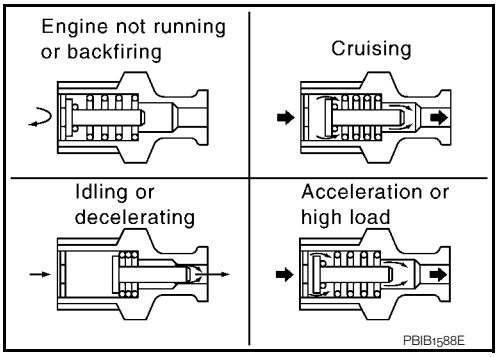
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001089543



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

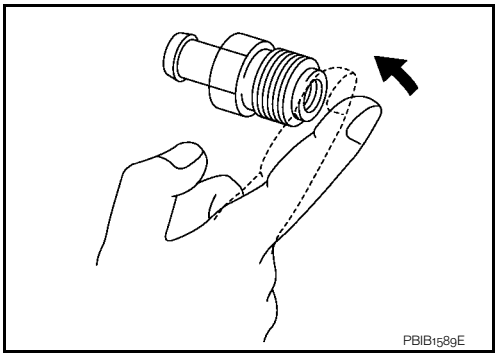


Component Inspection

INFOID:0000000001089544

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve.

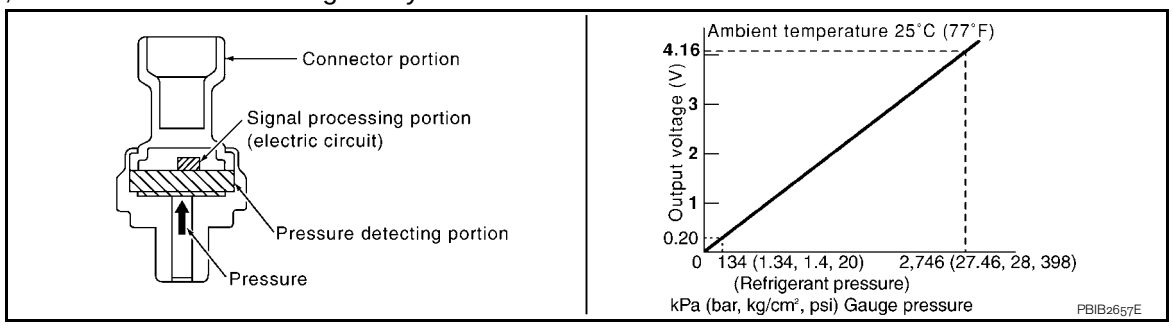
cardiagn.com

REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001089545

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001089546

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-936, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001089547

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

cardiagn.com

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F8	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F8	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

cardiagn.com

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000000936971

VALUES ON THE DIAGNOSIS TOOL

Remarks:

l Specification data are reference values.

l Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-728, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-728, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-728, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→→RICH Change more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

cardiagn.com

Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	20% - 90%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	Approx. 0% - 60%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON

cardiagn.com

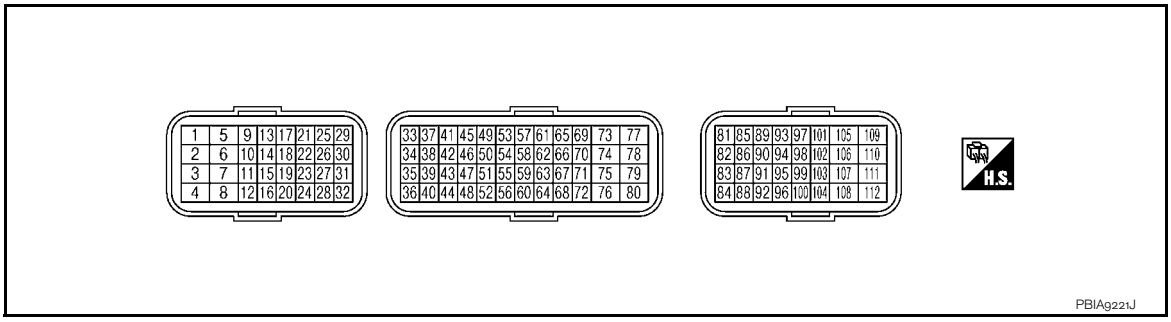
Monitor Item	Condition		Values/Status
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 94 °C (201°F) or less.	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW*2
		Engine coolant temperature is 100°C (212°F) or more	HIGH*2
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Above 3,600 rpm		ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	• Engine speed: Above 3,600 rpm		OFF
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
O2SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176°F) • Engine speed: below 3,600 rpm		Approx. 30%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF

cardiagn.com

Monitor Item	Condition		Values/Status
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

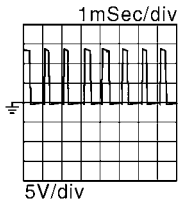
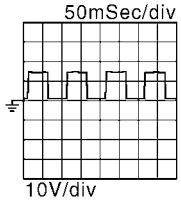
TERMINAL LAYOUT



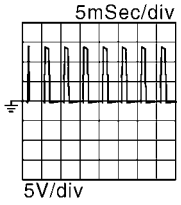
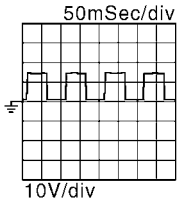
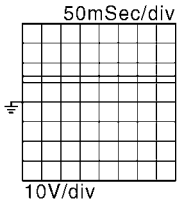
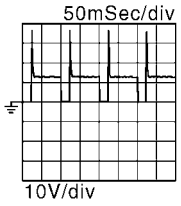
PHYSICAL VALUES

NOTE:
- ECM is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

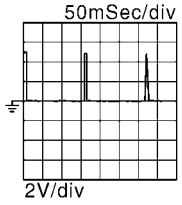
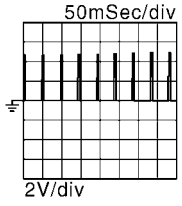
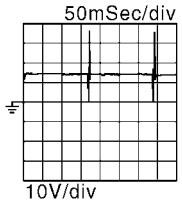
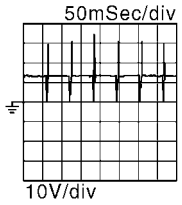
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/Output	Condition	Value (Approx.)
1	Ground	L	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	3.2V★  JMBIAo324GB
2	Ground	Y/R	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3	Ground	BR/Y	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm-up condition • Engine speed: Below 3,600 rpm	2.9 - 8.8V★  JMBIAo325GB
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: below 3,600 rpm	BATTERY VOLTAGE (11-14V)

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8V★  JMBIA0326GB
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  JMBIA0325GB
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/D	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  JMBIA0327GB
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	 JMBIA0328GB
10 11	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground
15	Ground	G	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V

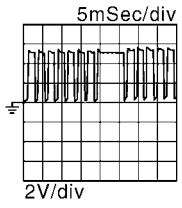
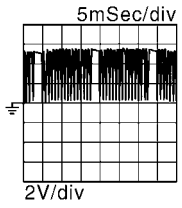
cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
17 18 21 22	Ground	V BR/Y O Y	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  JMBIA0329GB
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5V★  JMBIA0330GB
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
25 29 30 31	Ground	R U GR L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  JMBIA0331GB
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  JMBIA0332GB
					[Engine is running] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
32	Ground	R/B	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

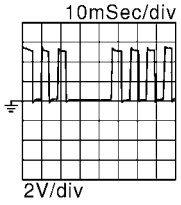
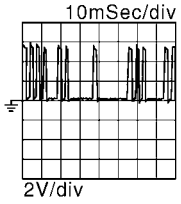
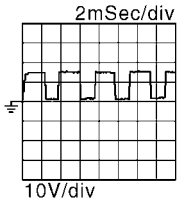
cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
33	Ground	Y	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	R	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Ground	B	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	P	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	B	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
44	Ground	O	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2V
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.5 - 1.8V
46	Ground	Y	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48	Ground	R/B	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
49	Ground	Y	Heated oxygen sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V
50	Ground	Y	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	B	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0 - 4.8V Output voltage varies with engine coolant temperature.
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	Y	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0V★  JMBIA0333GB
					[Engine is running] • Engine speed: 2,000 rpm	4.0V★  JMBIA0334GB
62	Ground	B	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	B	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
65	Ground	R	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★  JMBIA0335GB
					[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★  JMBIA0336GB
69	Ground	W/B	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above	0V
72	Ground	L	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
73	Ground	Y/R	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0V
					[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 10V★  JMBIA0337GB
74	Ground	L	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5V
75	Ground	G	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	LG	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	10.5V
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

cardiagn.com

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	Ground	G/B	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (CVT) • Brake pedal and clutch pedal: Slightly depressed (M/T)	0V
					[Ignition switch: ON] • Brake pedal: Fully released (CVT) • Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
104	Ground	B	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	O	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground
110	Ground	R	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V

cardiagn.com

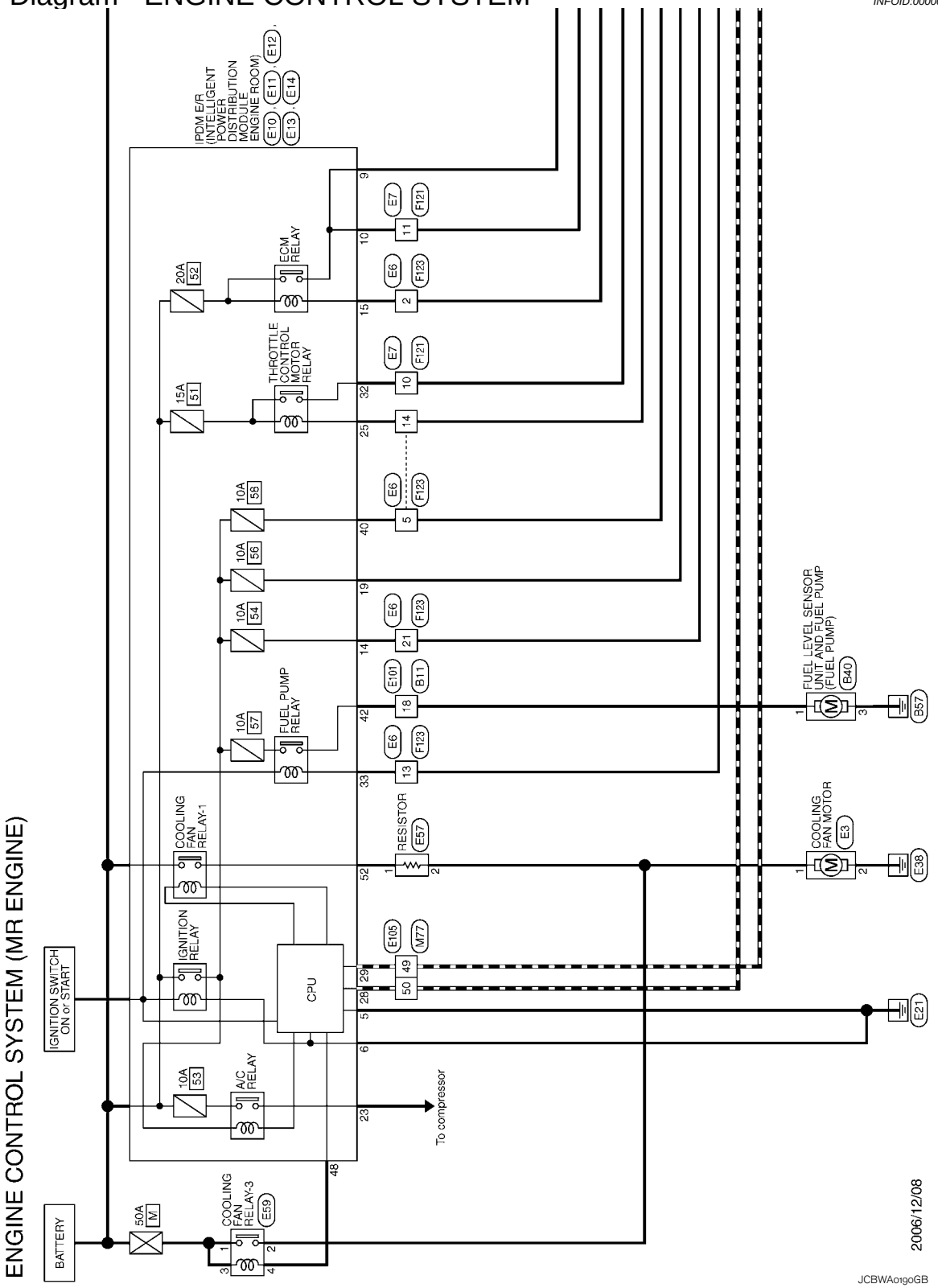
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
103	Ground	GR	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
111	Ground	B/Y	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

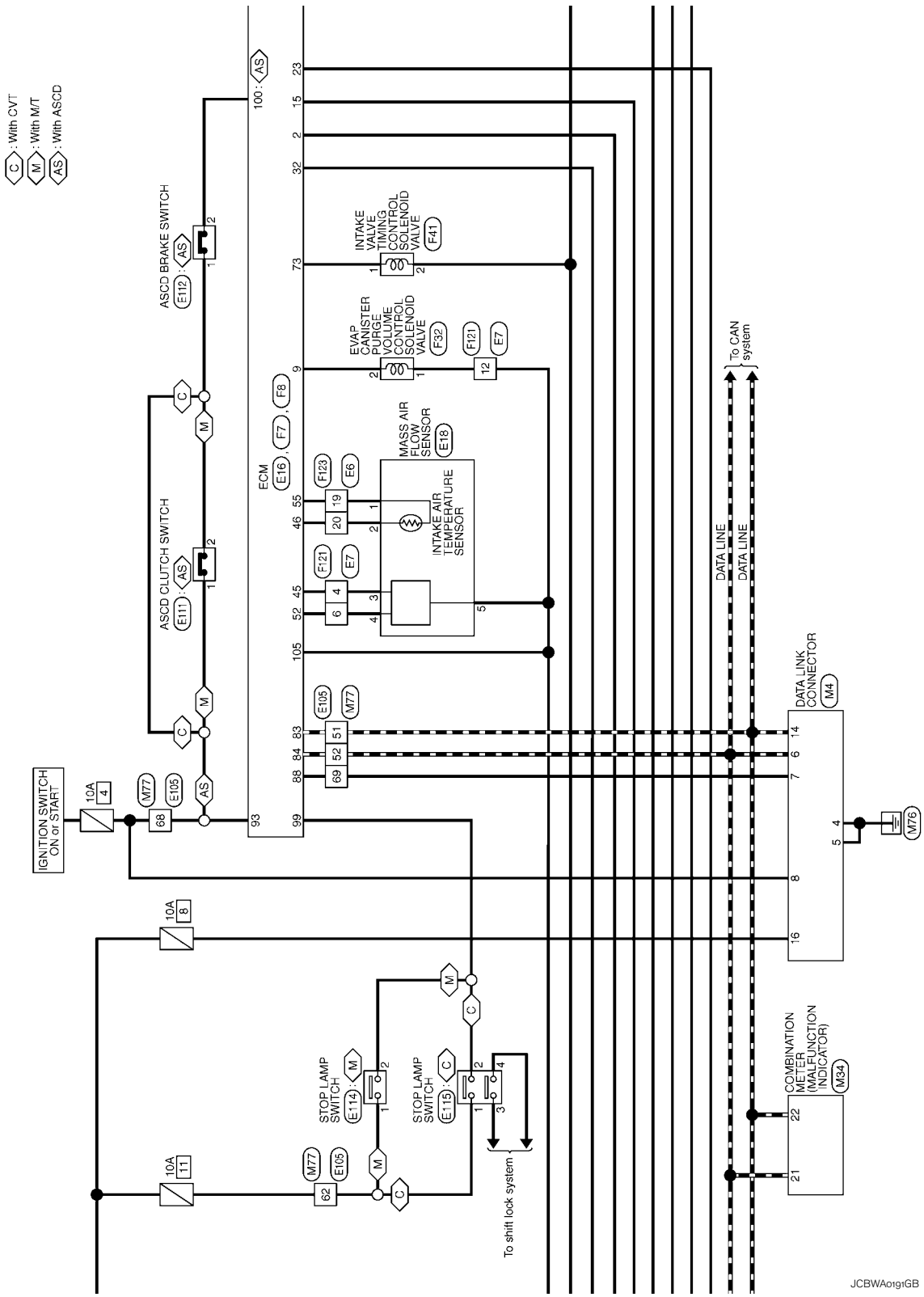
cardiagn.com

Wiring Diagram - ENGINE CONTROL SYSTEM -

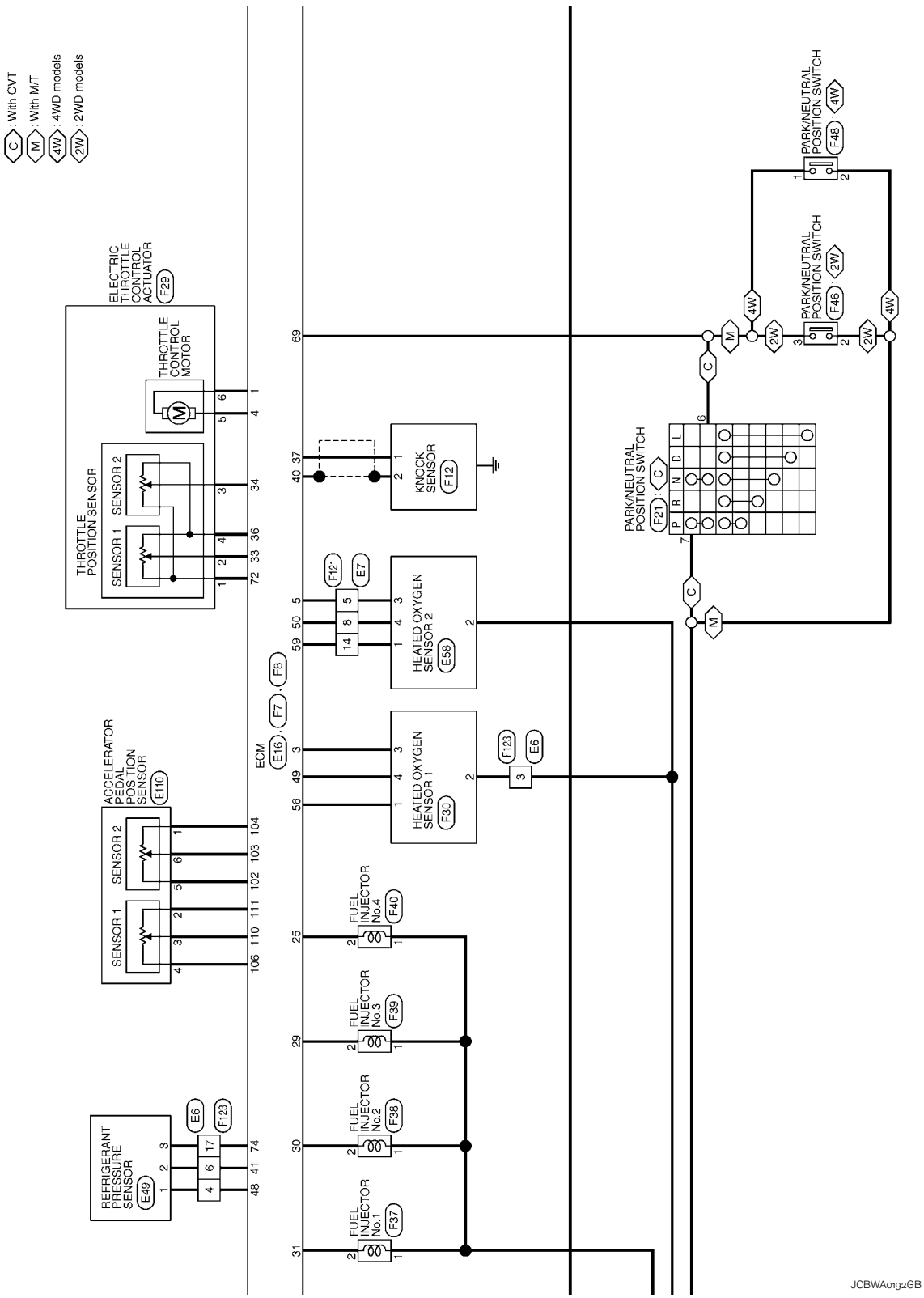
INFOID:0000000000936972



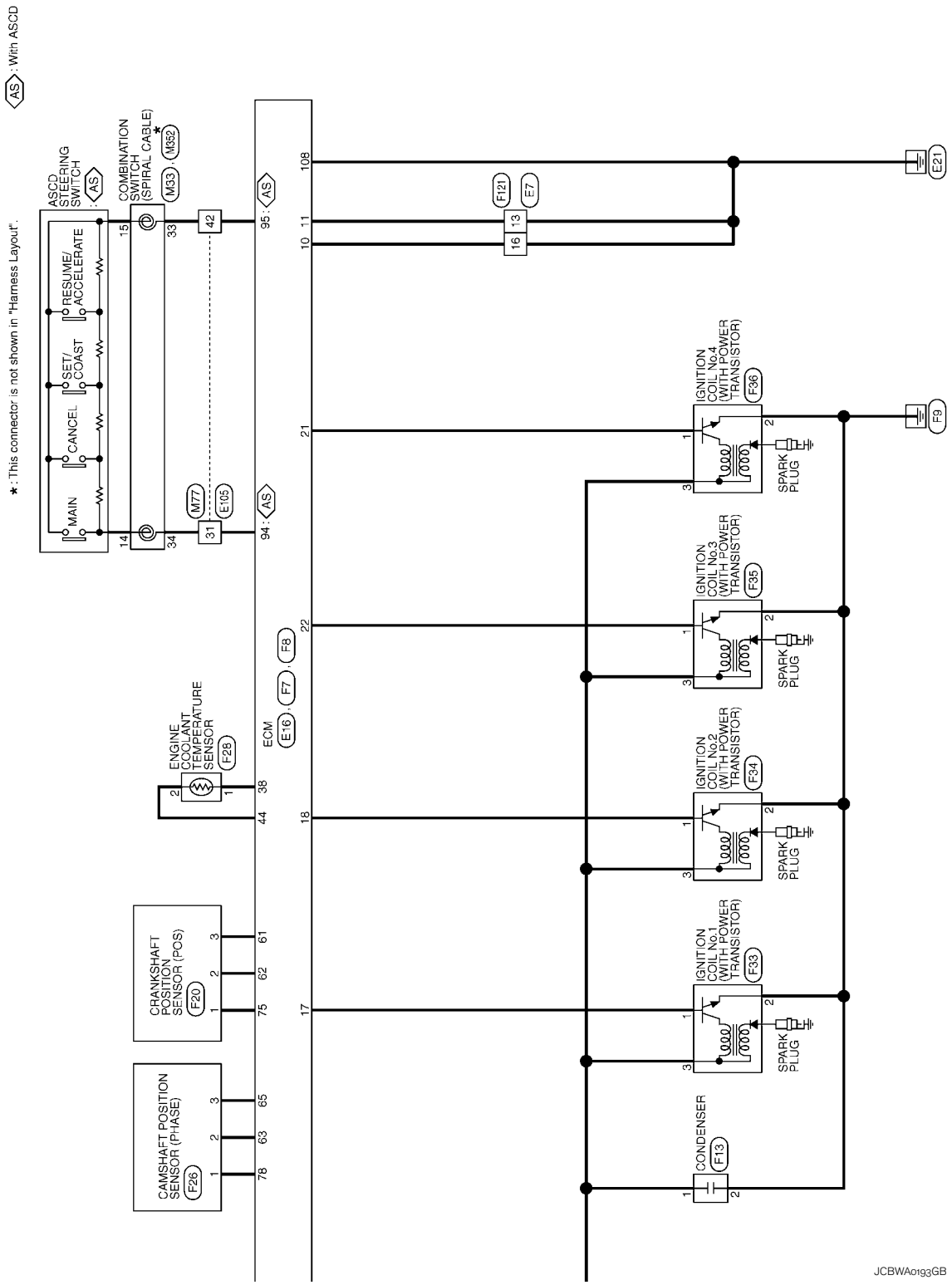
cardiagn.com



cardiagn.com



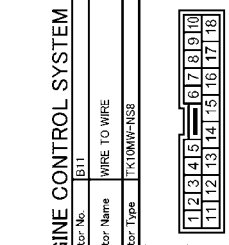
cardiagn.com



cardiagn.com

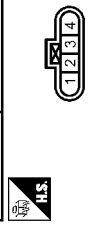
ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	B11
Connector Name	WIRE TO WIRE
Connector Type	TK10MW-NS8



Terminal No.	Color of Wire	Signal Name [Specification]
18	B/Y	–

Connector No.	B40
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	E04FGY-RS



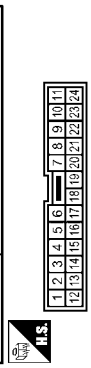
Terminal No.	Color of Wire	Signal Name [Specification]
1	B/Y	–
3	B	–

Connector No.	E3
Connector Name	COOLING FAN MOTOR
Connector Type	P80103B951602



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1V



Terminal No.	Color of Wire	Signal Name [Specification]
2	Y/L	–
3	R/O	–
4	R/L	–
5	SB	–
6	G/P	–
13	B/O	–
14	G/L	–
17	Y/W	–
19	O	–[With gasoline engine]
20	V	–[With gasoline engine]
21	R/B	–

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
4	BR	–[With gasoline engine]
5	R	–
6	LG	–[With gasoline engine]
8	Y	–
10	R/Y	–[With gasoline engine]
11	L/R	–[With gasoline engine]
12	G	–
13	B	–
14	SB	–
16	B	–

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

Terminal No.	Color of Wire	Signal Name [Specification]
5	B	–
6	B	–

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

Terminal No.	Color of Wire	Signal Name [Specification]
9	G	–
10	L/R	–
14	R/B	–
15	Y/L	–[With gasoline engine]
19	R/O	–

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
23	Y/B	–
25	G/L	–
28	L	–
29	P	–
32	R/Y	–

JCBWA0194GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

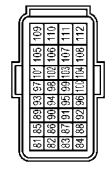
Terminal No.	Color of Wire	Signal Name [Specification]
33	B/O	–
40	SB	–[With MR engine]
42	B/Y	–
48	Y	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	Y2K 7263-5591-40-F



Terminal No.	Color of Wire	Signal Name [Specification]
52	W	–

Connector No.	E16
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH



Terminal No.	Color of Wire	Signal Name [Specification]
83	P	CAN-LI
84	L	CAN-HI
88	O	K-LINE
93	W/L	IGN SW
94	V	ASCD STRG SW
95	B	GND-ASCD STRG SW
99	R/W	BRAKE
100	R	BNCSW(BNC)
102	BR/Y	AVCC-APS2[With MR engine]
103	GR	APS2
104	B	GND-A-APS2[With MR engine]

105	G	VBR
106	O	AVCC-APS1[With MR engine]
108	B	GND
110	W	APS1[With MR engine]
111	B/Y	GND-A-APS1[With MR engine]

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	V	–
3	BR	–
4	LG	–
5	G	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	–
2	G/P	–
3	Y/W	–

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P801038951602



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	R	–

Connector No.	E58
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AF204FB



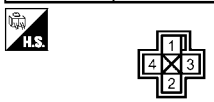
Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–
3	R	–
4	Y	–

JCBWA0195GB

cardiagn.com

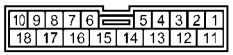
ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E59
Connector Name	COOLING FAN RELAY-3
Connector Type	24347 9F900



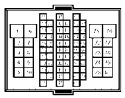
Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	-
2	R	-
3	W/B	-
4	W	-

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TK10FW-NS8



Terminal No.	Color of Wire	Signal Name [Specification]
18	B/Y	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-NS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
31	V	-
42	B	-
49	P	-
50	L	-
51	P	-
52	L	-
62	V	-
68	W/L	-
69	O	-

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	-[Except HR engine]
2	B/Y	-[With MR engine]
3	W	-[Except HR engine]
4	O	-[With MR engine]
5	BR/Y	-[With MR engine]
6	GR	-[Except K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	W/L	-[With gasoline engine]
2	O	-[With gasoline engine]

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	O	-[With M/T]
1	W/L	-[With CVT]
2	R	-

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	-
2	R/W	-

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	V	-
2	R/W	-
3	G	-[With CVT]
4	B	-[With CVT]

JCBWA0g66GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F7
Connector Name	ECM
Connector Type	MAA24FGY-MEA8-RH



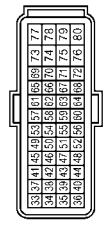
Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	MOTOR1
2	R/Y	VMOT
3	L/G	O2HF[With MR engine]
4	P	MOTOR2
5	R	O2HR
9	W/B	EVAP
10	B	GND
11	B/W	GND
15	G/L	MOTRLY
17	L/Y	IGN COIL#1
18	BR/Y	IGN COIL#2

Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BS02FB-AHY-S

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-
2	B/W	-

21	R/G	IGN COIL#4
22	Y	IGN COIL#3[With MR engine]
23	B/O	FPR
25	R/O	INJ#4
29	O	INJ#3[With MR engine]
30	GR	INJ#2[With MR engine]
31	L	INJ#1
32	Y/L	SSOFF

Connector No.	F8
Connector Name	ECM
Connector Type	MAA40FBR-MEA8-LH



Terminal No.	Color of Wire	Signal Name [Specification]
33	V/W	TPS1[With MR engine]
34	L/R	TPS2[With MR engine]
36	B	GND-A TPS[With MR engine]
37	W	KNK
38	P	TW[With MR engine]
40	SHIELD	GND-A KNK
41	G/P	PDPRESS
44	W/G	GND-A[With MR engine]
45	BR	OA+
46	V	TA
48	R/L	GND-A[PDPRES]

Connector No.	F13
Connector Name	CONDENSER
Connector Type	M02FW-GY-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/R	-
2	B	-

Connector No.	F20
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/W	-
2	B/O	-[With MR engine]
3	LG/B	-

49	LG/R	O2SF[With MR engine]
50	Y	O2SR
52	LG	OA-
55	O	GND-TA
56	B/Y	GND-A O2SF[With MR engine]
59	SB	O2SR-GND
61	LG/B	POS
62	B/O	GND-POS[With MR engine]
63	B/L	GND-PHASE[With MR engine]
65	GR/L	PHASE[With MR engine]
69	W/B	NEUT HIGH
72	L/O	AVCC-TPS[With MR engine]
73	Y/R	CVTC
74	Y/W	AVCC(PDPRES)
75	L/W	POS AVCC
78	Y/V	PHASE AVCC

Connector No.	F21
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	RK08FG

Terminal No.	Color of Wire	Signal Name [Specification]
6	W/B	-
7	R/B	-

JCBWA0197GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F26
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/V	–
2	B/L	–[With MR engine]
3	GR/L	–[With MR engine]

Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

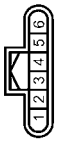
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With MR engine]
2	W/G	–[With MR engine]

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	L/O	–[With MR engine]
2	V/W	–[With MR engine]
3	L/R	–[With MR engine]
4	B	–[With MR engine]
5	P	–
6	L/W	–

Connector No.	F30
Connector Name	HEATED OXYGEN SENSOR 1
Connector Type	AF204FB

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	B/V	–[With MR engine]
2	R/O	–
3	L/G	–[With MR engine]
4	LG/R	–[With MR engine]

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL-RS-LGY

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	W/B	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	–
2	B	–
3	L/R	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR/Y	–
2	B	–
3	L/R	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–[With MR engine]
2	B	–
3	L/R	–

JCBWA0198GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	R/G	–
2	B	–
3	L/R	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	L	–

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	GR	–[With MR engine]

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	O	–[With MR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–

Connector No.	F41
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/R	–
2	L/R	–

Connector No.	F46
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	FEA03FG

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	R/B	–
3	W/B	–

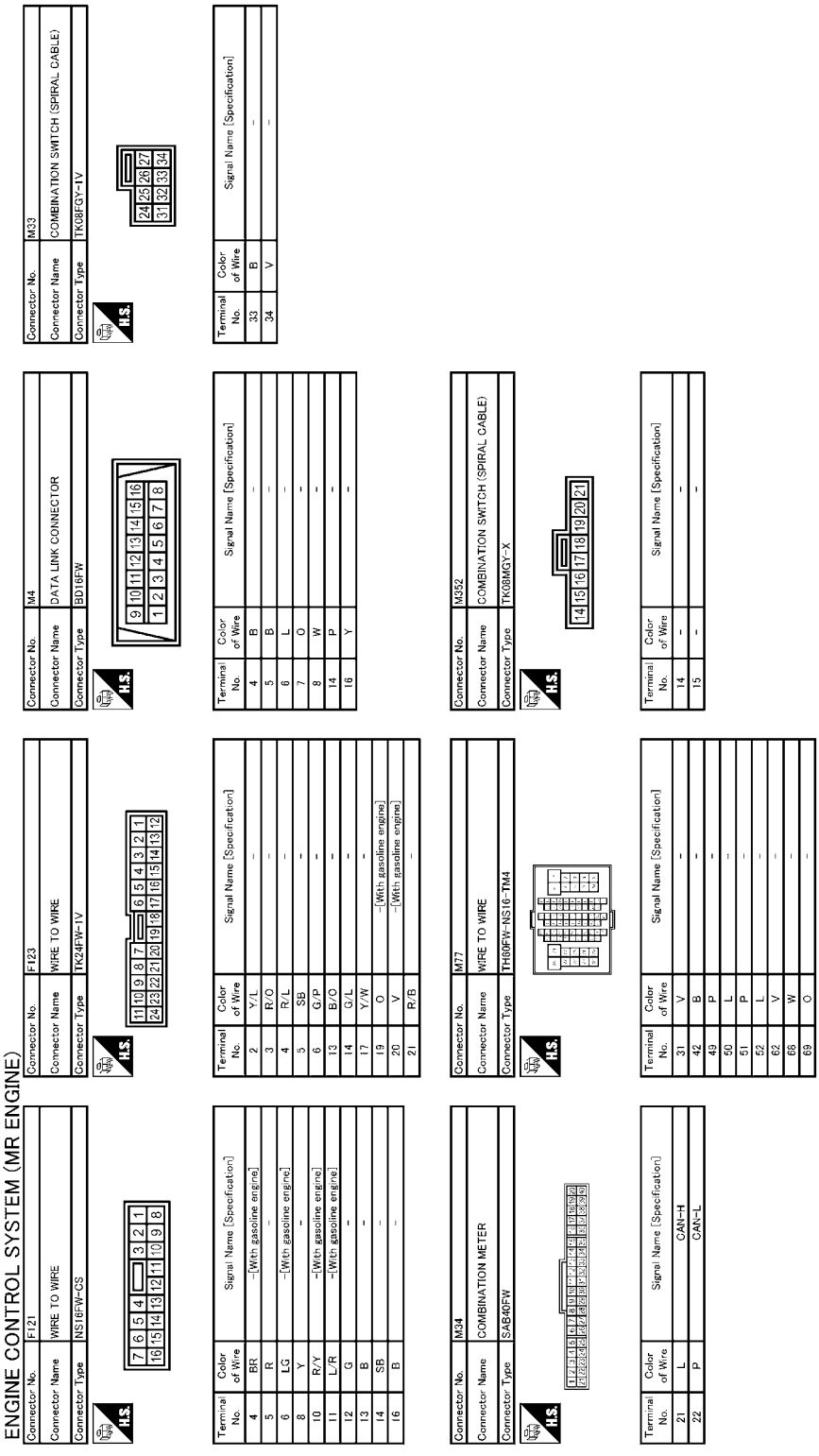
Connector No.	F48
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	RK02FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	–
2	R/B	–

JCBWA0199GB

cardiagn.com



JCBWA0200GB

Fail Safe

INFOID:0000000000936973

NON DTC RELATED ITEM

cardiagn.com

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	EC-934

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0500	Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (Highest) while engine is running.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

cardiagn.com

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P1124
P1126</td><td>Throttle control motor relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1128</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1229</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td rowspan="4">P1805</td><td rowspan="4">Brake switch</td><td colspan="2">ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Vehicle condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P2122
P2123
P2127
P2128
P2138</td><td>Accelerator pedal position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.</td></tr>
</table>

DTC Inspection Priority Chart

INFOID:0000000000936974

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1001 CAN communication line • U1010 CAN communication • P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P0705 P0850 Park/neutral position (PNP) switch • P1229 sensor power supply • P1610 P1611 P1612 P1615 NATS • P1706 Park/Neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

cardiagn.com

Priority	Detected items (DTC)
2	• P0132 P0133 P0134 P1143 P1144 Heated oxygen • P0135 Heated oxygen sensor 1 heater • P0138 P0139 P1146 P1147 Heated oxygen sensor 2 • P0141 Heated oxygen sensor 2 heater • P0444 EVAP canister purge volume control solenoid valve • P0710 P0715 P0720 P0740 P0744 P0776 P0778 P0840 P0845 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P1121 Electric throttle motor actuator • P1211 TCS control unit • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Primary speed sensor

DTC Index

INFOID:0000000000936975

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
U1001	1001*4	CAN COMM CIRCUIT	—	—	2	—	EC-740
U1010	1010	CONTROL UNIT(CAN)	—	—	1 (CVT) 2 (M/T)	× —	EC-741
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**Flashing***6	**—**
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	EC-742
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-746
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-746
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-751
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-751
P0117	0117	ECT SEN/CIRC	—	—	1	×	EC-754
P0118	0118	ECT SEN/CIRC	—	—	1	×	EC-754
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	EC-757
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	EC-757
P0132	0132	HO2S1 (B1)	—	×	2	×	EC-760
P0133	0133	HO2S1 (B1)	×	×	2	×	EC-764
P0134	0134	HO2S1 (B1)	—	×	2	×	EC-770
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	EC-775
P0138	0138	HO2S2 (B1)	×	×	2	×	EC-778
P0139	0139	HO2S2 (B1)	×	×	2	×	EC-782
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	EC-788

cardiagn.com

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
P0171	0171	FUEL SYS-LEAN-B1	—	—	2	×	EC-791
P0172	0172	FUEL SYS-RICH-B1	—	—	2	×	EC-795
P0222	0222	TP SEN 1/CIRC-B1	—	—	1	×	EC-799
P0223	0223	TP SEN 1/CIRC-B1	—	—	1	×	EC-799
P0300	0300	MULTICYL MISFIRE	—	—	2	×	EC-802
P0301	0301	CYL 1 MISFIRE	—	—	2	×	EC-802
P0302	0302	CYL 2 MISFIRE	—	—	2	×	EC-802
P0303	0303	CYL 3 MISFIRE	—	—	2	×	EC-802
P0304	0304	CYL 4 MISFIRE	—	—	2	×	EC-802
P0327	0327	KNOCK SEN/CIRC-B1	—	—	2	—	EC-807
P0328	0328	KNOCK SEN/CIRC-B1	—	—	2	—	EC-807
P0335	0335	CKP SEN/CIRCUIT	—	—	2	×	EC-809
P0340	0340	CMP SEN/CIRC-B1	—	—	2	×	EC-813
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	EC-817
P0444	0444	PURG VOLUME CONT/V	—	—	2	×	EC-822
P0500	0500	VEH SPEED SEN/CIRC*5	—	—	2	×	EC-825
P0605	0605	ECM	—	—	1 or 2	× or —	EC-827
P0705	0705	PNP SW/CIRC	—	—	2	×	TM-226
P0710	0710	ATF TEMP SEN/CIRC	—	—	1	×	TM-229
P0715	0715	INPUT SPD SEN/CIRC	—	—	2	×	TM-231
P0720	0720	VEH SPD SEN/CIR AT*5	—	—	2	×	TM-234
P0740	0740	TCC SOLENOID/CIRC	—	—	2	×	TM-240
P0744	0744	A/T TCC S/V FNCTN	—	—	2	×	TM-242
P0746	0746	PRS CNT SOL/A FCTN	—	—	1	×	TM-246
P0776	0776	PRS CNT SOL/B FCTN	—	—	2	×	TM-248
P0778	0778	PRS CNT SOL/B CIRC	—	—	2	×	TM-250
P0840	0840	TR PRS SENS/A CIRC	—	—	2	×	TM-255
P0845	0845	TR PRS SENS/B CIRC	—	—	2	×	TM-260
P1111	1111	INT/V TIM C/CIRC	—	—	1	×	EC-829
P1121	1121	ETC ACTR - B1	—	—	1	×	EC-832
P1122	1122	ETC FUNCTION/CIRC - B1	—	—	1	×	EC-834
P1124	1124	ETC MOT PWP	—	—	1	×	EC-838
P1126	1126	ETC MOT PWP - B1	—	—	1	×	EC-838
P1128	1128	ETC MOT - B1	—	—	1	×	EC-841
P1143	1143	HO2S1 (B1)	×	×	2	×	EC-844
P1144	1144	HO2S1 (B1)	×	×	2	×	EC-849
P1146	1146	HO2S2 (B1)	×	×	2	×	EC-854
P1147	1147	HO2S2 (B1)	×	×	2	×	EC-861
P1211	1211	TCS C/U FUNCTN	—	—	2	—	EC-868
P1212	1212	TCS/CIRC	—	—	2	—	EC-869
P1217	1217	ENG OVER TEMP	—	—	1	×	EC-870
P1225	1225	CTP LEARNING-B1	—	—	2	—	EC-874

cardiagn.com

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
P1226	1226	CTP LEARNING-B1	—	—	2	—	EC-876
P1229	1129	SENSOR POWER/CIRC	—	—	1	×	EC-878
P1564	1564	ASCD SW	—	—	1	—	EC-880
P1572	1572	ASCD BRAKE SW	—	—	1	—	EC-883
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	EC-890
P1610	1610	LOCK MODE	—	—	2	—	SEC-181
P1611	1611	ID DISCARD IMM-ECM	—	—	2	—	SEC-177
P1612	1612	CHAIN OF ECM-IMMU	—	—	2	—	SEC-178
P1615	1615	DIFFERENCE OF KEY	—	—	2	—	SEC-176
P1706	1706	P-N POS SW/CIRCUIT	—	—	2	×	EC-892
P1715	1715	IN PULY SPEED	—	—	2	—	EC-895
P1740	1740	LU-SLCT SOL/CIRC	—	—	2	×	TM-273
P1777	1777	STEP MOTOR CIRC	—	—	1	×	TM-276
P1778	1778	STEP MOTOR FNCT	—	—	2	×	TM-278
P1805	1805	BRAKE SW/CIRCUIT	—	—	2	—	EC-896
P2122	2122	APP SEN 1/CIRC	—	—	1	×	EC-899
P2123	2123	APP SEN 1/CIRC	—	—	1	×	EC-899
P2127	2127	APP SEN 2/CIRC	—	—	1	×	EC-902
P2128	2128	APP SEN 2/CIRC	—	—	1	×	EC-902
P2135	2135	TP SENSOR-B1	—	—	1	×	EC-906
P2138	2138	APP SENSOR	—	—	1	×	EC-909

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

*6: When the ECM is in the mode of displaying SRT status, MI may flash. For the details, refer to “How to Display SRT Status”.

How to Set SRT Code

INFOID:0000000000936976

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III

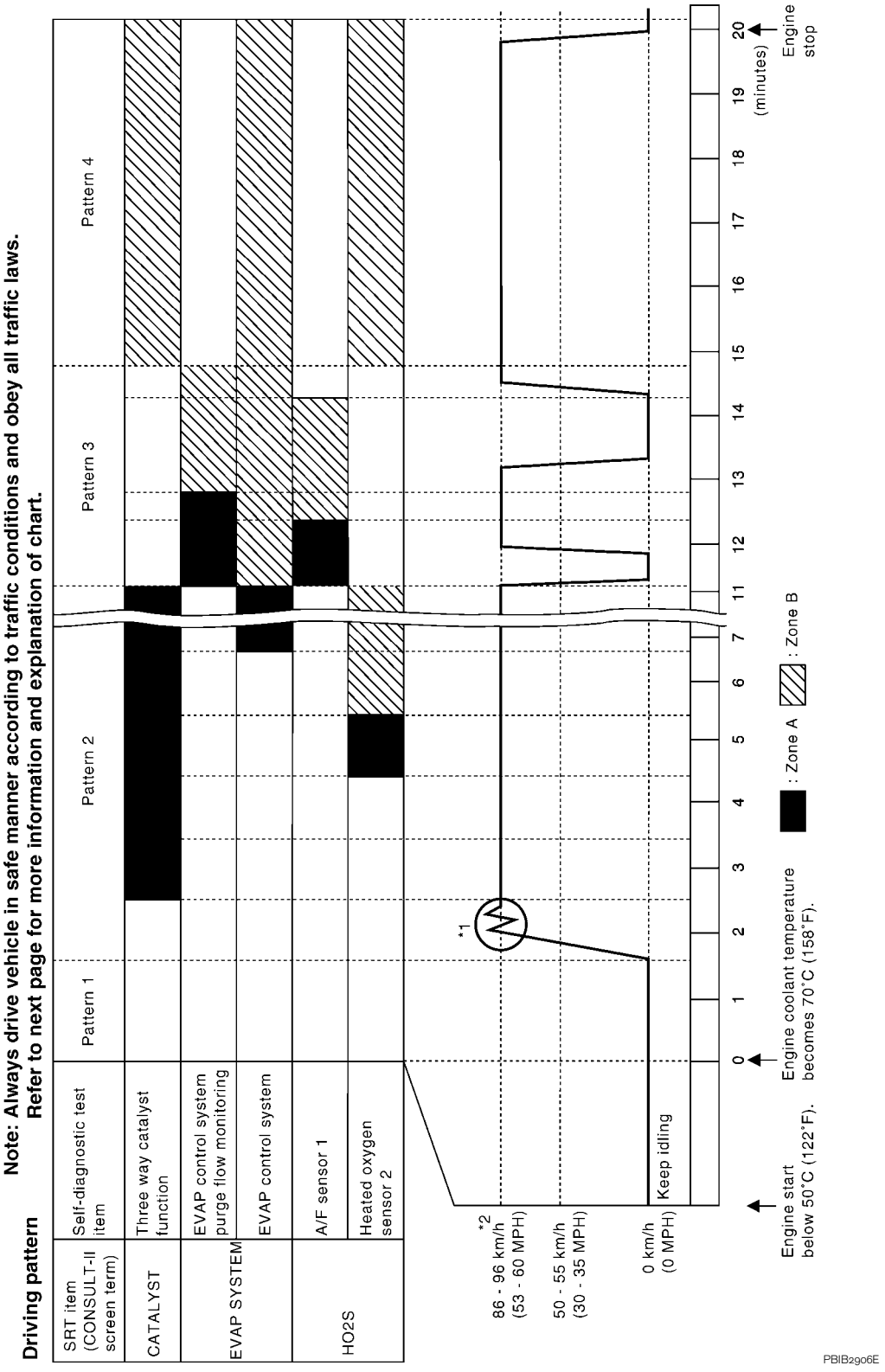
Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on “SRT Item”.

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

cardiagn.com

DRIVING PATTERN



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

cardiagn.com

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 46 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 46 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 95 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Test Value and Test Limit

INFOID:0000000000936977

The following is the information specified in Service $06 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

SRT item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
CATALYST	Three way catalyst function	P0420	01H	01H	Max.
		P0420	02H	81H	Min.
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
		P1144	0BH	04H	Max.
		P0132	0CH	04H	Max.
		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
HO2S HTR	Heated oxygen sensor 1 heater	P0135	29H	08H	Max.
			2AH	88H	Min.
	Heated oxygen sensor 2 heater	P0141	2DH	0AH	Max.
			2EH	8AH	Min.

cardiagn.com

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000000936978

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-926
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-978
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-923
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-692
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-935
	Incorrect idle speed adjustment						1	1	1	1		1			EC-646
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-832, EC-834
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-646
	Ignition circuit	1	1	2	2	2		2	2			2			EC-929
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-736
Mass air flow sensor circuit		1			2										EC-746
Engine coolant temperature sensor circuit							3			3					EC-754
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-760, EC-764, EC-770, EC-844, EC-849
Throttle position sensor circuit							2			2					EC-757, EC-799, EC-874, EC-876, EC-906
Accelerator pedal position sensor circuit				3	2	1									EC-899, EC-902, EC-906
Knock sensor circuit				2								3			EC-807
Crankshaft position sensor (POS) circuit		2	2												EC-809

cardiagn.com

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	3	2												EC-813
Vehicle speed signal circuit		2	3		3						3			EC-825
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-827
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-829
PNP switch circuit			3		3		3	3			3			EC-892
Refrigerant pressure sensor circuit		2				3			3		4			EC-936
Electrical load signal circuit							3							EC-921
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HA-12
ABS actuator and electric unit (control unit)			4											BRC-9

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FL-15, FL-17
	Fuel piping			5	5	5		5	5			5			EM-155
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct														EM-146
	Air cleaner														EM-144
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5	5	5	5	5	5	5	5	5		5			EM-146
	Electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-118
	Generator circuit														CHG-8
	Starter circuit	3													STR-8
	Signal plate	6													EM-195, EM-199
	PNP switch	4													TM-226 or TM-324
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-186
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-187
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-163
	Camshaft														EM-163
	Intake valve timing control														EM-163
	Intake valve												3		EM-163
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-149, EX-10
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-152, LU-18, LU-17,
	Oil level (Low)/Filthy oil														LU-14
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-35
	Thermostat									5					CO-41
	Water pump														CO-39
	Water gallery														CO-24, CO-25
	Cooling fan									5					CO-37
	Coolant level (Low)/Contaminated coolant														CO-30
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												SEC-14

1 - 6: The numbers refer to the order of inspection.

cardiagn.com

NORMAL OPERATING CONDITION

Description

INFOID:0000000000936979

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-657, "System Diagram".

cardiagn.com

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001099091

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

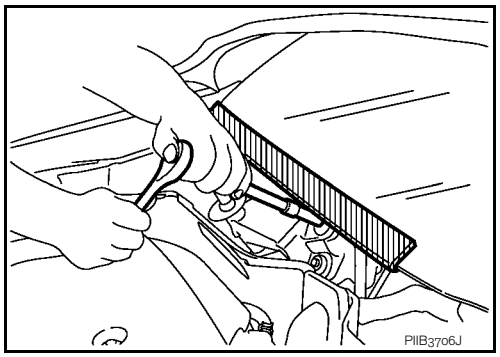
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRC section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001099090

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000000936980

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

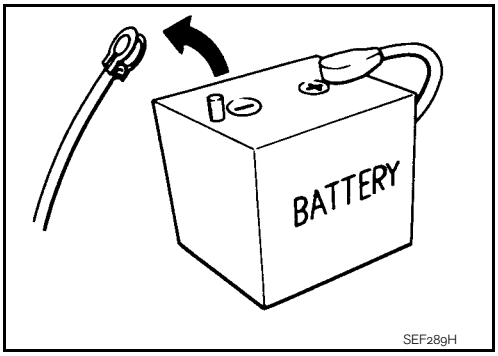
- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-105, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

General Precautions

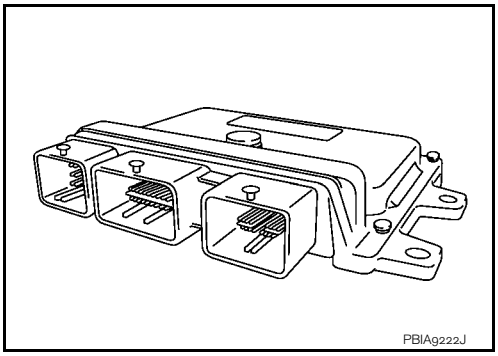
INFOID:0000000000936981

cardiagn.com

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

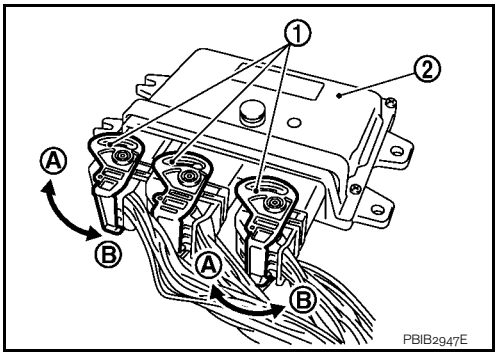


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

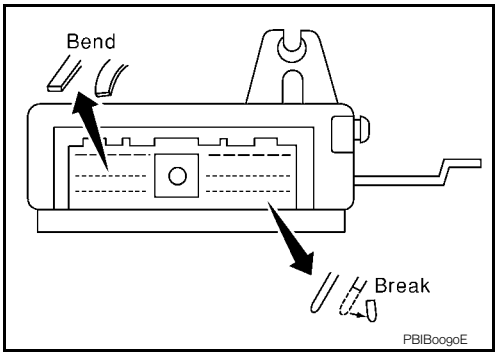


- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

  2. ECM
  A. Loosen

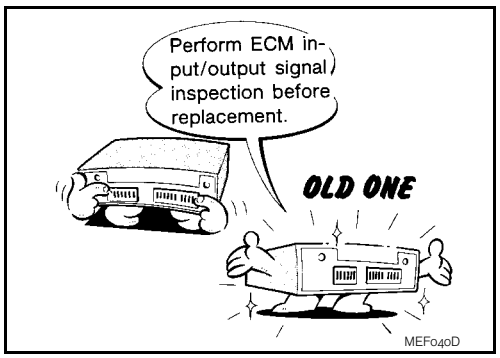


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**

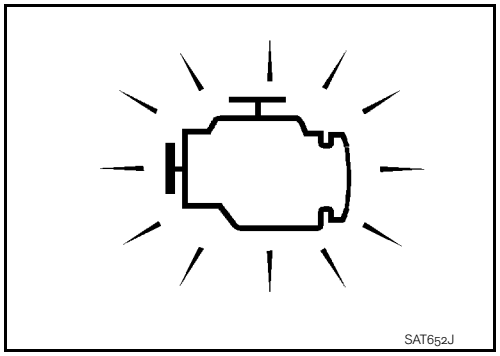


cardiagn.com

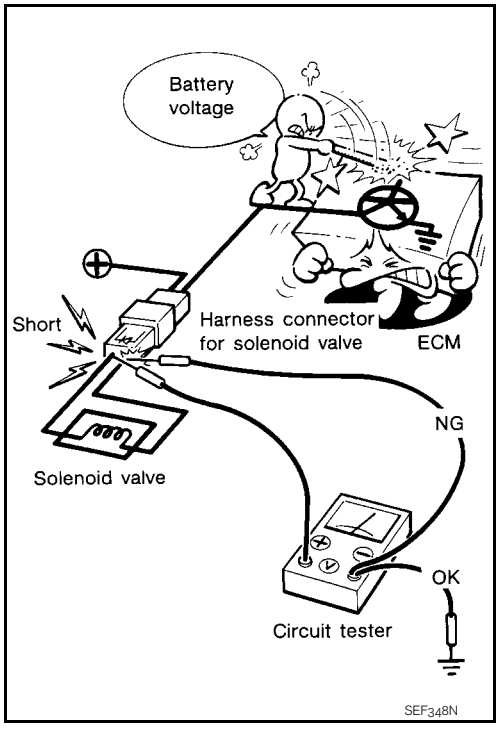
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-938, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



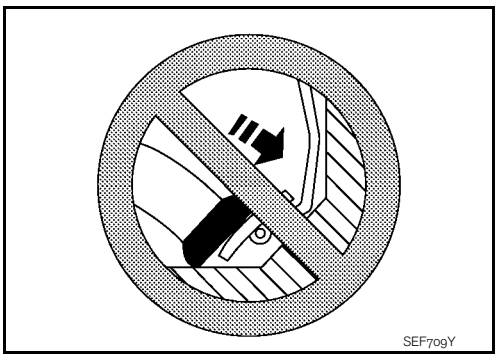
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



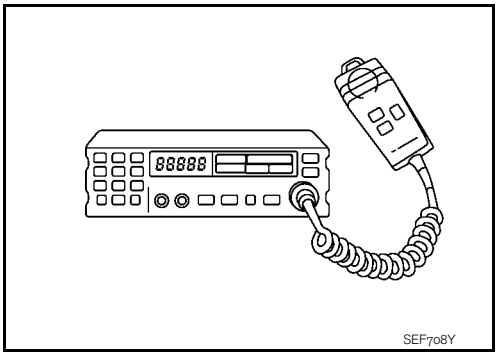
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

cardiagn.com

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



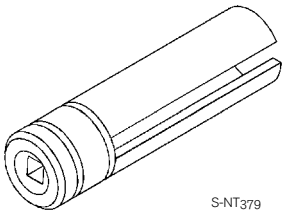
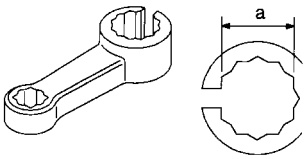
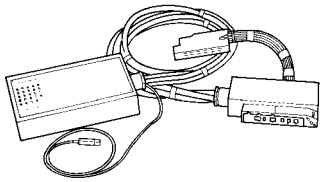
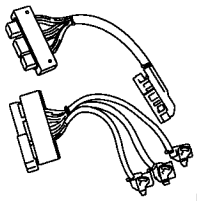
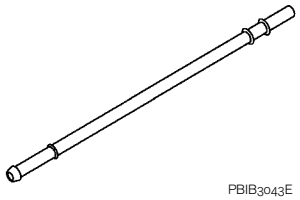
cardiagn.com

PREPARATION

PREPARATION

Special Service Tools

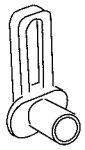
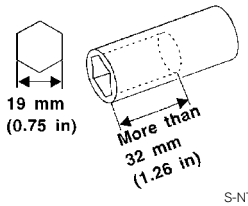
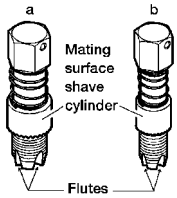
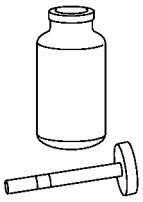
INFOID:0000000001093275

Tool number Tool name		Description
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
EG17550000 Break-out box	 ZZA1194D	Measuring ECM signals with a circuit tester
EG17680000 Y-cable adapter	 PBIA9379J	Measuring ECM signals with a circuit tester
KV10118400 Fuel tube adapter	 PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001115676

cardiagn.com

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

cardiagn.com

ON-VEHICLE REPAIR

FUEL PRESSURE

Inspection

INFOID:0000000001092491

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

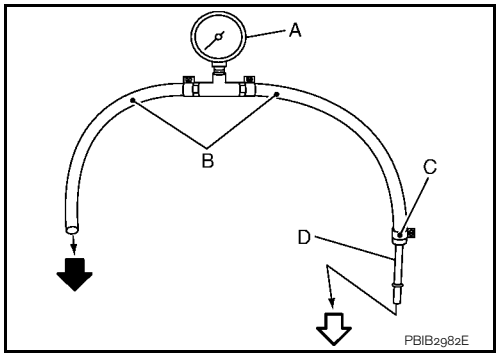
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

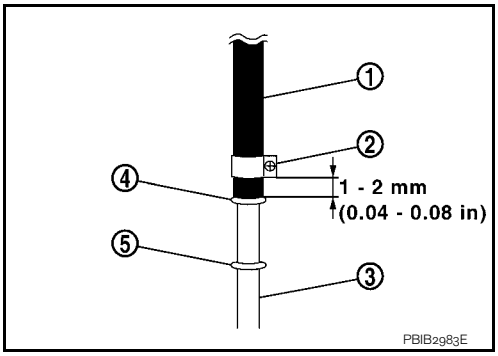
1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

cardiagn.com

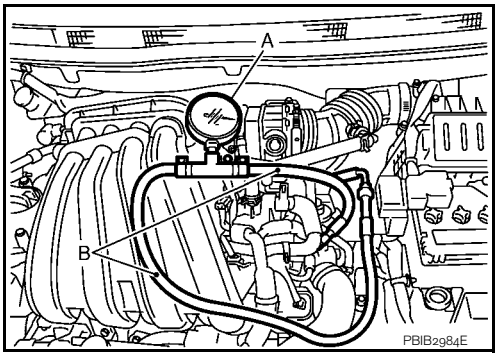
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

cardiagn.com

EVAPORATIVE EMISSION SYSTEM

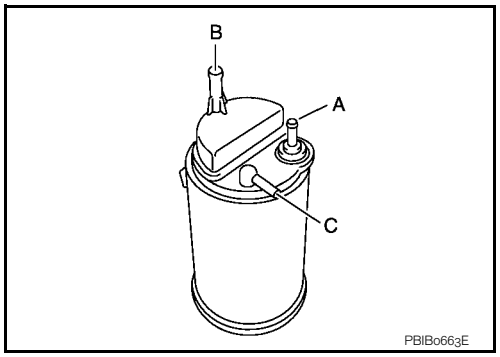
Inspection

INFOID:0000000001092492

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).

b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

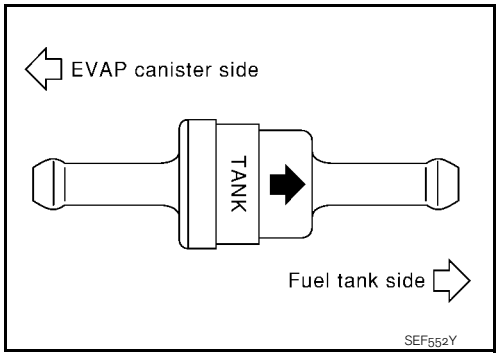


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

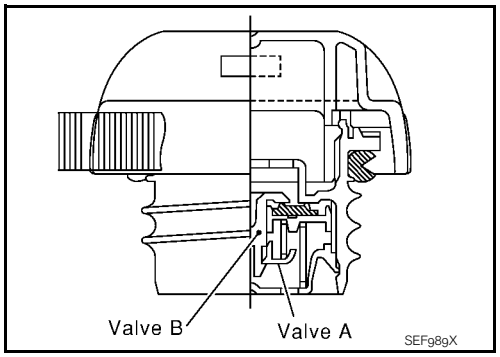
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

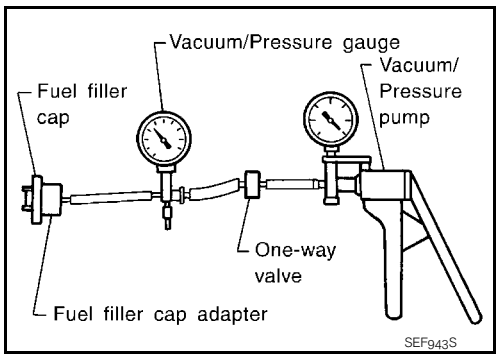
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



cardiagn.com

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001089050

Transmission	Condition	Specification
CVT	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	700 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001089051

Transmission	Condition	Specification
CVT	No load* (in P or N position)	15 ± 5° BTDC
M/T	No load* (in Neutral position)	15 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000001089052

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000001089053

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.3V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

cardiagn.com

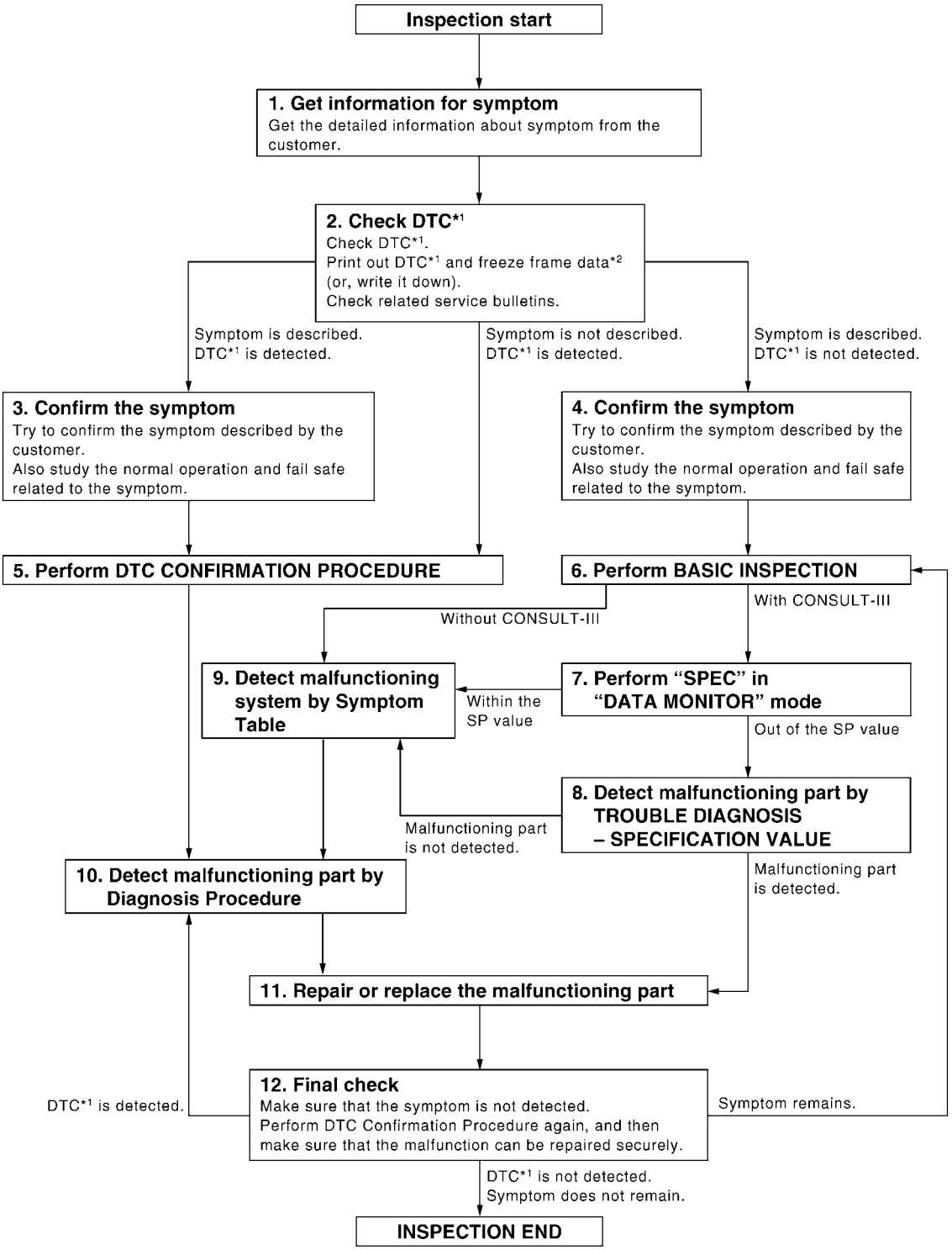
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001094030

OVERALL SEQUENCE



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

JMBIA0078GB

DETAILED FLOW

cardiagn.com

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-984, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III.)
- Erase DTC. (Refer to EC-1050, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-1243, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-1247, "Description" and EC-1239, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-1247, "Description" and EC-1239, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-1241, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to EC-1241, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-986, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 7.
NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to EC-1061, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-1061, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-1243, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to EC-1218, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to EC-1050, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to EC-1050, "Diagnosis Description".)

Diagnostic Work Sheet

INFOID:0000000001094031

DESCRIPTION

cardiagn.com

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms – ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms – ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms – ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms – ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather conditions – Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Weather conditions – Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

MTBL0017

cardiagn.com

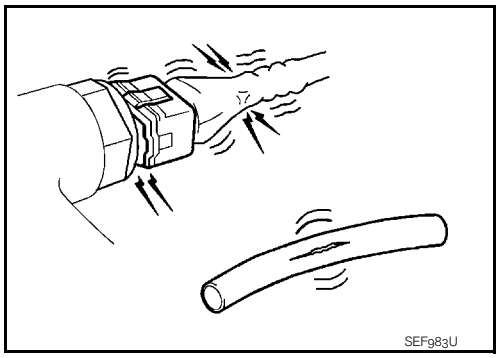
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

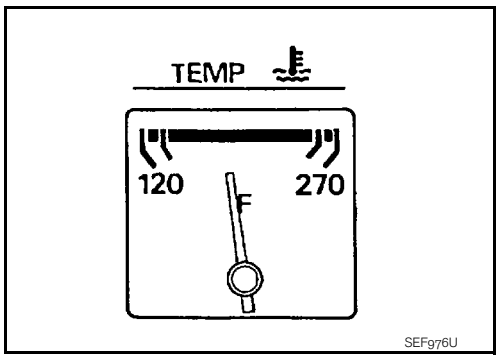
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001094032

1.INSPECTION START

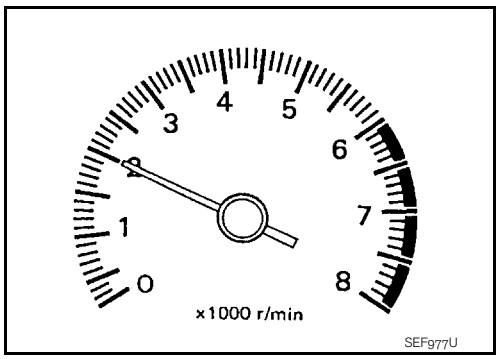
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.


SEF983U



SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or ECM [Diagnostic Test Mode II (self-diagnostic results)].



SEF977U

Is any DTC detected?

YES >> GO TO 2.
NO >> GO TO 3.

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

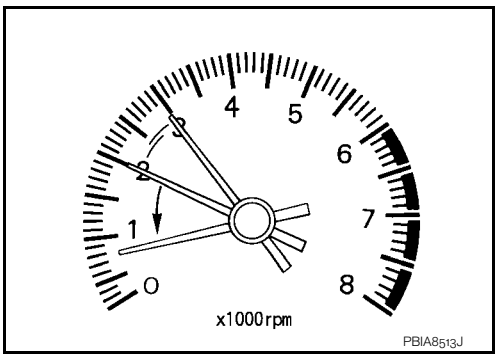
>> GO TO 3.

3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

cardiagn.com

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-990, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-981, "Idle Speed".



Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-991, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-990, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-981, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1107, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1103, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

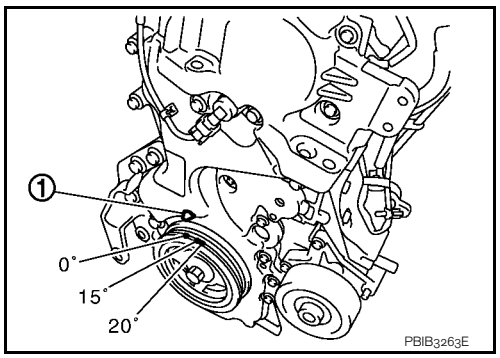
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

cardiagn.com

2. Check ignition timing with a timing light.
For procedure, refer to EC-990, "IGNITION TIMING : Special Repair Requirement"
For specification, refer to EC-981, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-991, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

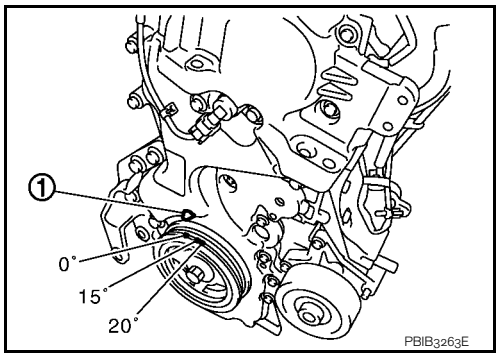
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-990, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-981, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-990, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-981, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-163, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

cardiagn.com

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1107, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1103, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001094033

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001094034

1. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

Refer to EC-990, "VIN REGISTRATION : Special Repair Requirement".

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-991, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001094035

This describes how to check the idle speed. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

IDLE SPEED : Special Repair Requirement

INFOID:0000000001094036

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

Without CONSULT-III
Check idle speed by installing the pulse type tachometer clamp on suitable high-tension wire whitch installed between No.4 ignition coil and No.4 Spark plug.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001094037

This describes how to check the ignition timing. For the actual procedure, follow the instructions in “BASIC INSPECTION”.

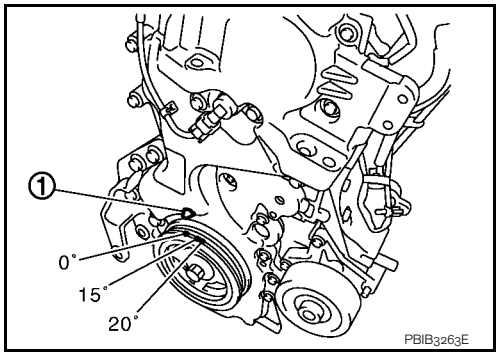
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001094038

1.CHECK IGNITION TIMING

1. Attach timing light to the ignition coil No.4 harness.
2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

VIN REGISTRATION

VIN REGISTRATION : Description

INFOID:0000000001094039

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:0000000001094040

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-22, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT-III
1. Turn ignition switch ON and engine stopped.
2. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.

cardiagn.com

3. Follow the instruction of CONSULT-III display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001094041

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001094042

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001094043

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001094044

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001094045

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001094046

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- PNP switch: ON
- Electric load switch: OFF

cardiagn.com

(Air conditioner, headlamp, rear window defogger)
On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- CVT models
- With CONSULT-III: Drive vehicle until “ATF TENP SEN” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-991, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

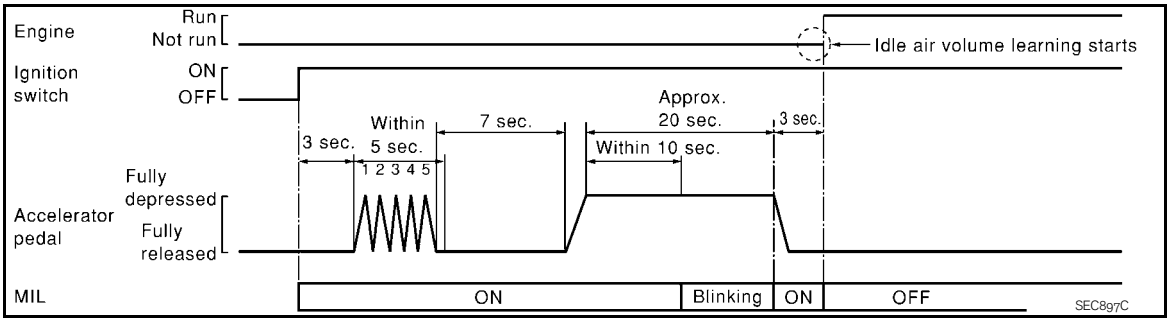
YES >> GO TO 4.
NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-991, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



cardiagn.com

>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-981, "Idle Speed" and EC-981, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following
- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-1061, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001094047

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:0000000001094048

1. START

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear mixture ratio self-learning value by touching “CLEAR”.

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "DTC Index".
7. Make sure that DTC P0000 is displayed.

>> END

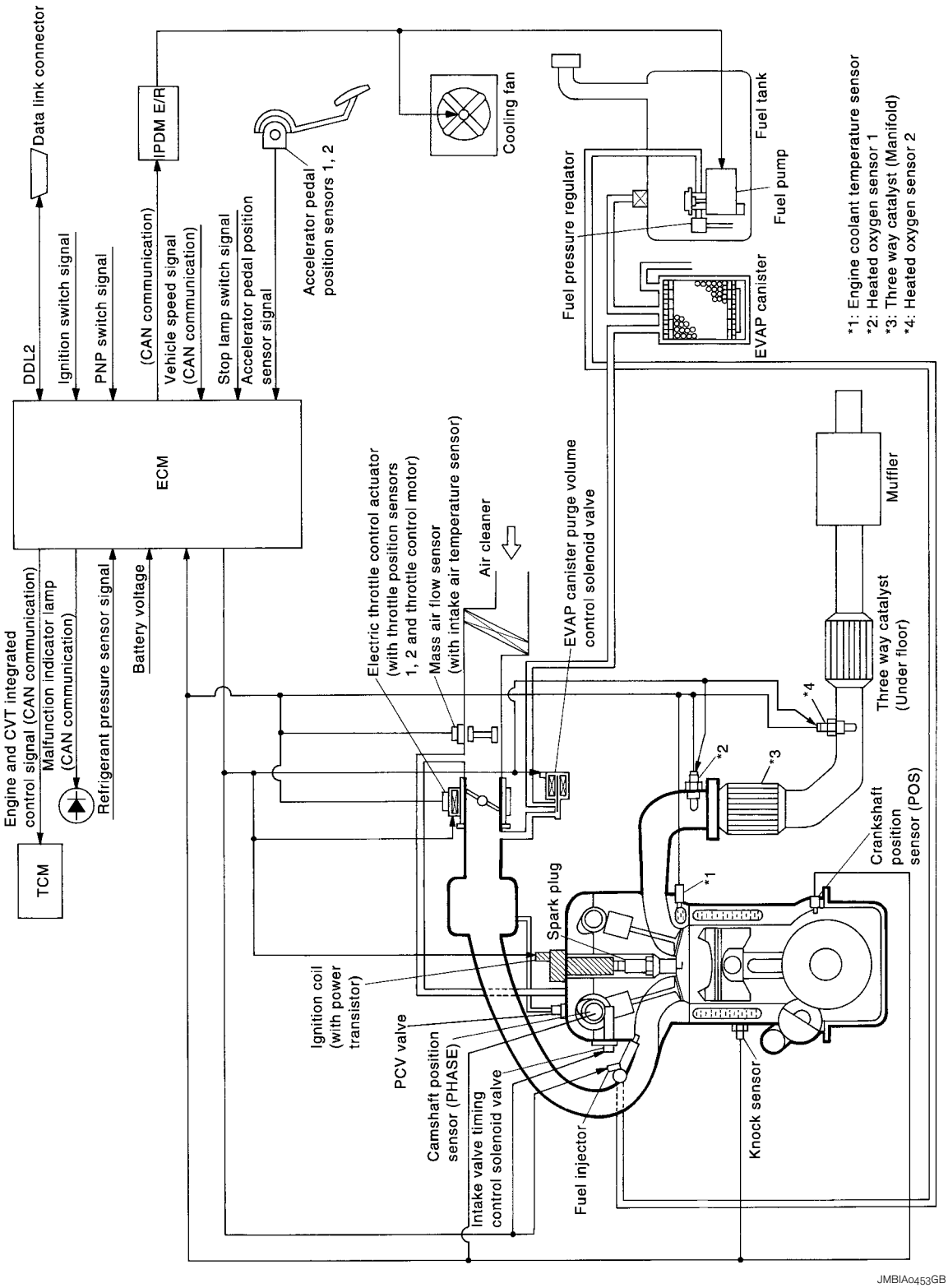
cardiagn.com

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001094049



JMBIA0453GB

System Description

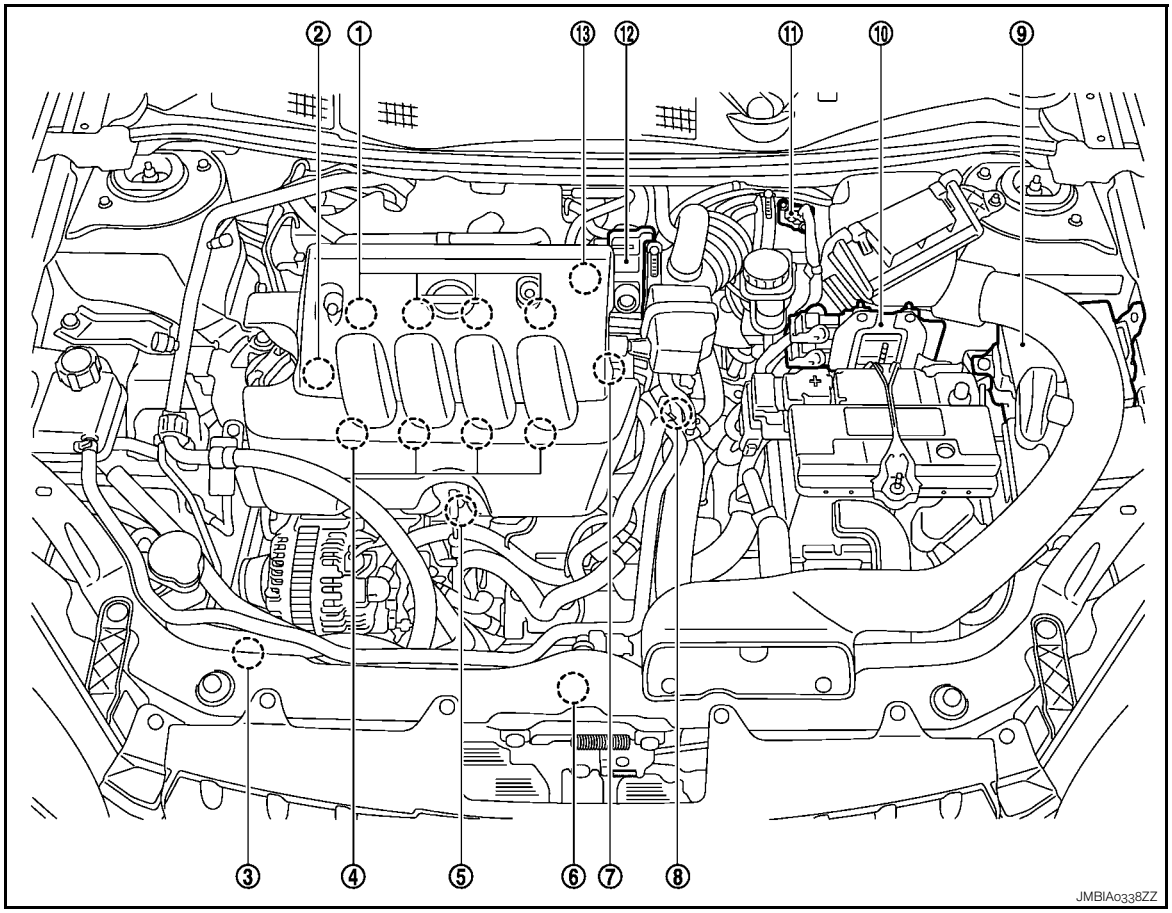
INFOID:0000000001094050

cardiagn.com

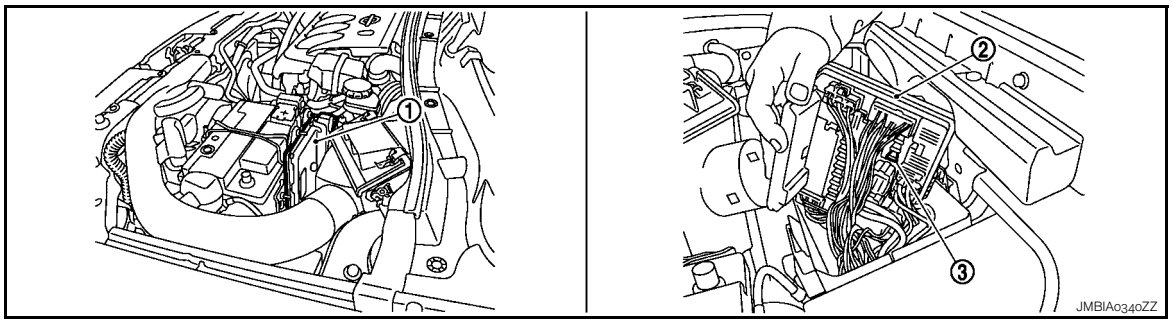
ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:0000000001094051

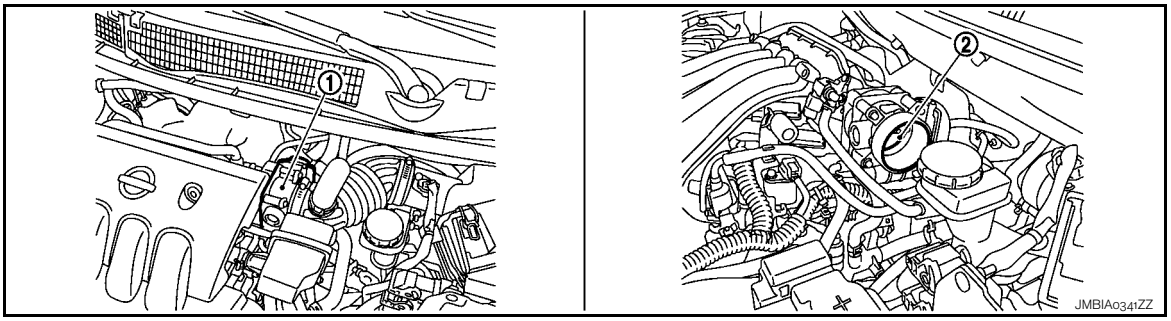


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

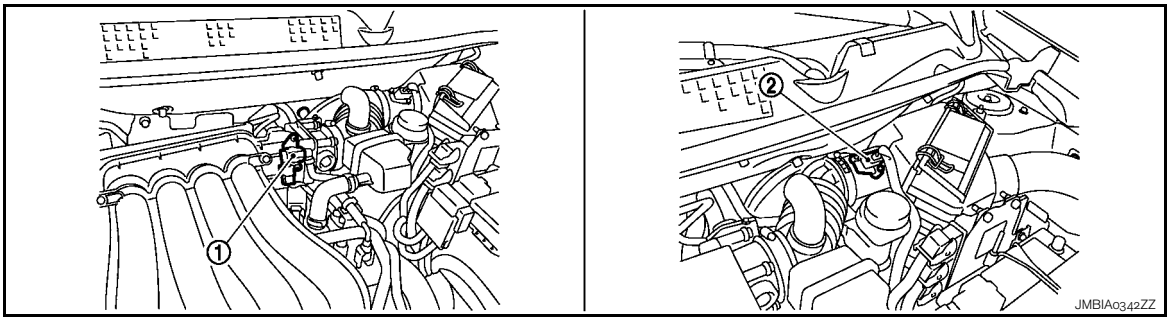


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

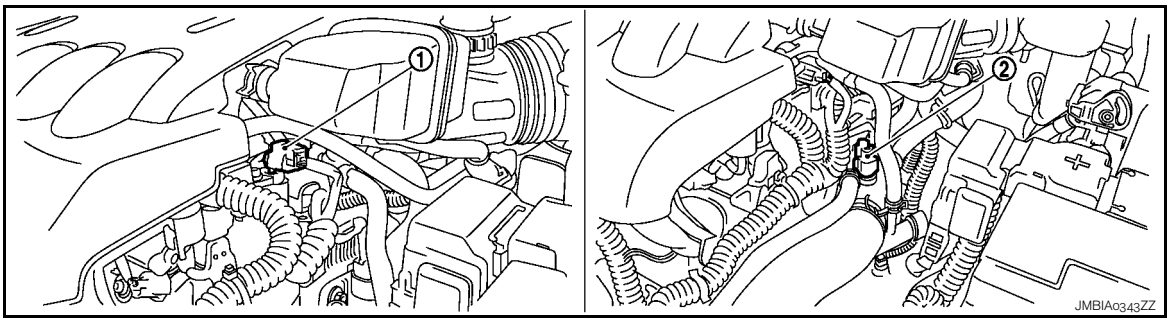
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

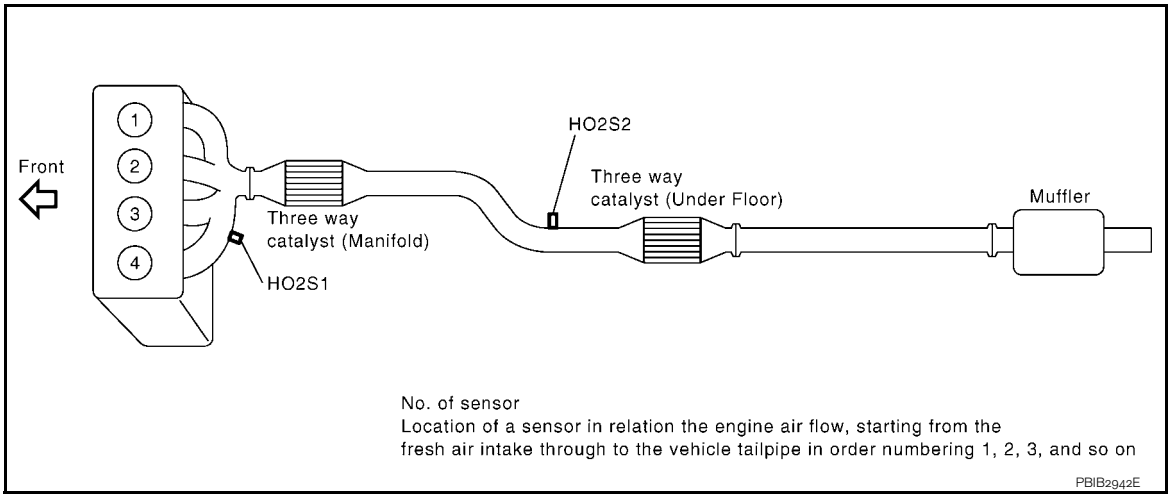


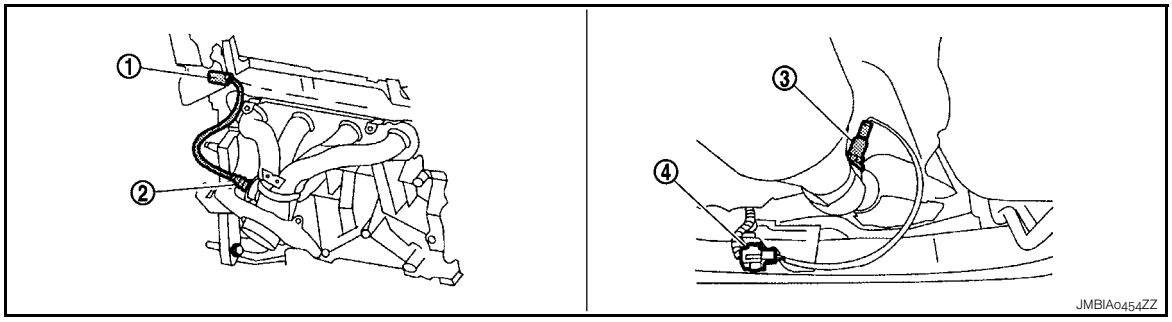
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



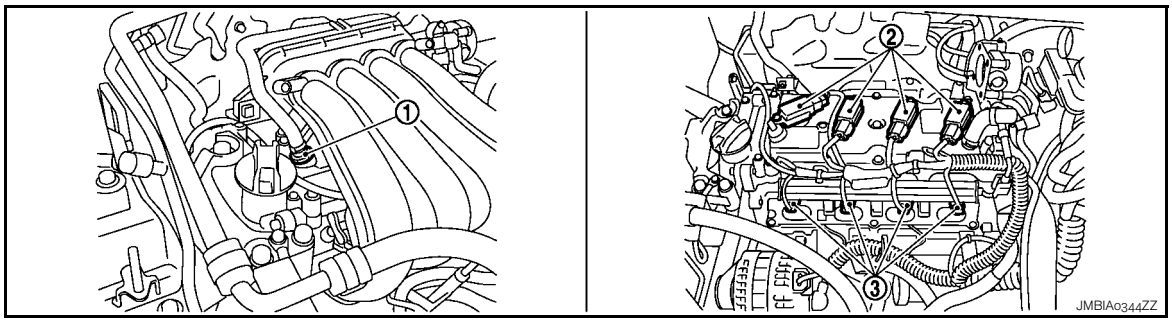
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

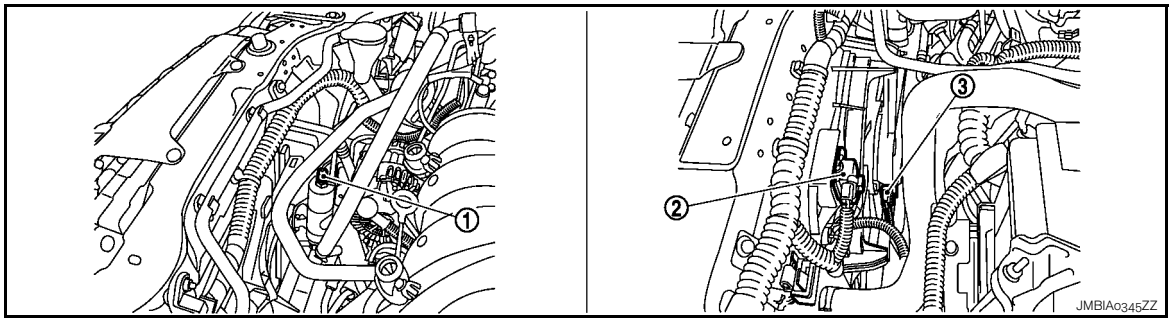




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

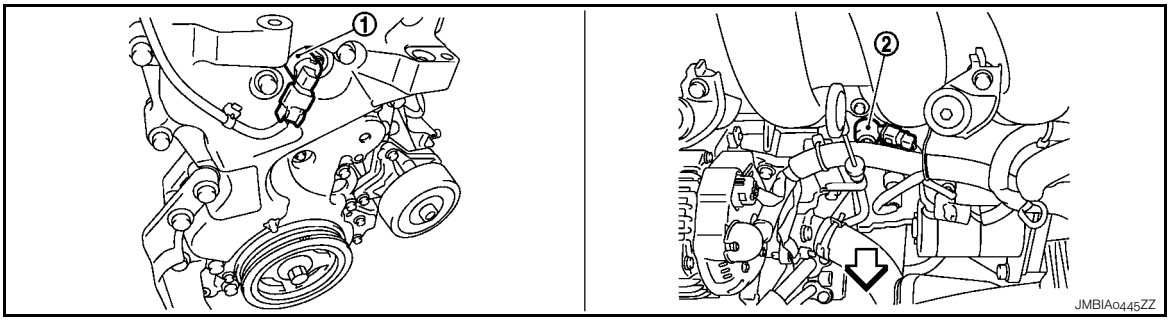


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

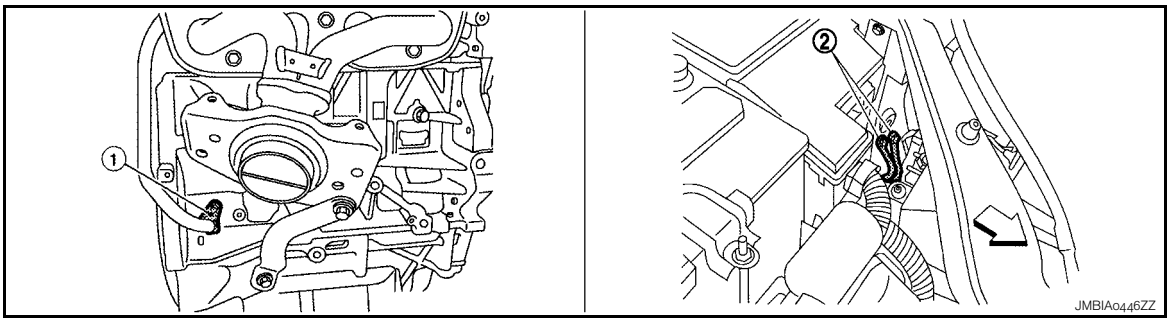


cardiagn.com

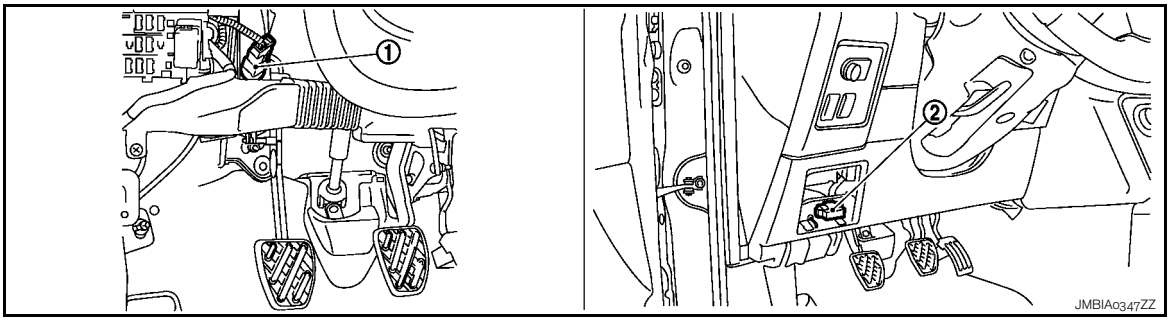
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



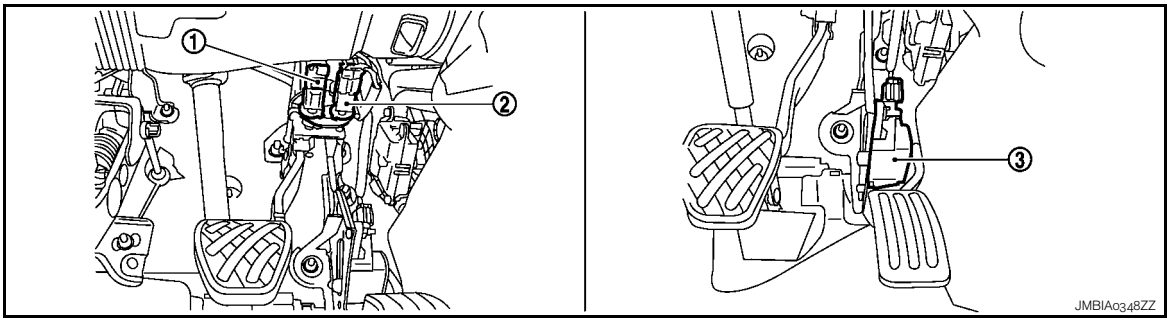
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

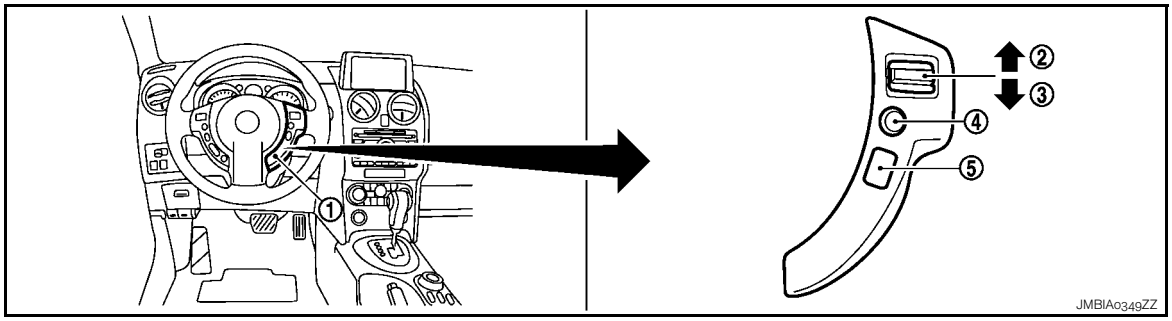


1. ASCD clutch switch 2. Data link connector

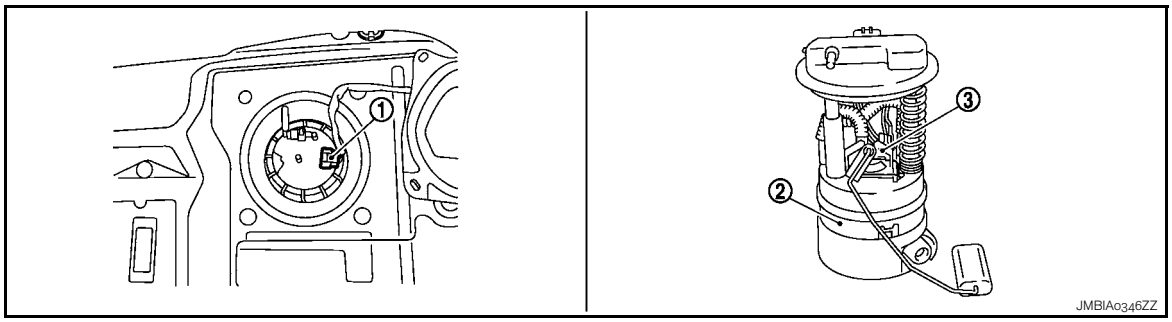


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094052

Component	Reference
Accelerator pedal position sensor	EC-899, "Description"
ASCD brake switch	EC-883, "Description"
ASCD steering switch	EC-880, "Description"
ASCD vehicle speed sensor	EC-890, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Cooling fan motor	EC-685, "System Diagram"
Electric throttle control actuator	EC-832, "Description"
Engine coolant temperature sensor	EC-754, "Description"
EVAP canister purge volume control solenoid valve	EC-822, "Description"
Fuel injector	EC-923, "Description"
Fuel pump	EC-926, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Heated oxygen sensor 1 heater	EC-775, "Description"
Heated oxygen sensor 2	EC-778, "Description"
Heated oxygen sensor 2 heater	EC-788, "Description"

cardiagn.com

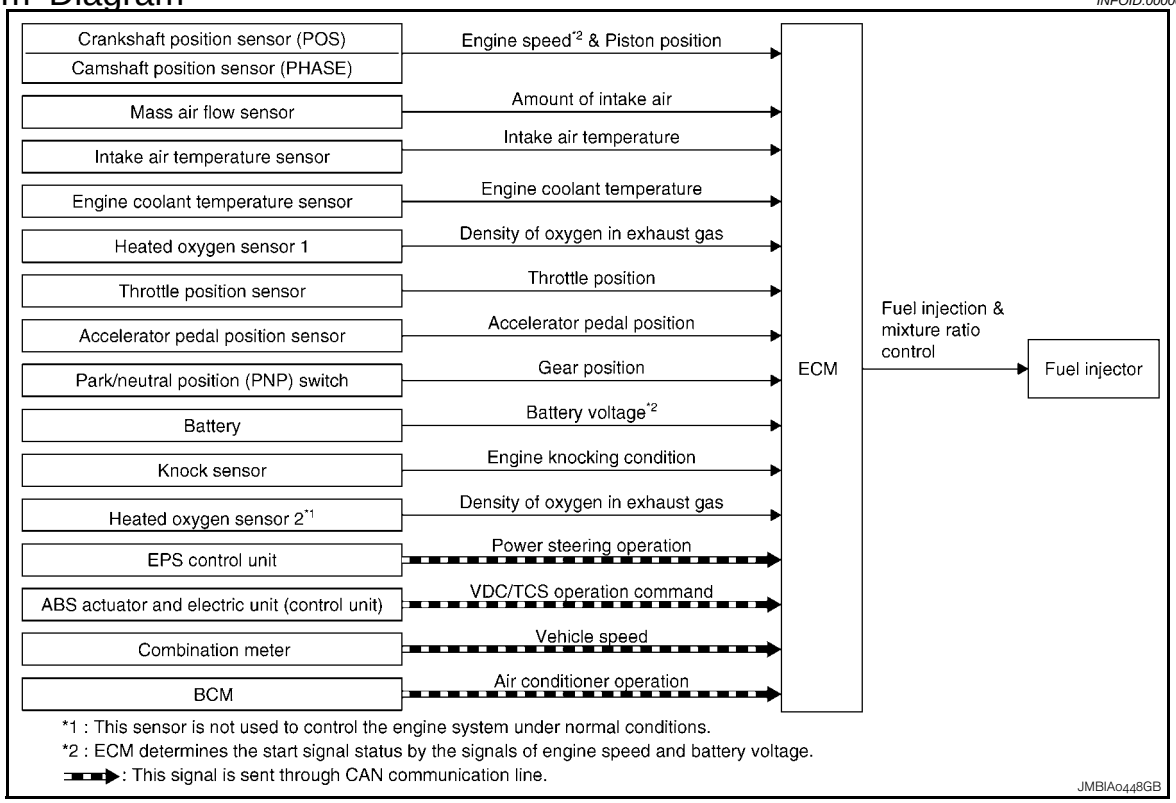
Component	Reference
Ignition signal	EC-929, "Description"
Intake air temperature sensor	EC-1206, "Description"
Intake valve timing control solenoid valve	EC-1044, "System Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
PCV valve	EC-935, "Description"
Refrigerant pressure sensor	EC-936, "Description"
Stop lamp switch	EC-896, "Description"
Throttle control motor	EC-841, "Description"
Throttle control motor relay	EC-838, "Description"
Throttle position sensor	EC-874, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001094053



System Description

INFOID:0000000001094054

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
ABS actuator and electric unit (control unit)*2	ABS operation command		
Air conditioner switch*2	Air conditioner operation		
Combination meter*2	Vehicle speed		

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

cardiagn.com

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-760, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

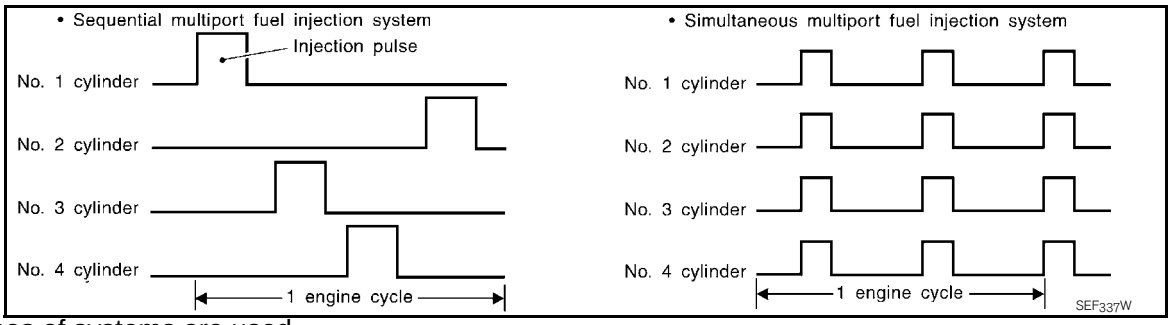
MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

cardiagn.com

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

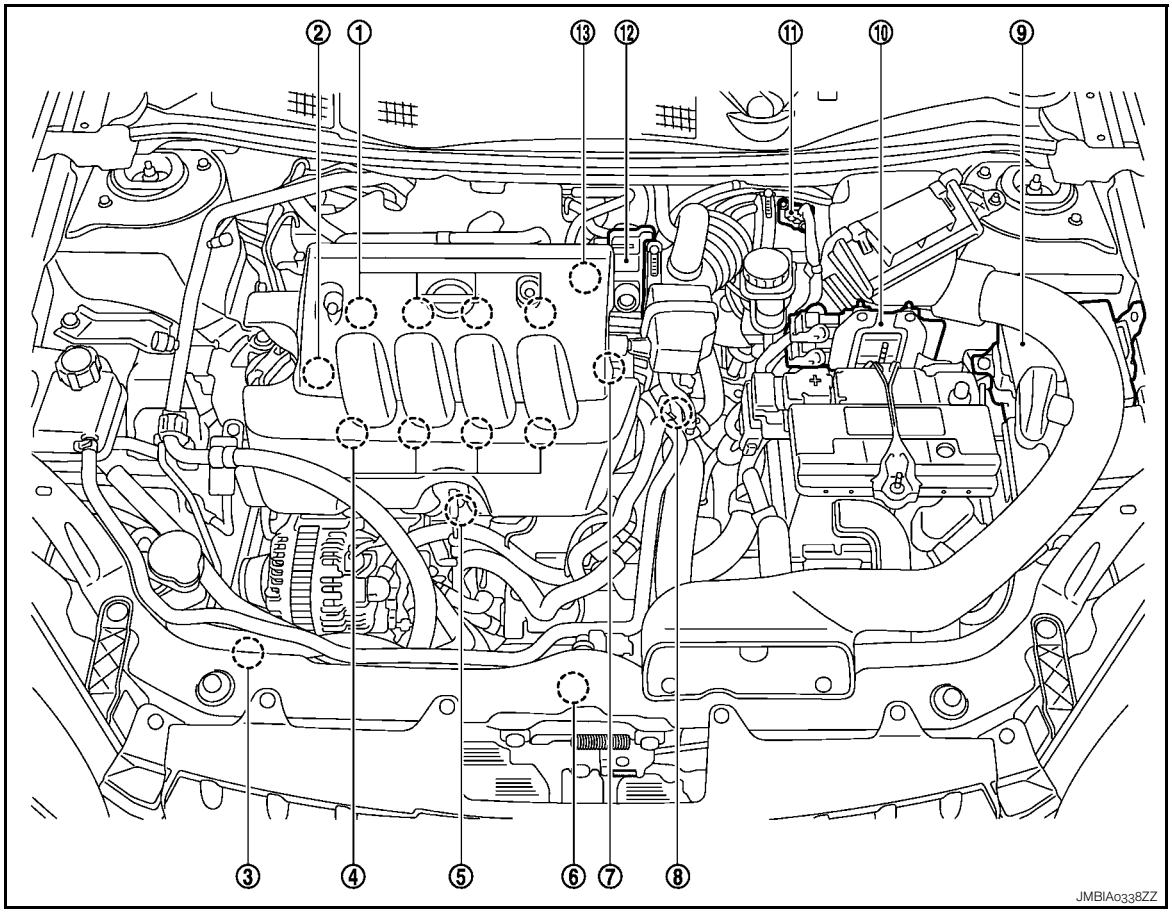
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

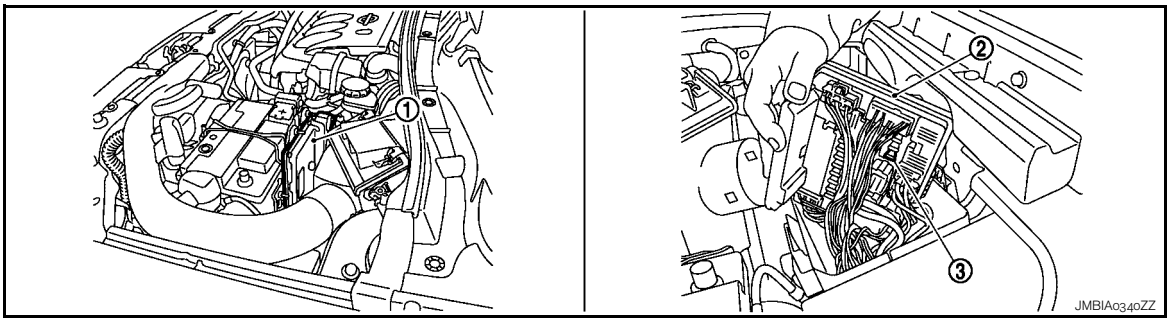
Component Parts Location

INFOID:0000000001115783



cardiagn.com

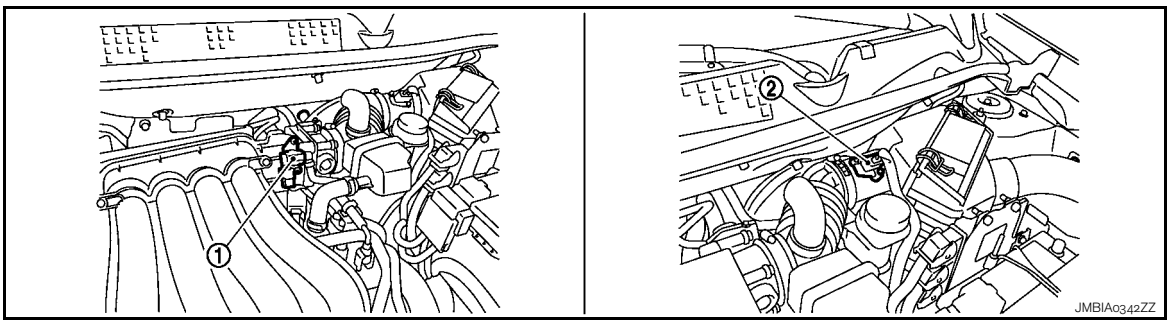
1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve



1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

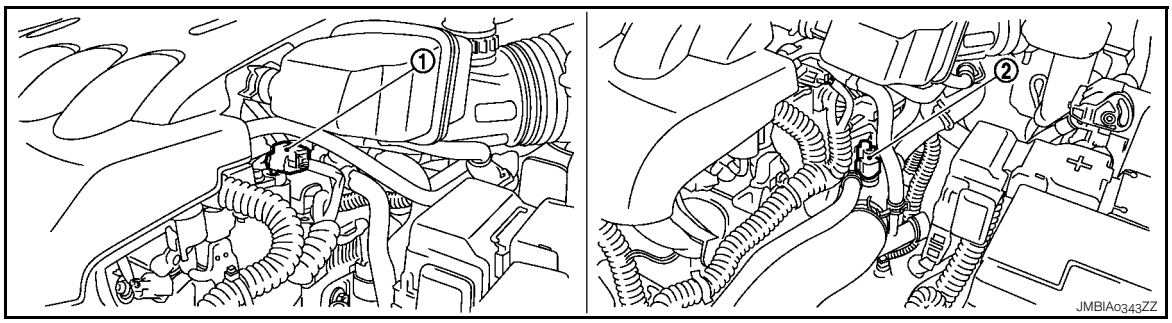


1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

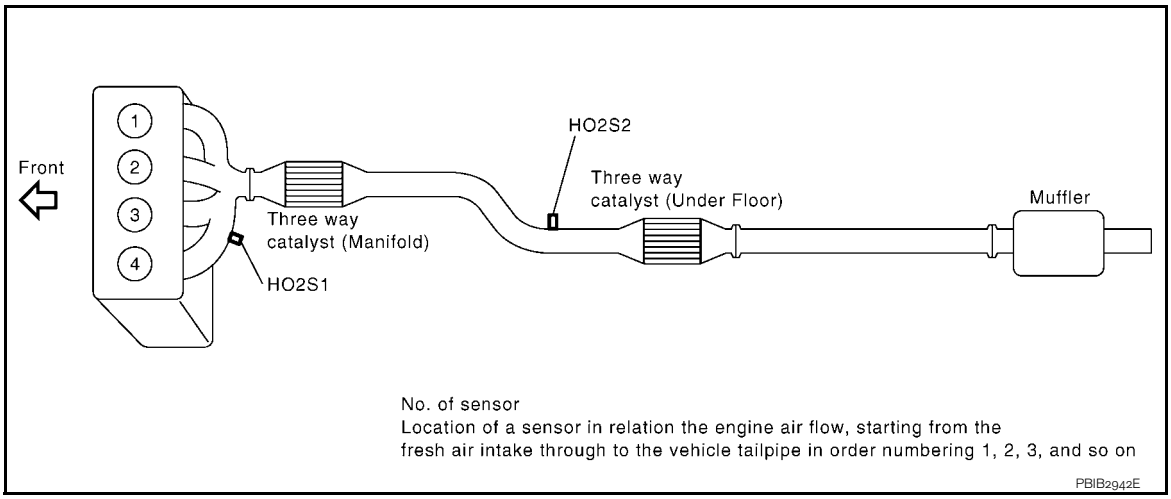


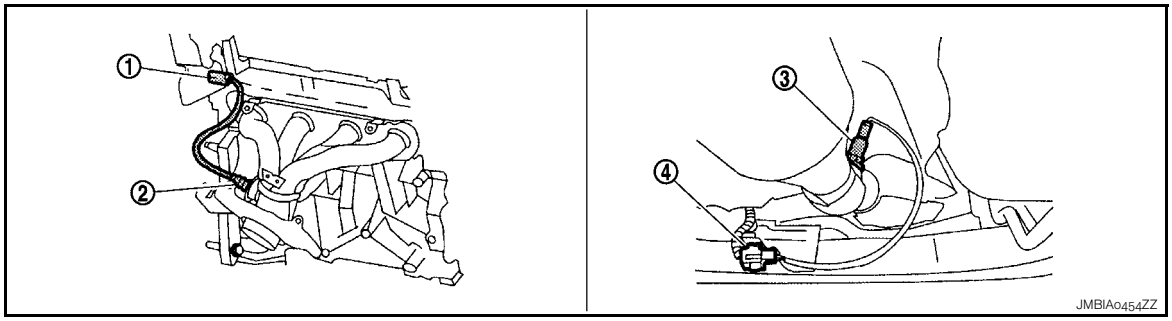
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)

cardiagn.com

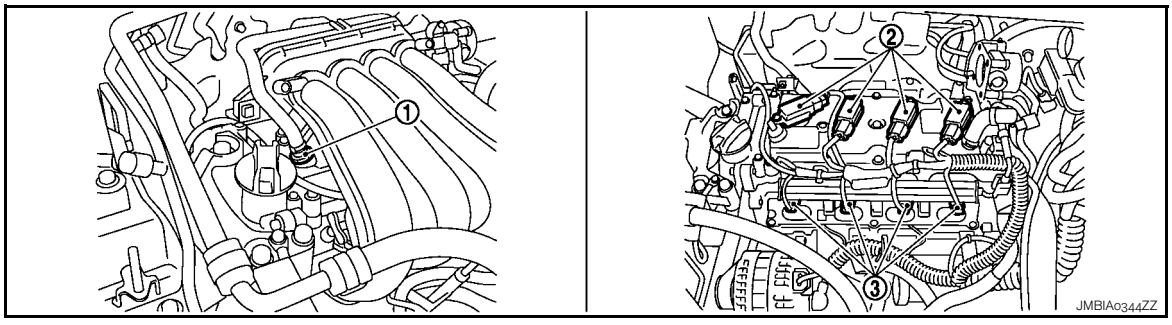


1. Camshaft position sensor
2. Engine coolant temperature sensor



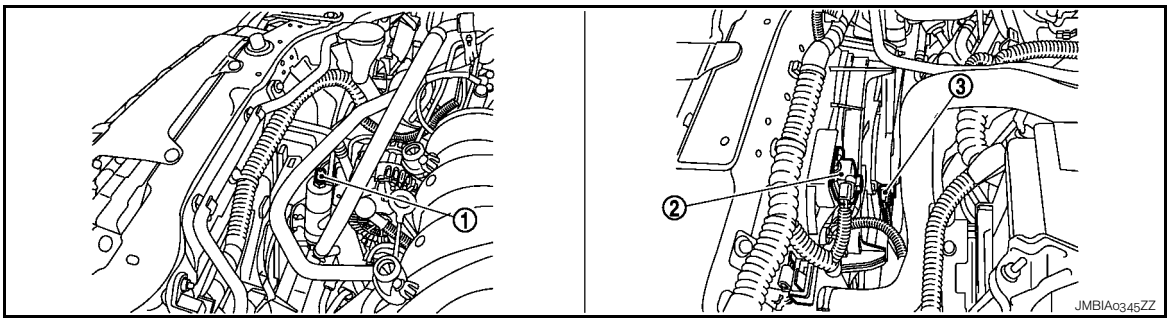


1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

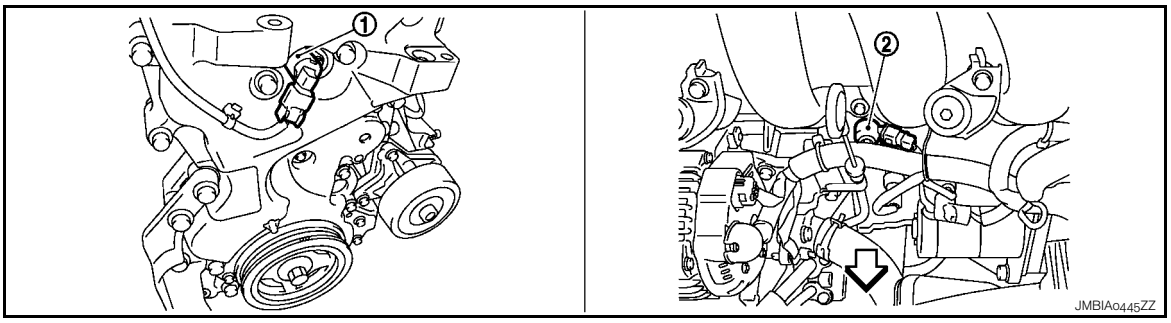


cardiagn.com

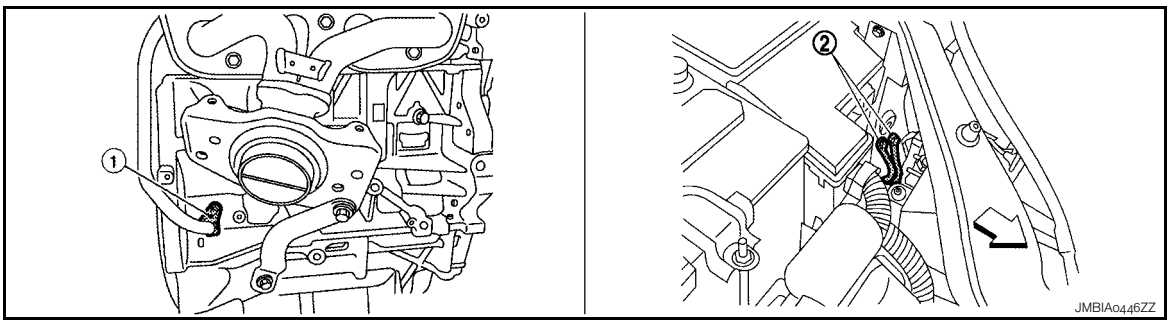
1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection



1. Refrigerant pressure sensor
2. Resister
3. Cooling fan motor

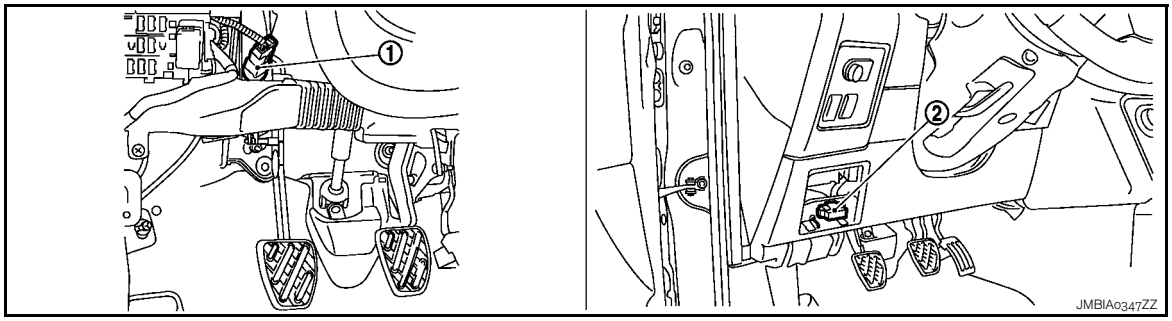


1. Intake valve timing control solenoid valve
2. Knock sensor

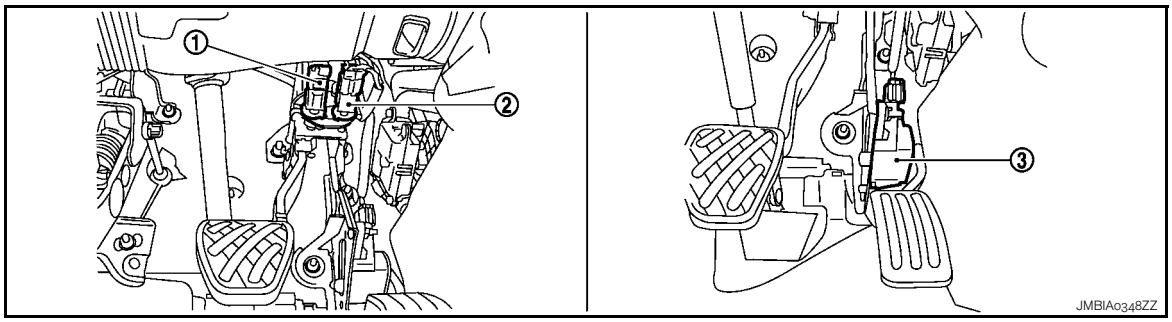


1. Crankshaft position sensor (POS)
2. Ground

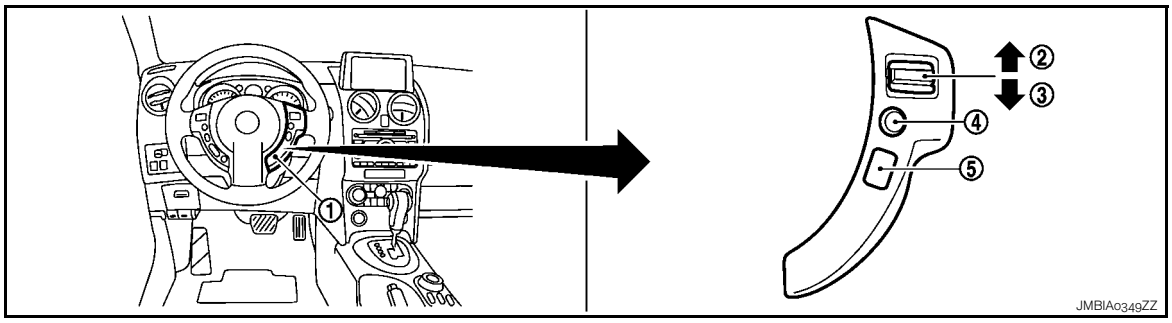
cardiagn.com



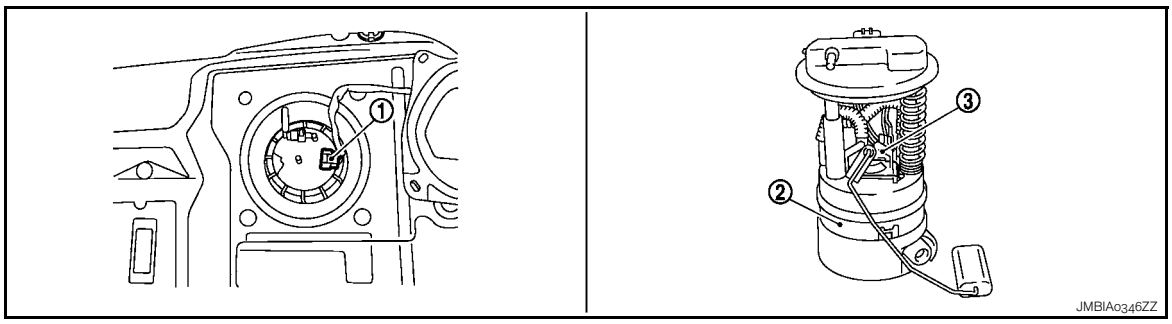
1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

cardiagn.com

Component Description

INFOID:0000000001094056

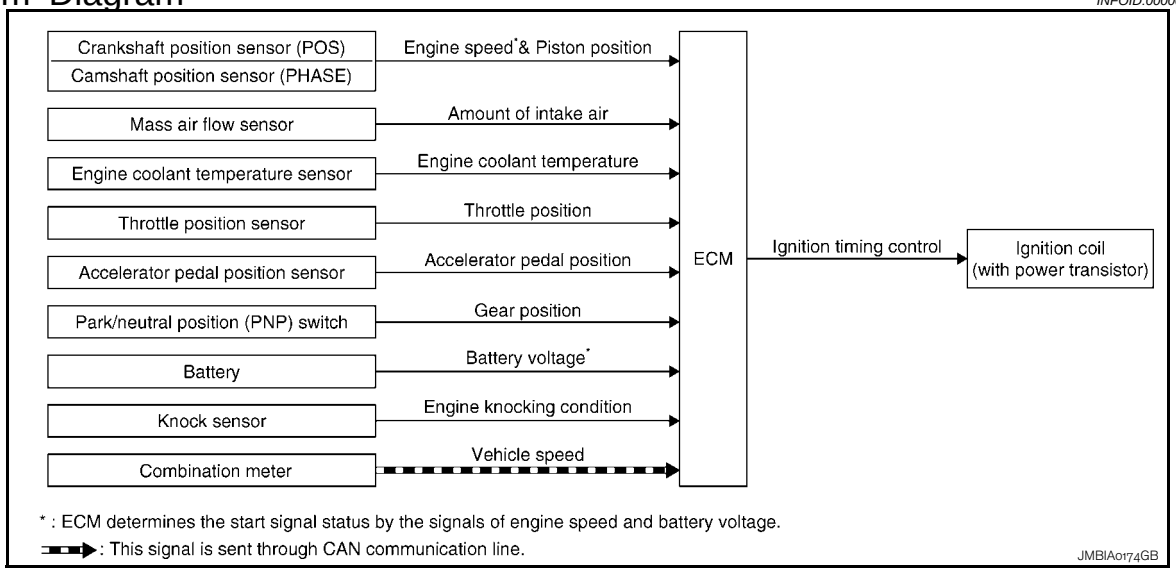
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Fuel injector	EC-923, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Heated oxygen sensor 2	EC-778, "Description"
Intake air temperature sensor	EC-751, "Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001094057



System Description

INFOID:0000000001094058

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking condition		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

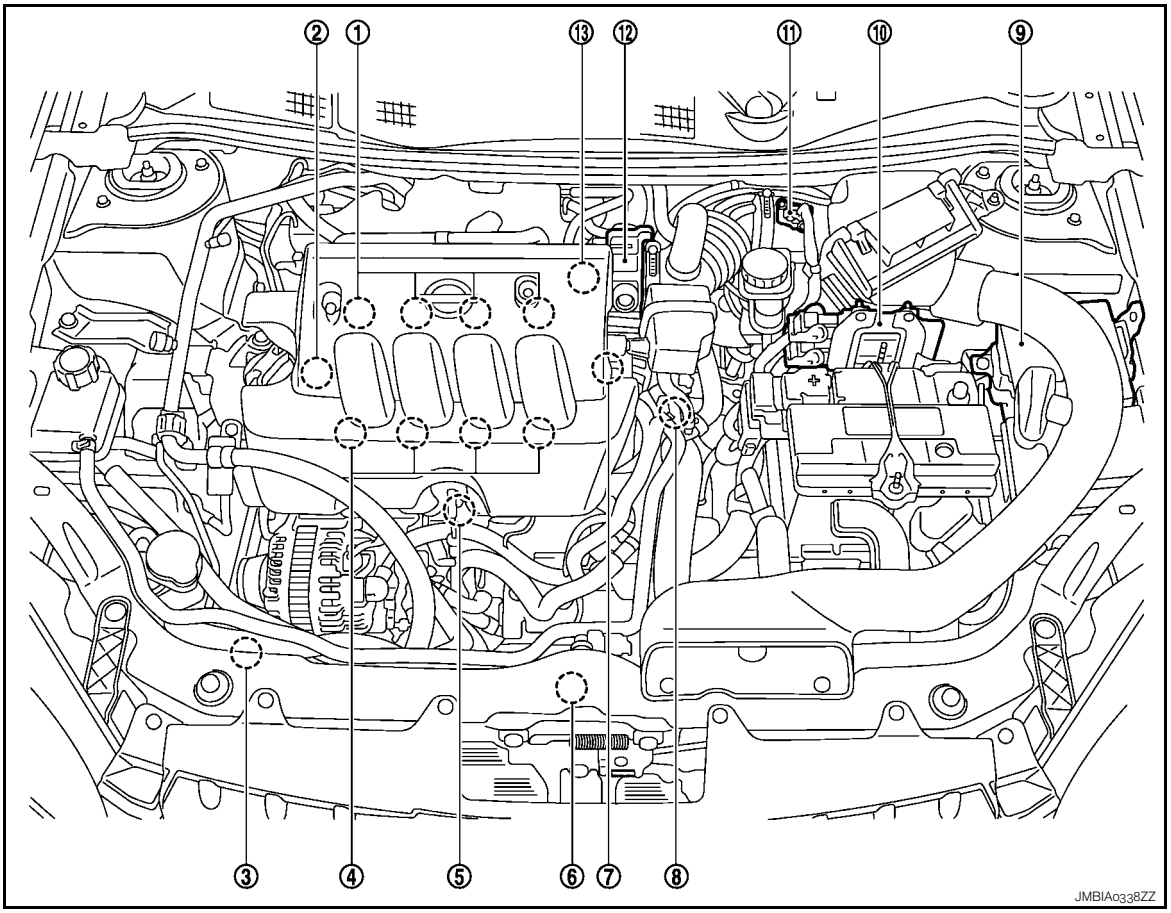
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

cardiagn.com

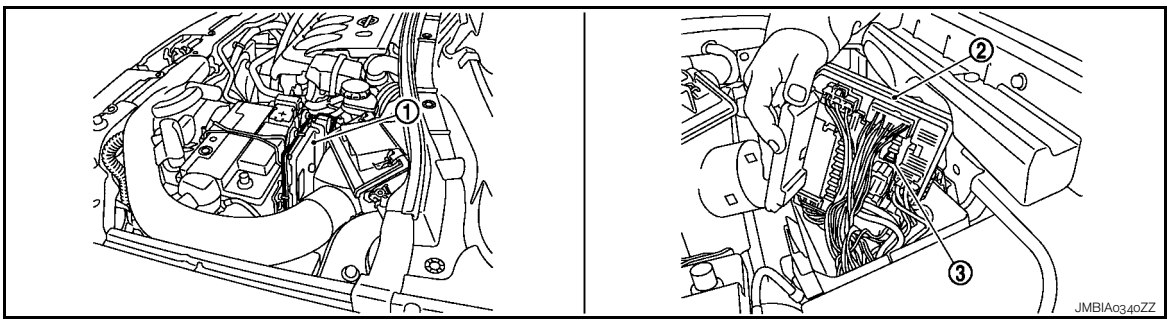
operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:0000000001115784

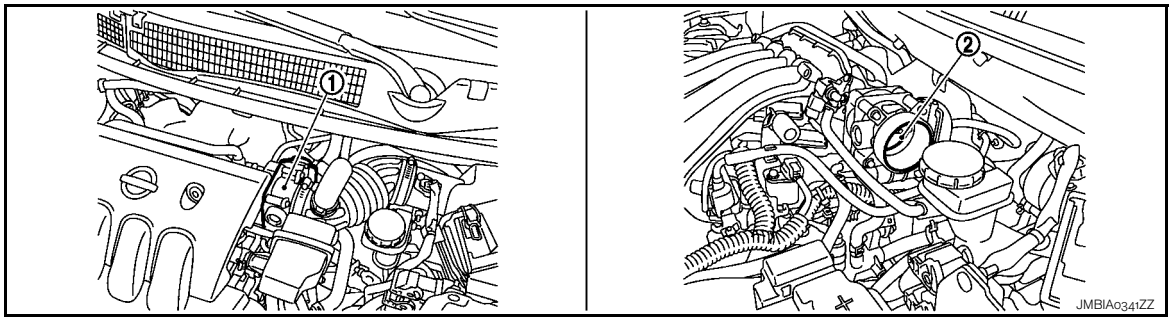


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

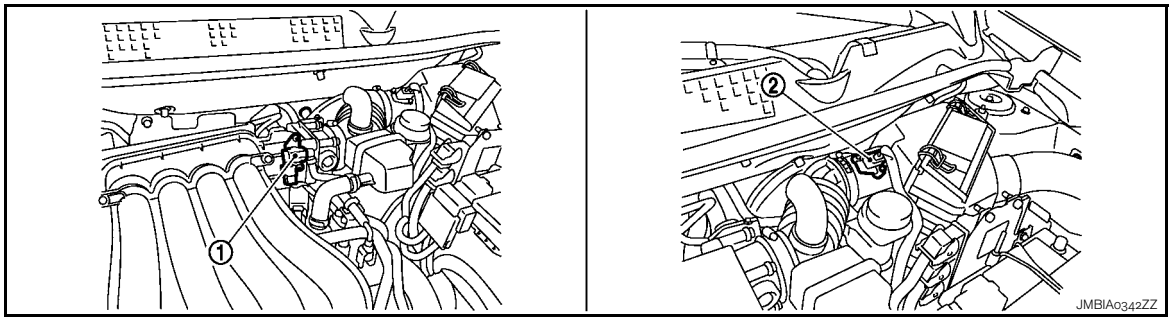


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

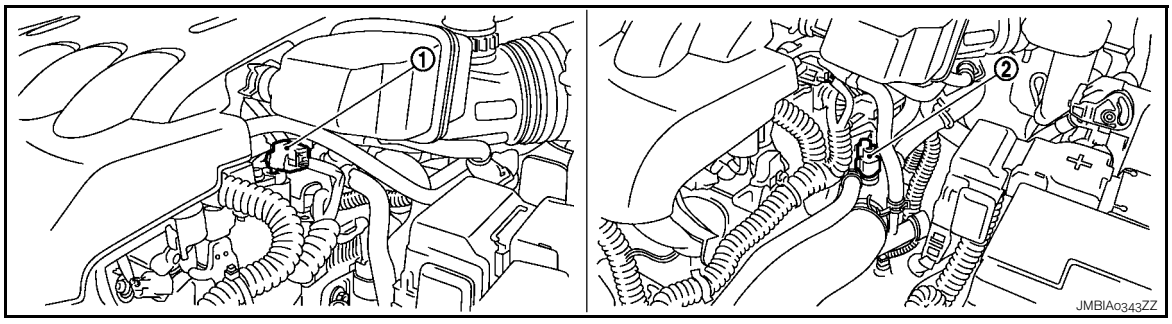
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

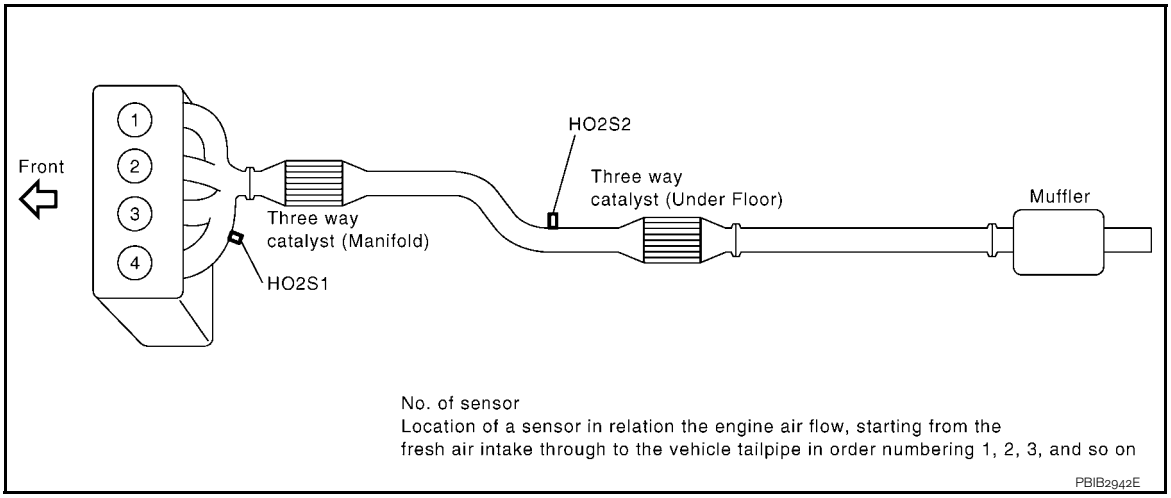


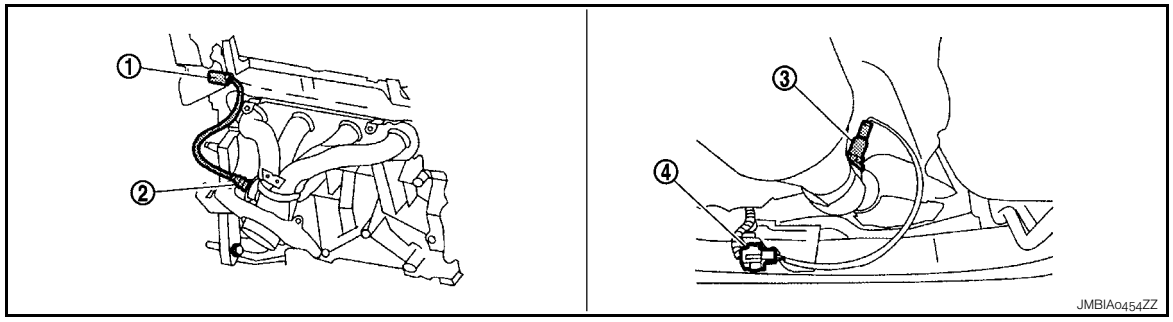
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



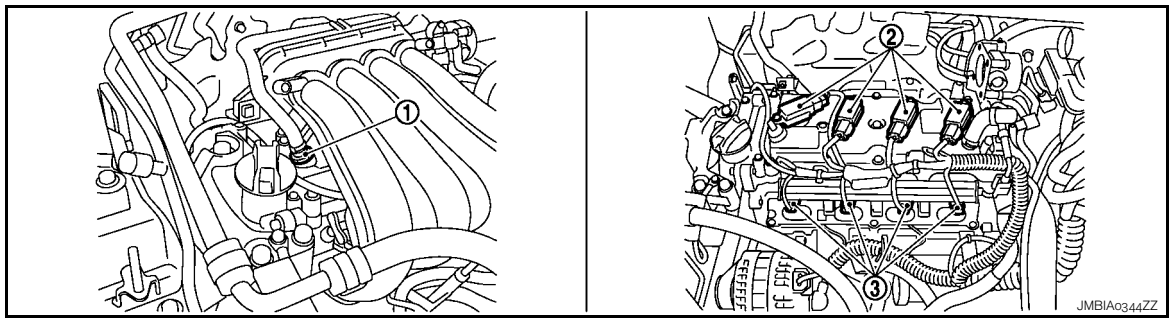
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

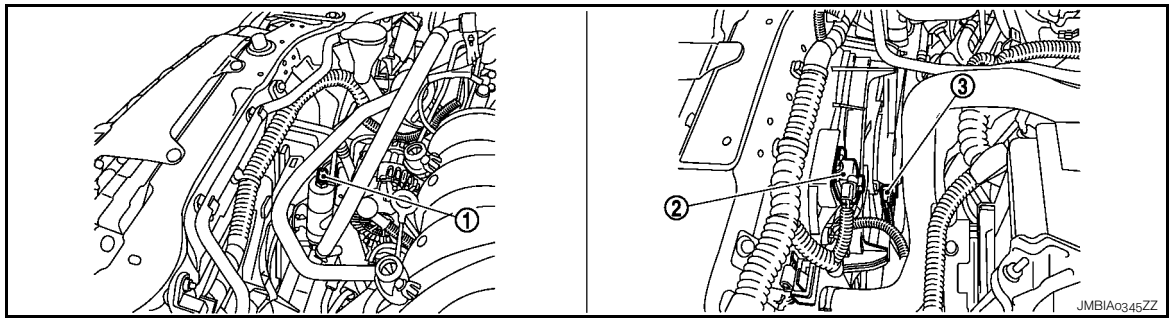




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

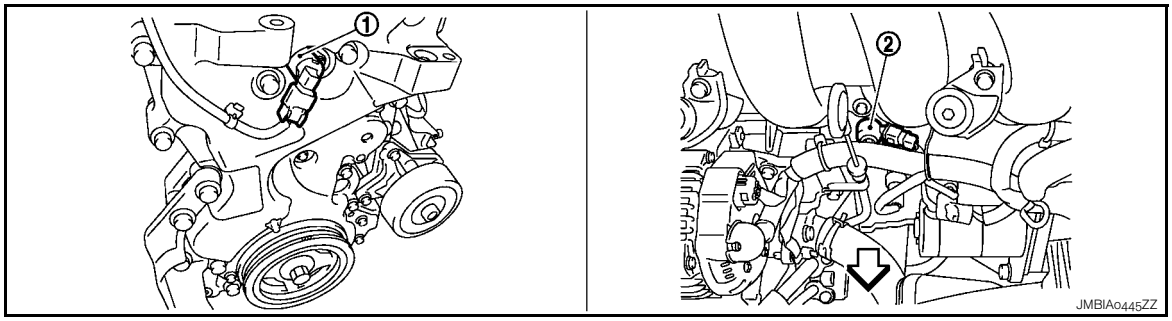


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

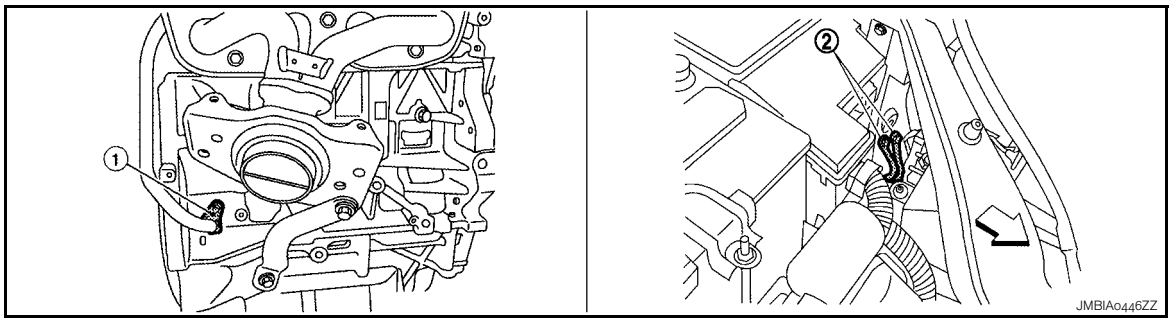


cardiagn.com

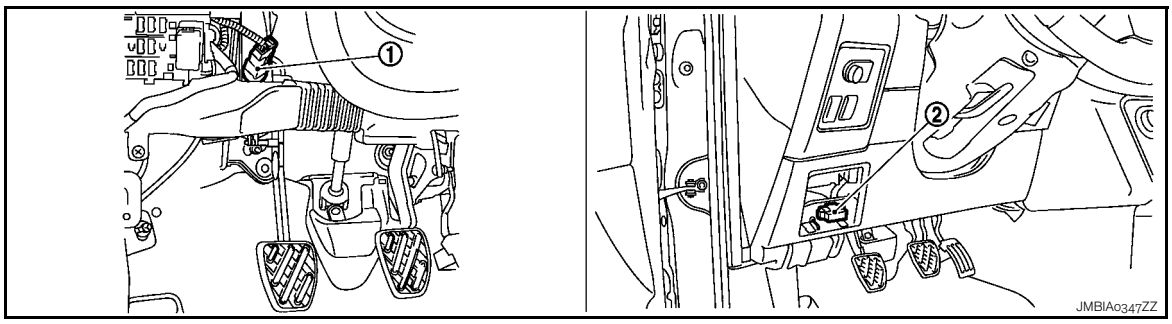
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



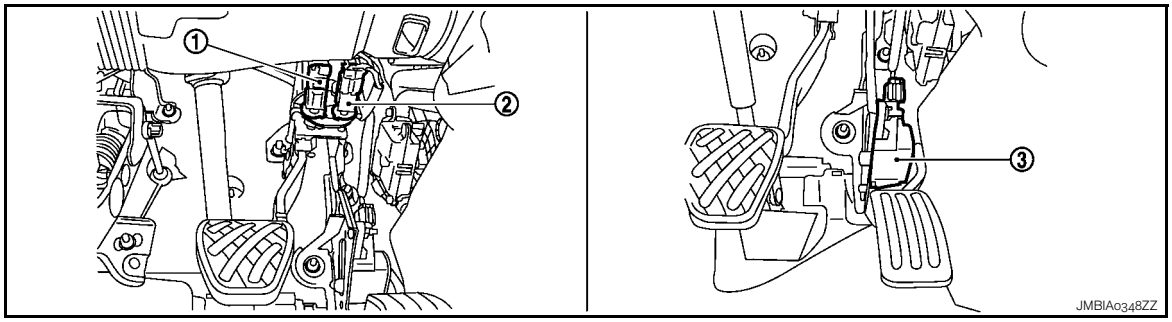
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

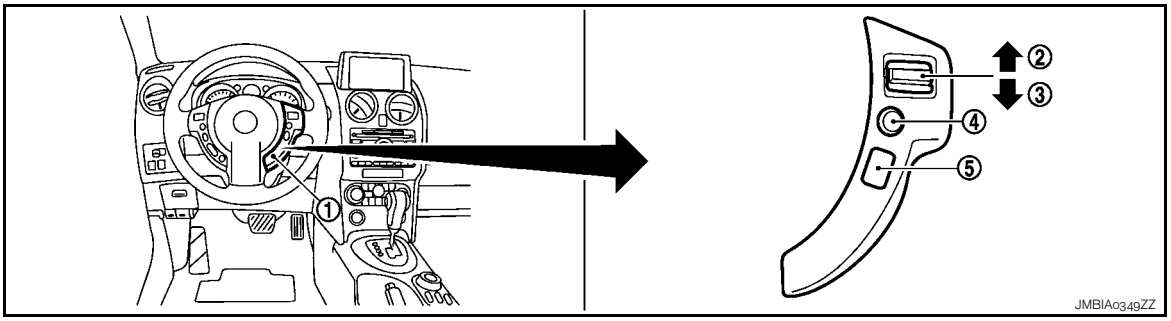


1. ASCD clutch switch 2. Data link connector

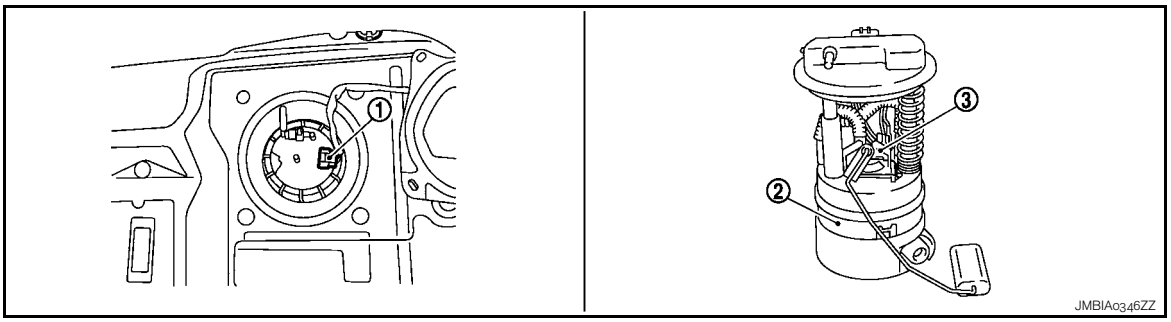


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094060

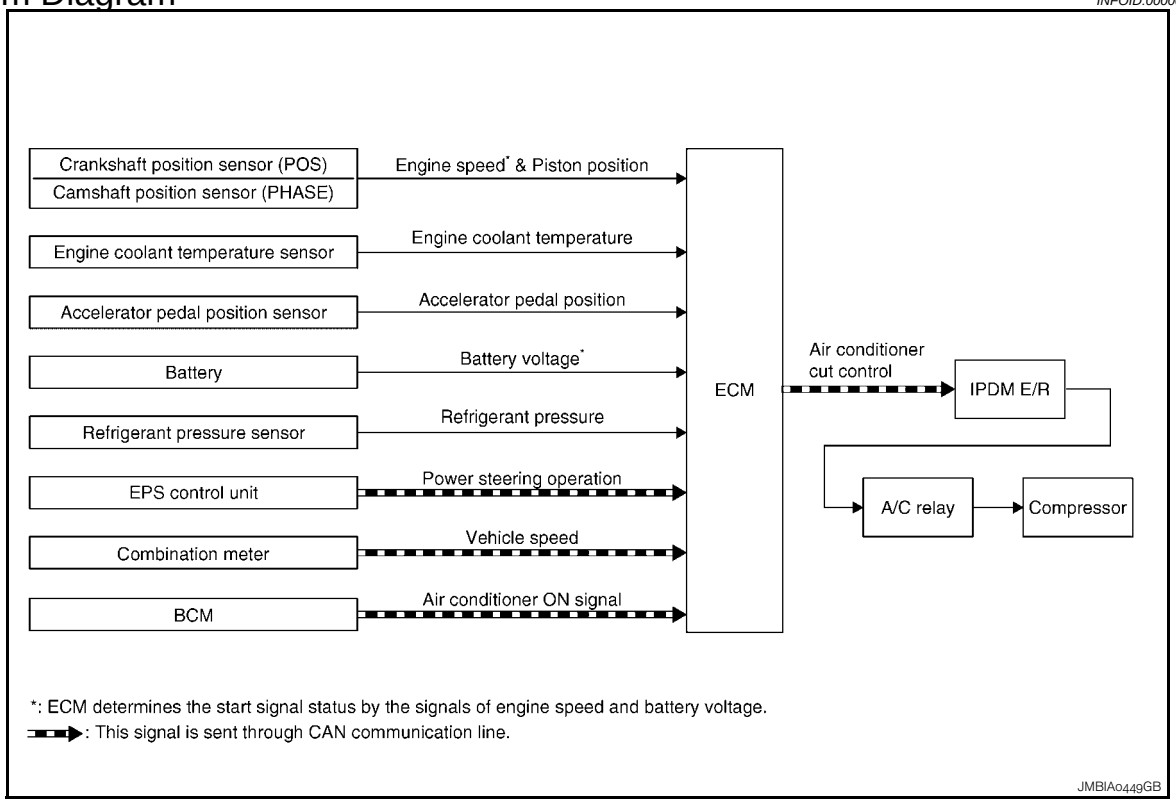
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Ignition signal	EC-929, "Description"
Knock sensor	EC-807, "Description"
Mass air flow sensor	EC-746, "Description"
Park/neutral position (PNP) switch	EC-892, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001094061



System Description

INFOID:0000000001094062

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

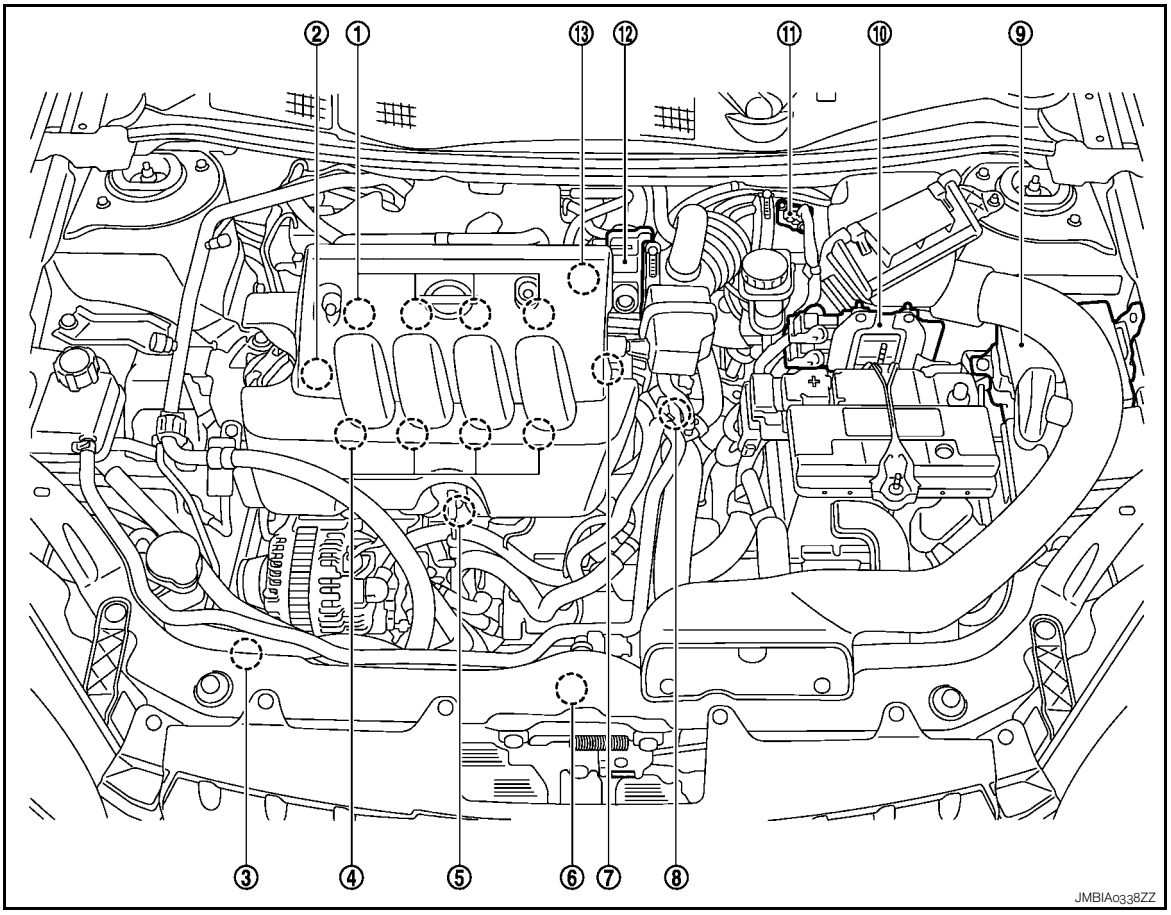
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

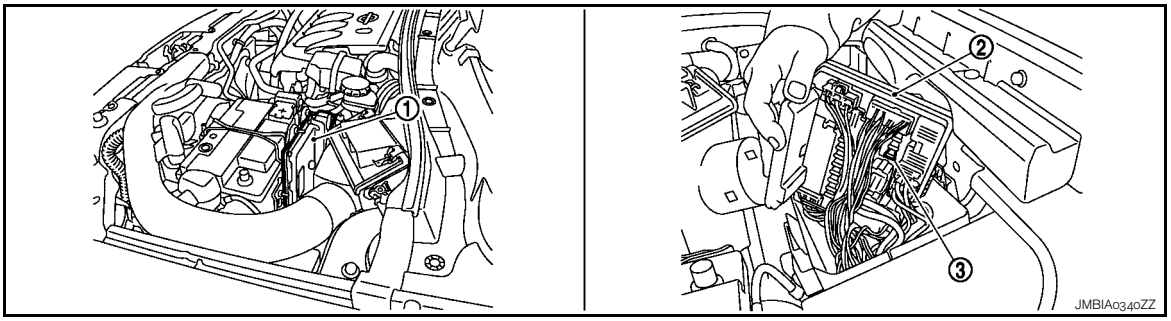
cardiagn.com

Component Parts Location

INFOID:0000000001115785

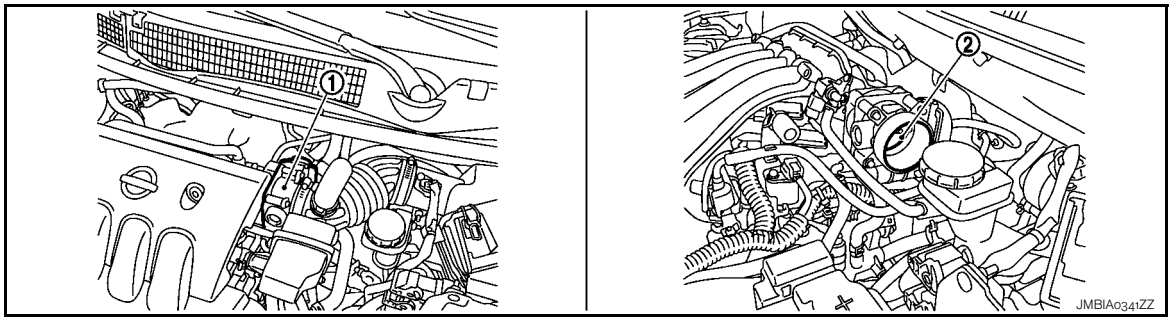


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

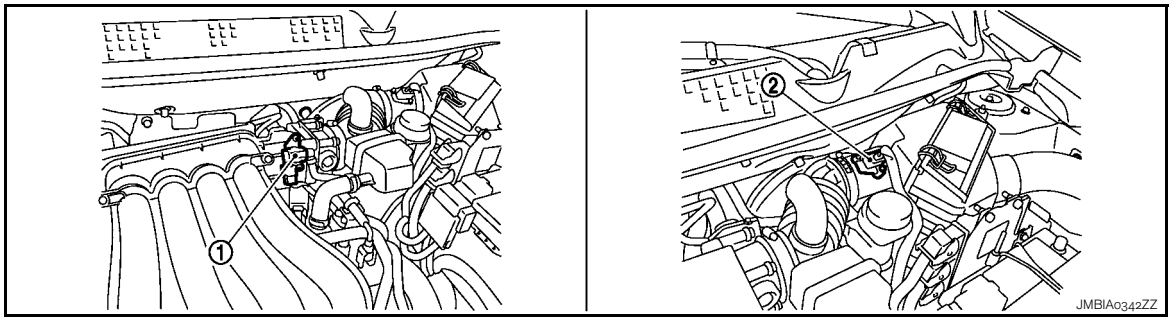


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

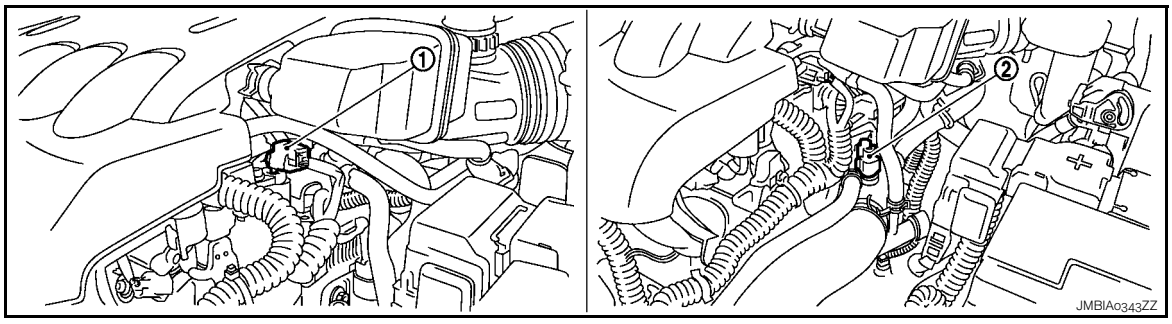
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

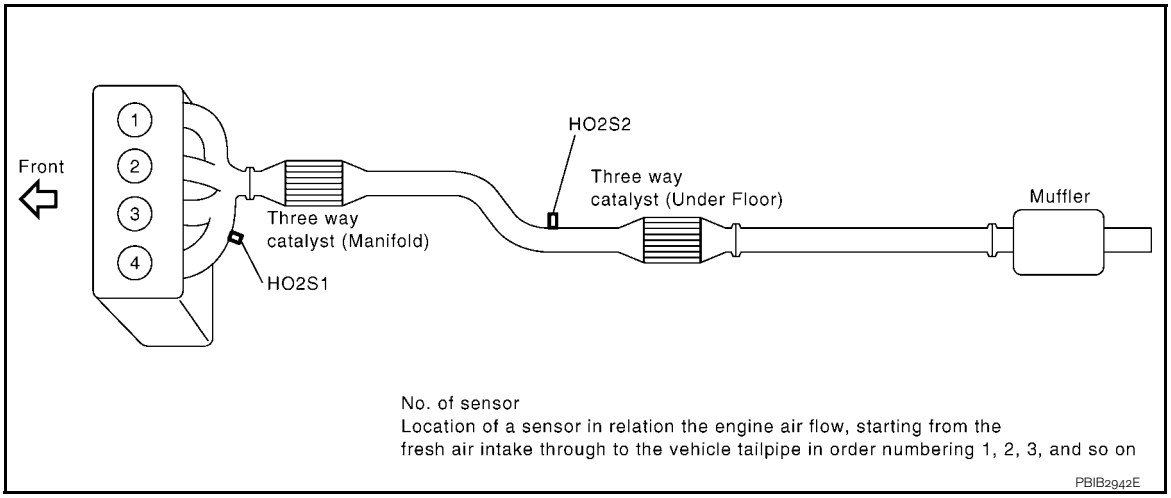


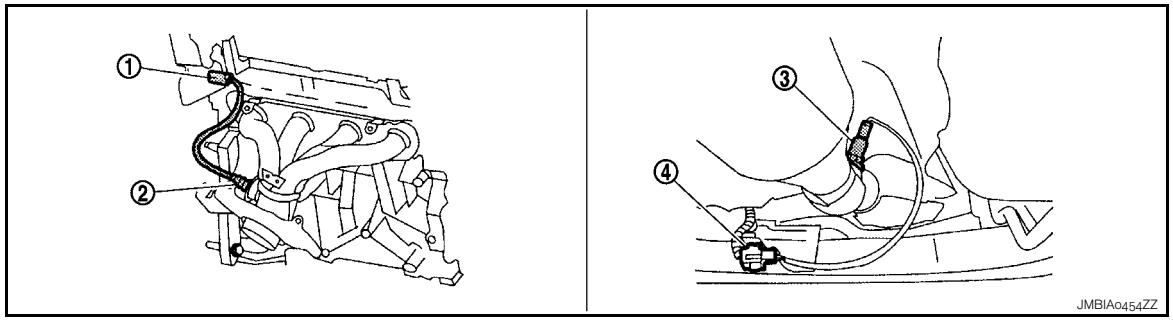
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



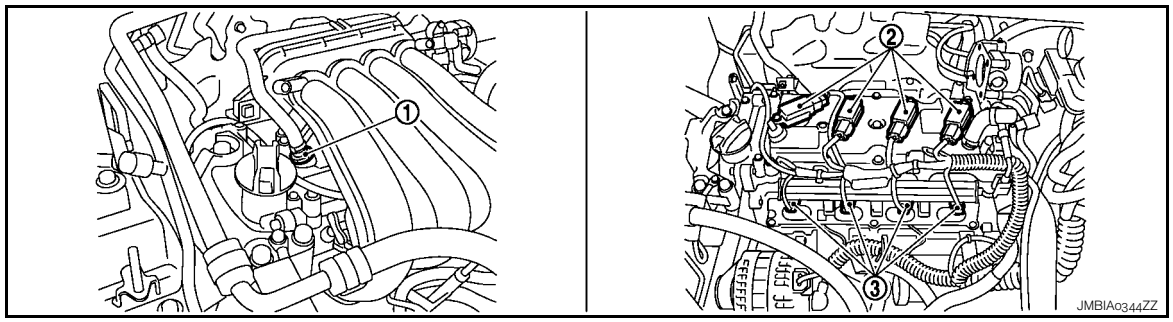
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

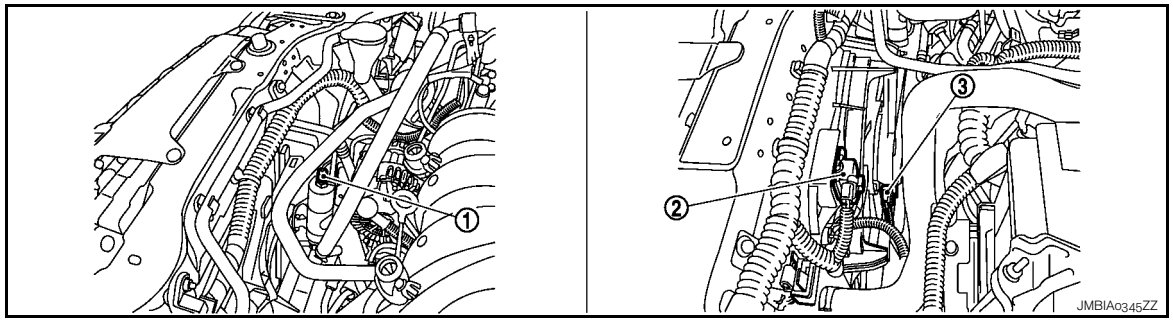




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

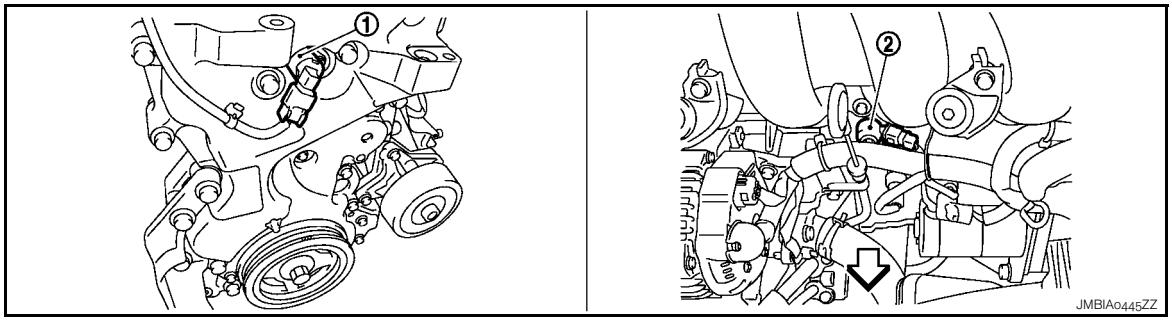


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

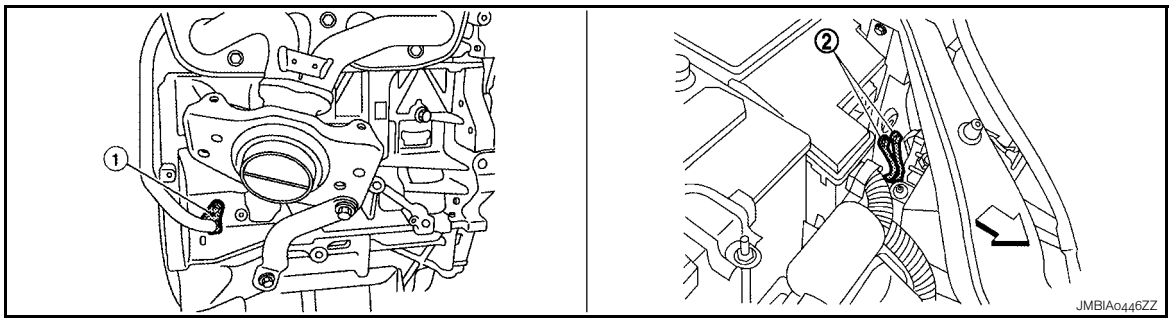


cardiagn.com

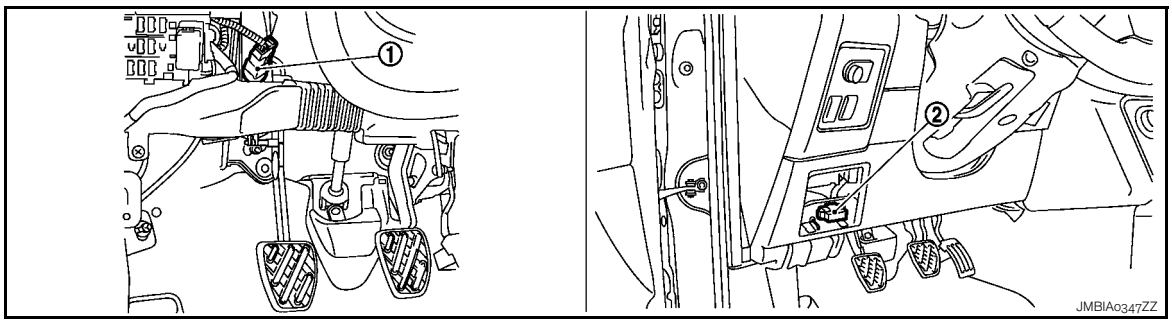
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



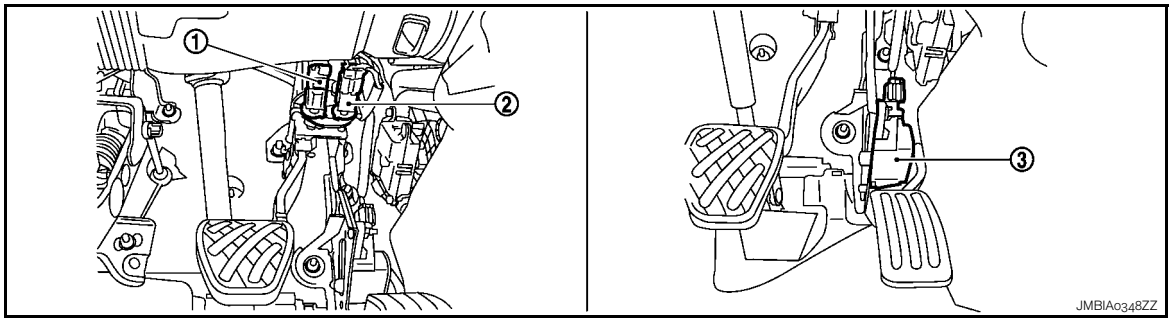
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

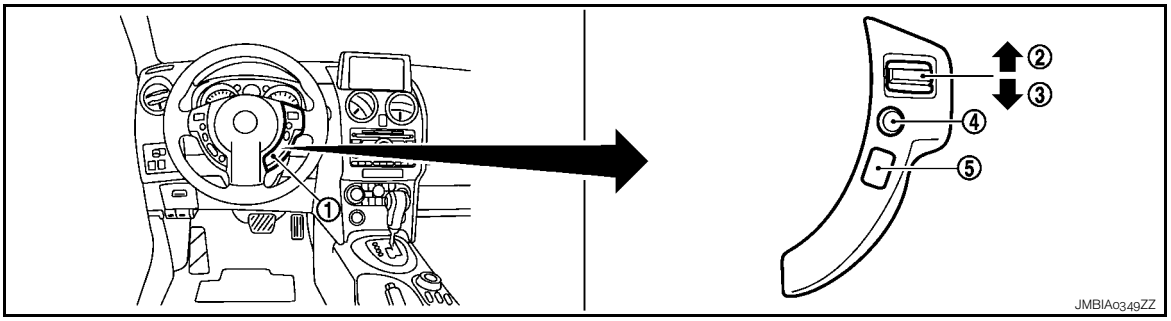


1. ASCD clutch switch 2. Data link connector

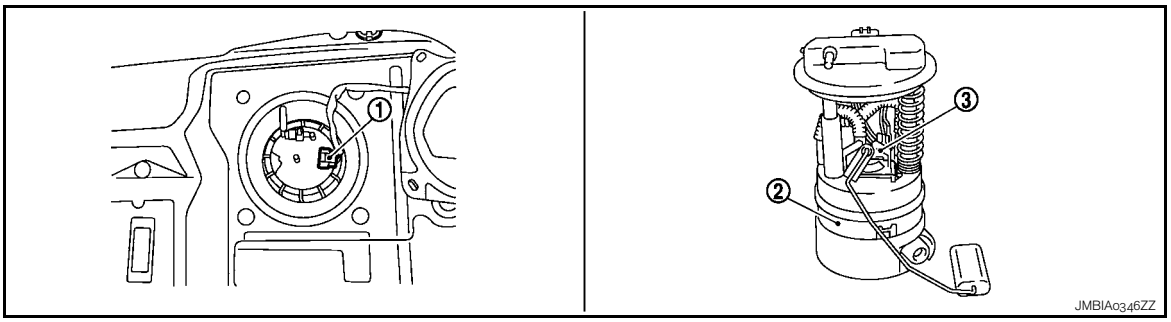


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094064

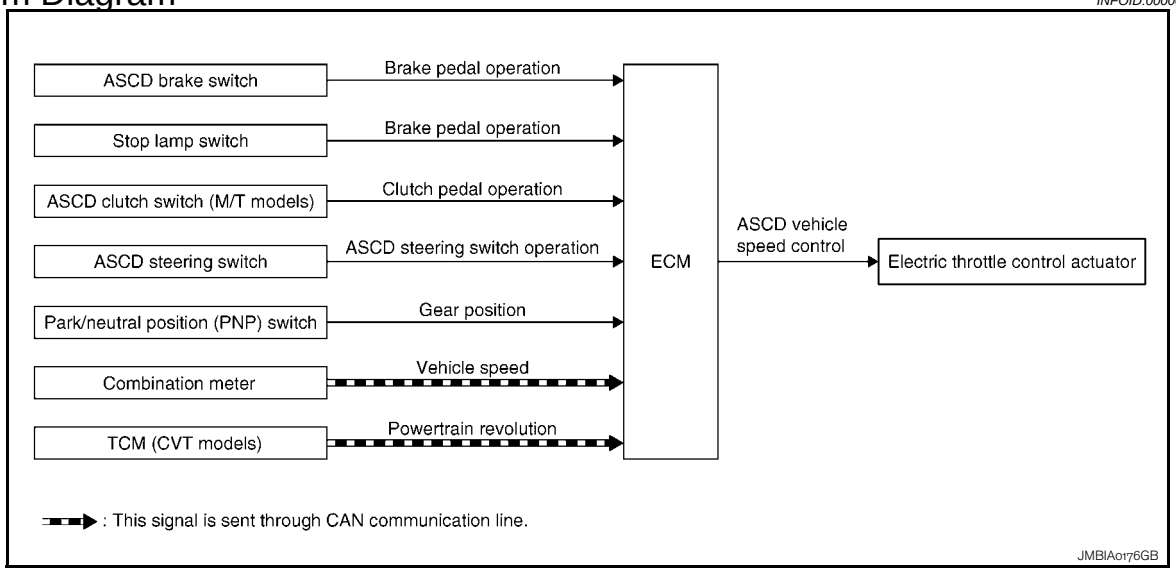
Component	Reference
Accelerator pedal position sensor	EC-899, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Refrigerant pressure sensor	EC-936, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001094065



System Description

INFOID:0000000001094066

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch			
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch	Gear position		
Combination meter*	Vehicle speed		
TCM* (CVT models)	Powertrain revolution		

*: This signal is sent to the ECM through CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

cardiagn.com

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, R position (CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

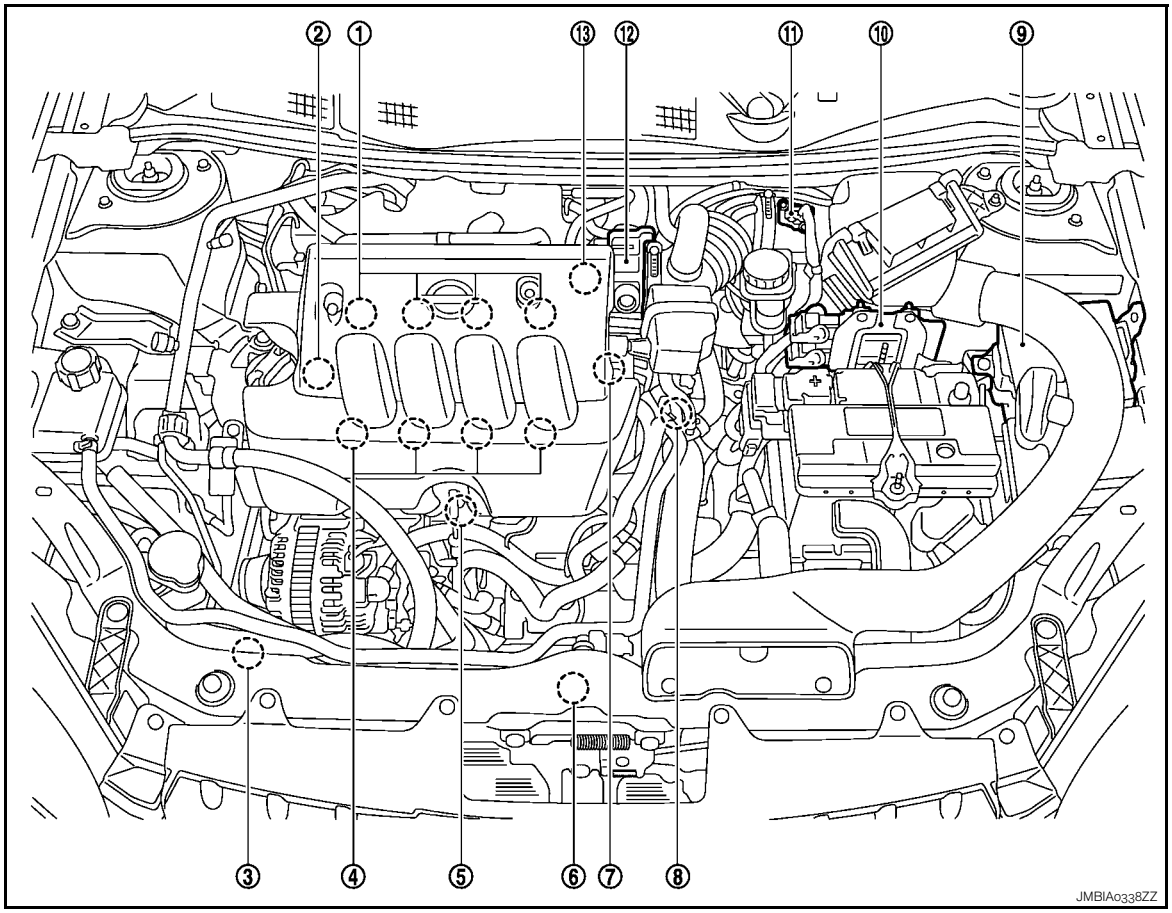
RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180 km/h (112 MPH)

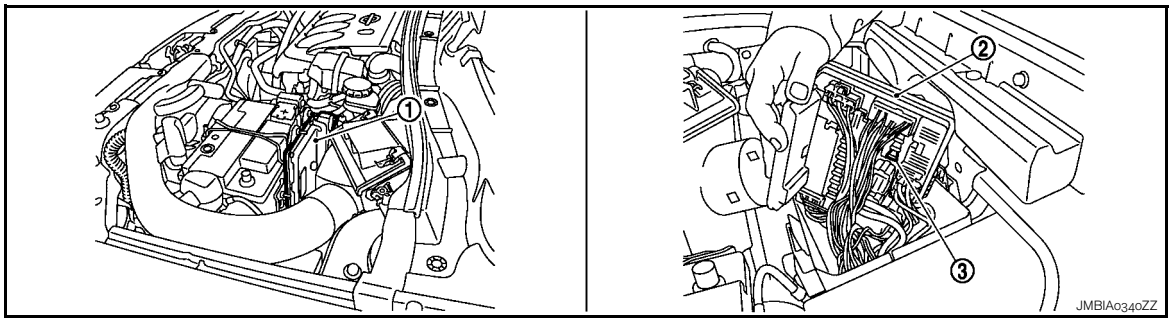
Component Parts Location

INFOID:0000000001115786

cardiagn.com

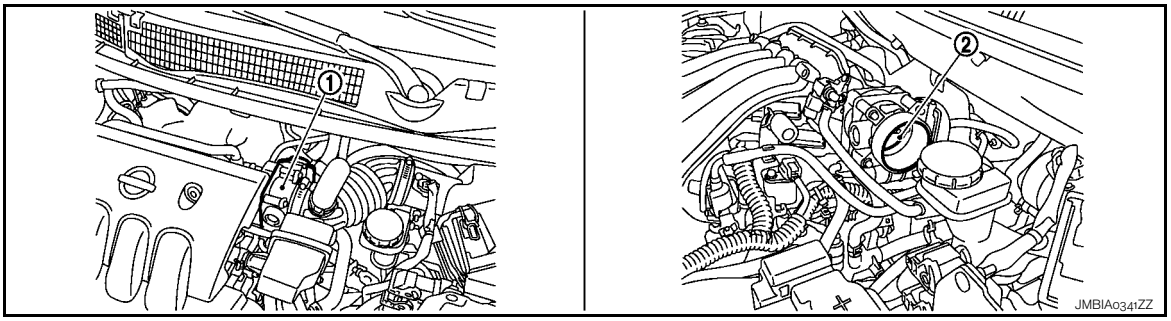


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

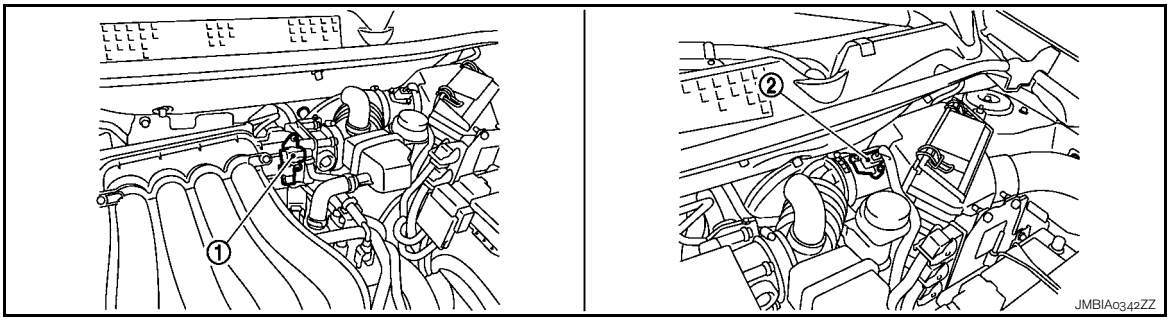


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

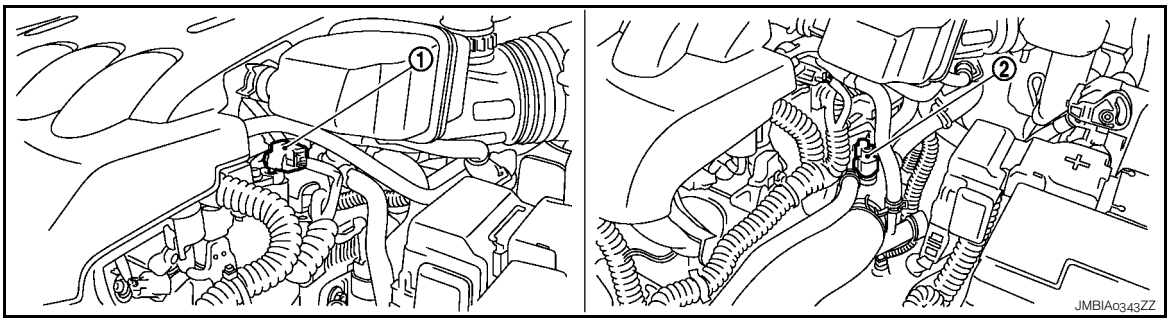
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

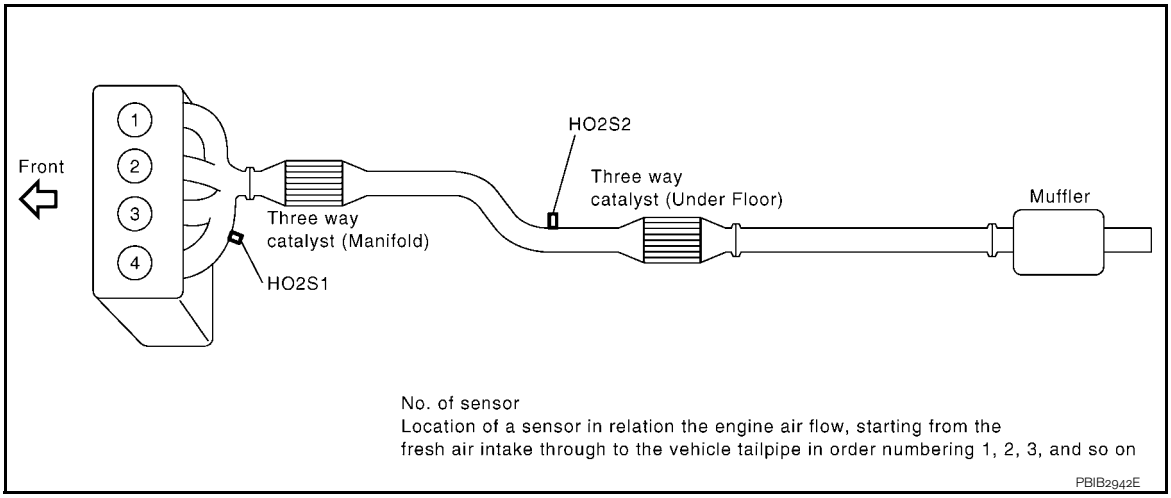


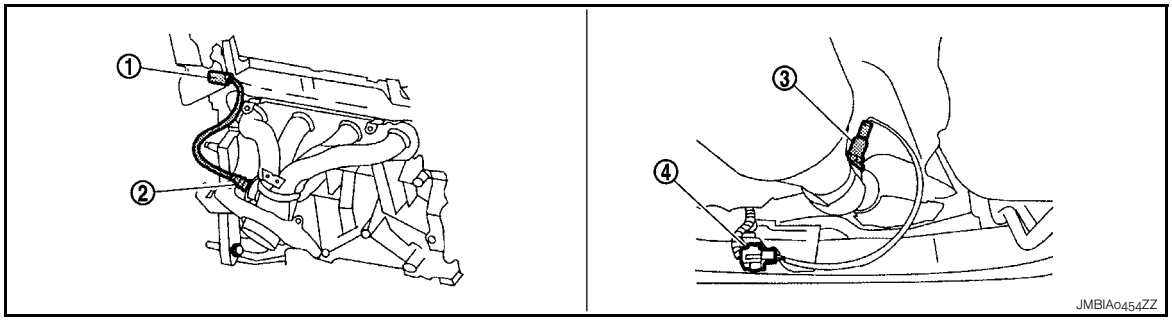
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



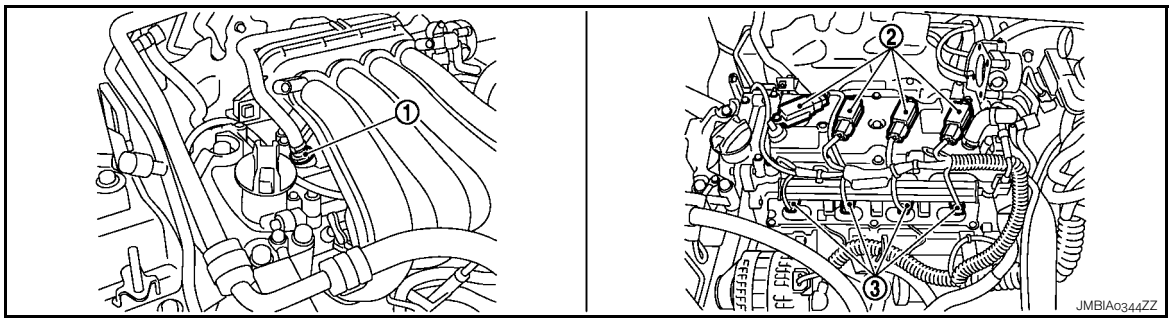
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

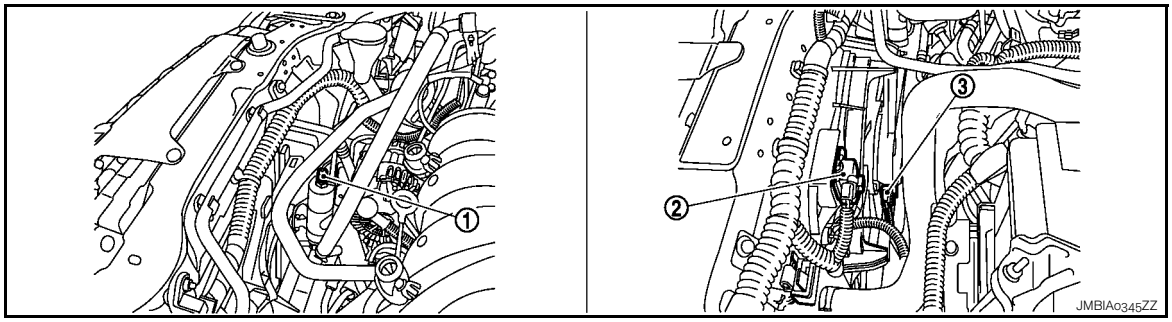




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

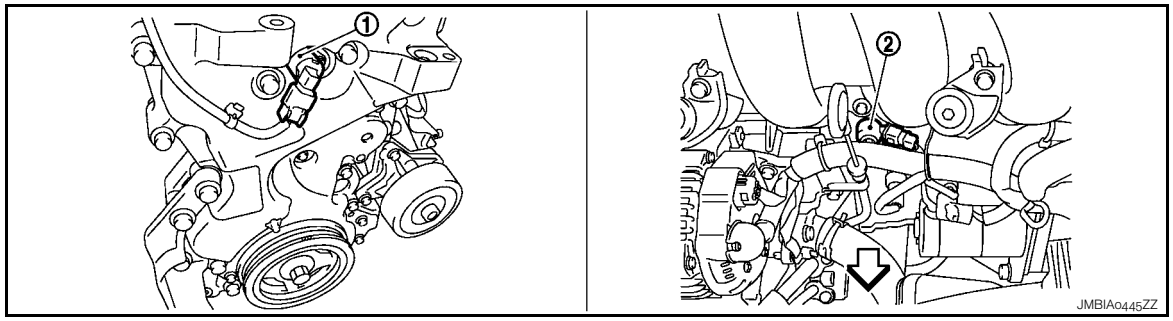


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

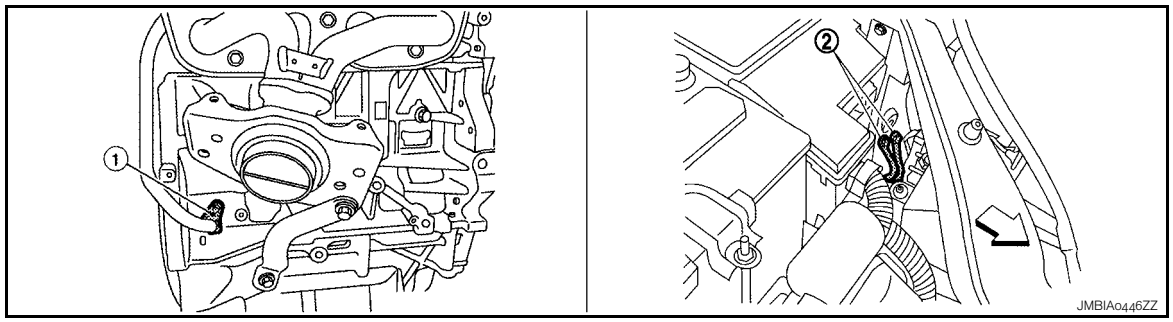


cardiagn.com

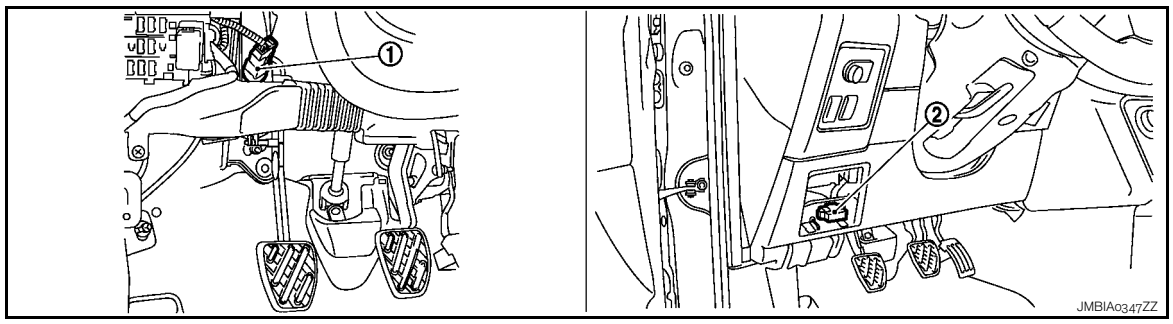
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



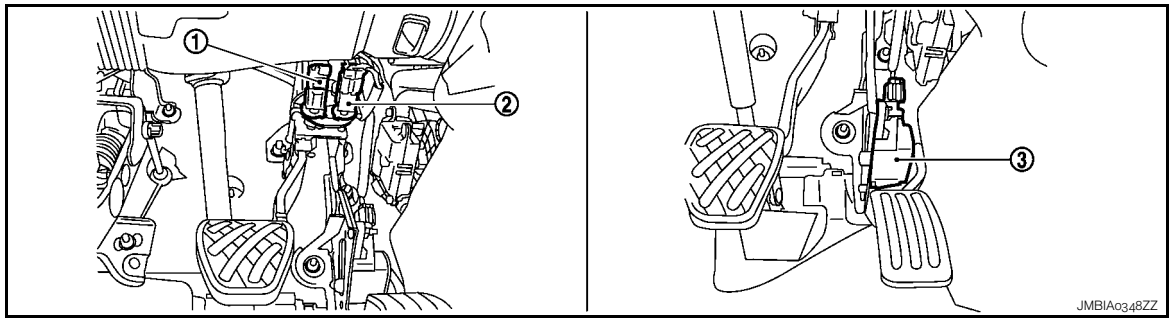
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

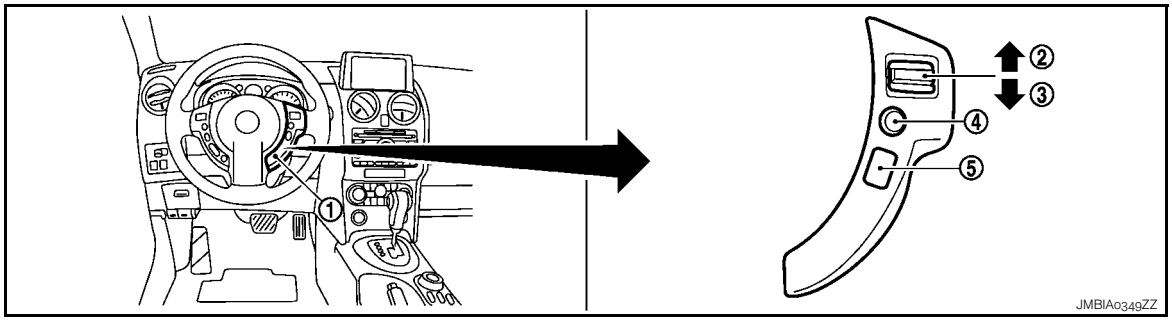


1. ASCD clutch switch 2. Data link connector

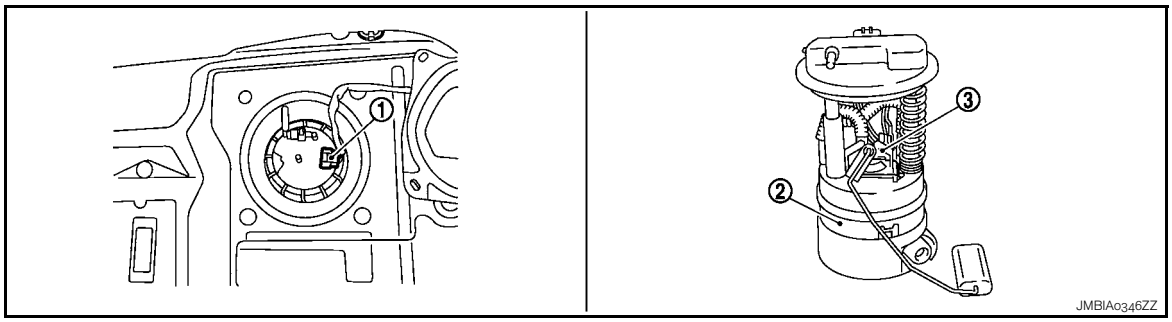


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094068

Component	Reference
ASCD steering switch	EC-880, "Description"
ASCD clutch switch	EC-883, "Description"
ASCD brake switch	EC-883, "Description"
ASCD indicator	EC-917, "Description"
Stop lamp switch	EC-896, "Description"
Electric throttle control actuator	EC-832, "Description"

cardiagn.com

CAN COMMUNICATION

System Description

INFOID:0000000001094069

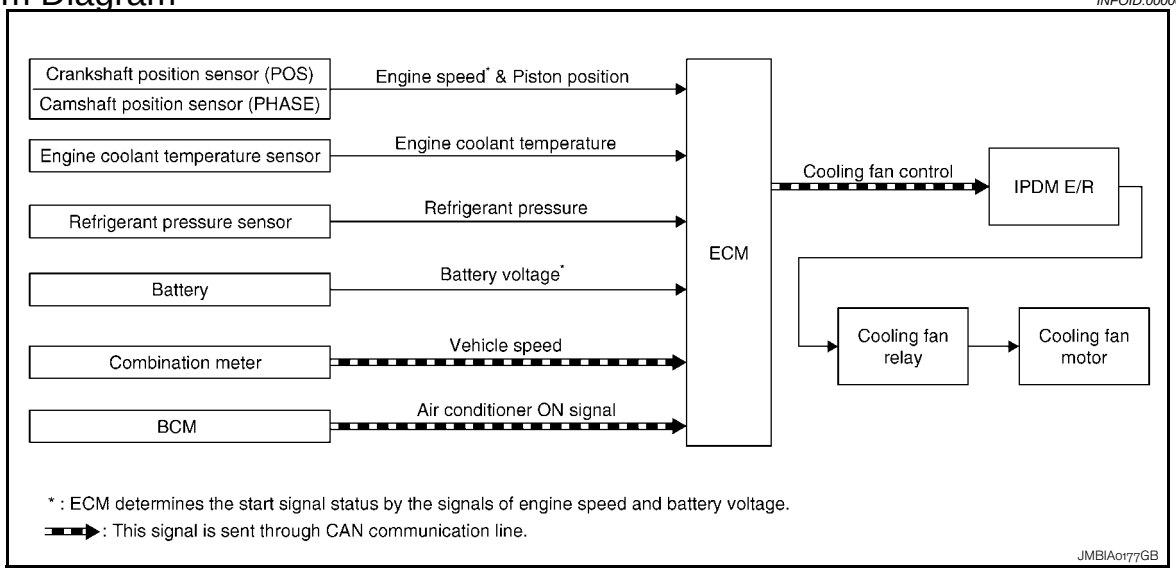
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-59, "CAN Communication Signal Chart", about CAN communication for detail..

cardiagn.com

COOLING FAN CONTROL

System Diagram

INFOID:0000000001094070



System Description

INFOID:0000000001094071

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

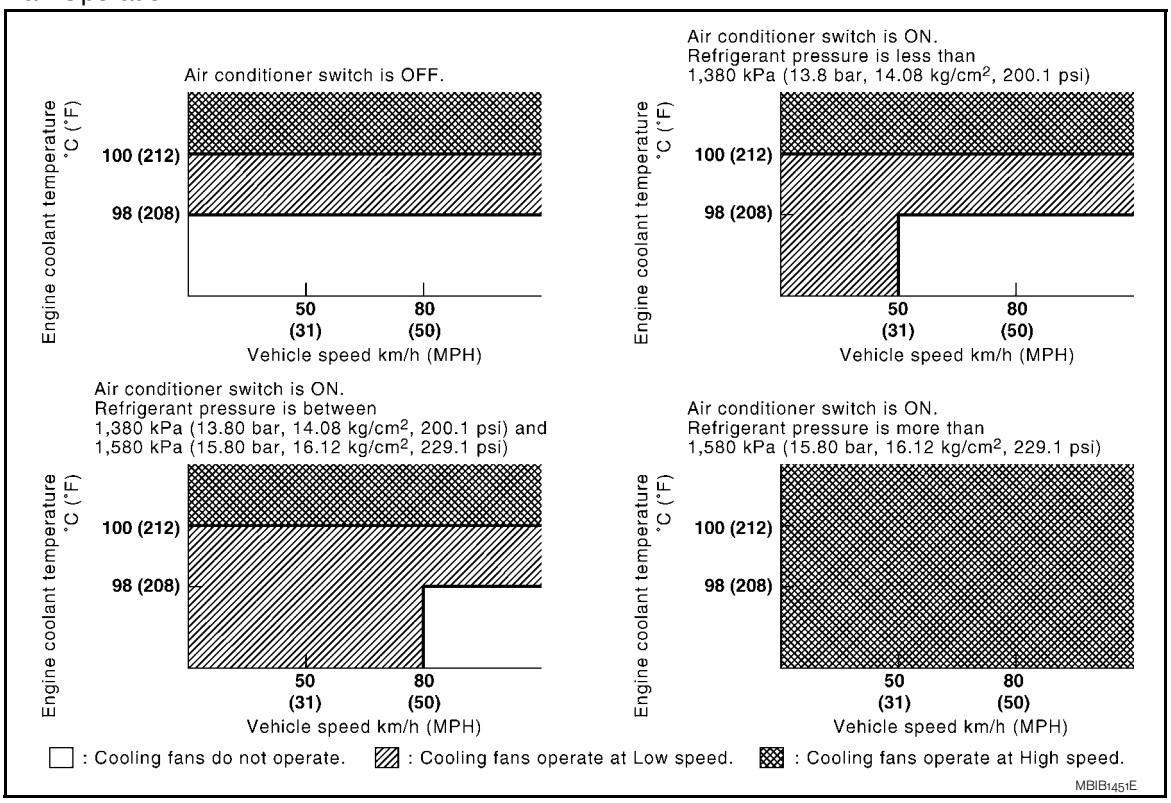
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

cardiagn.com

Cooling Fan Operation



Cooling Fan Relay Operation

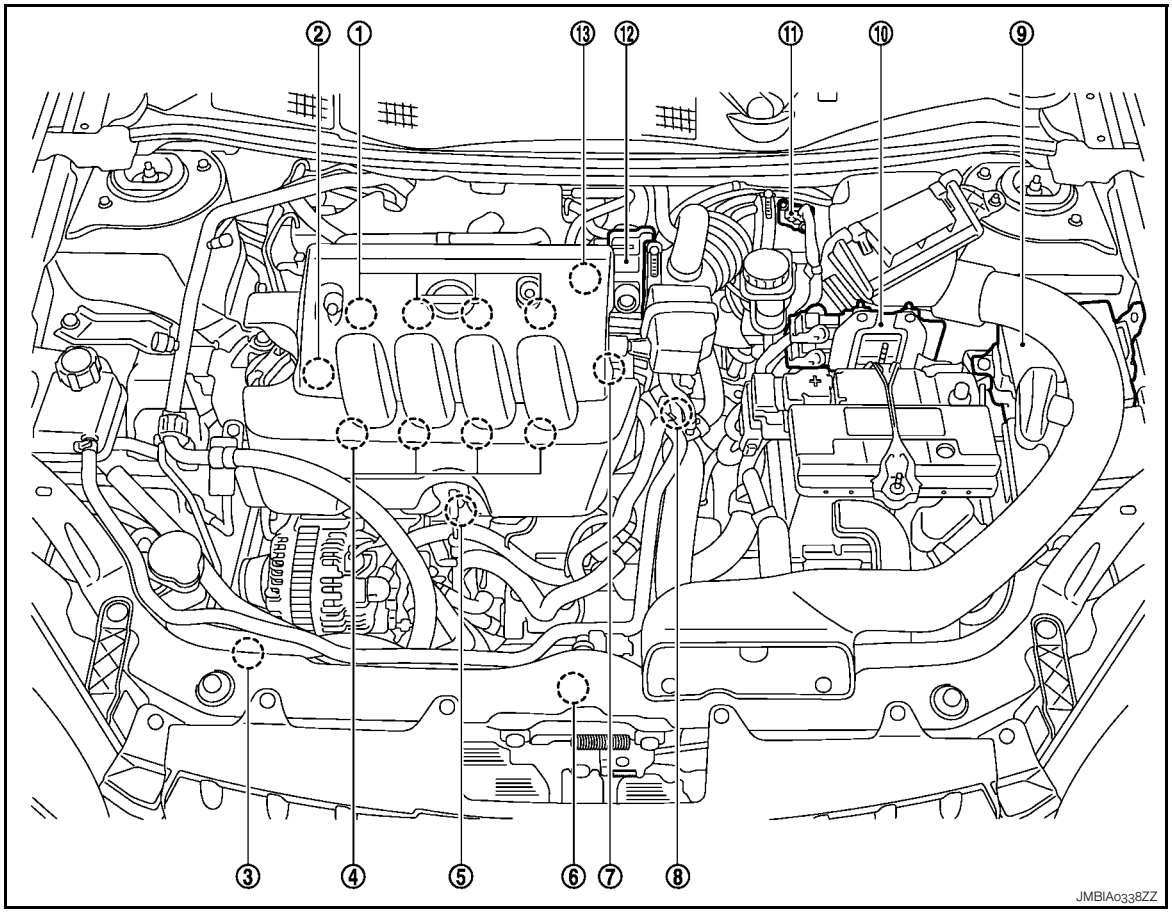
The ECM controls cooling fan relays through CAN communication line.

Cooling fan speed	Cooling fan relay	
	1	3
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	OFF	ON

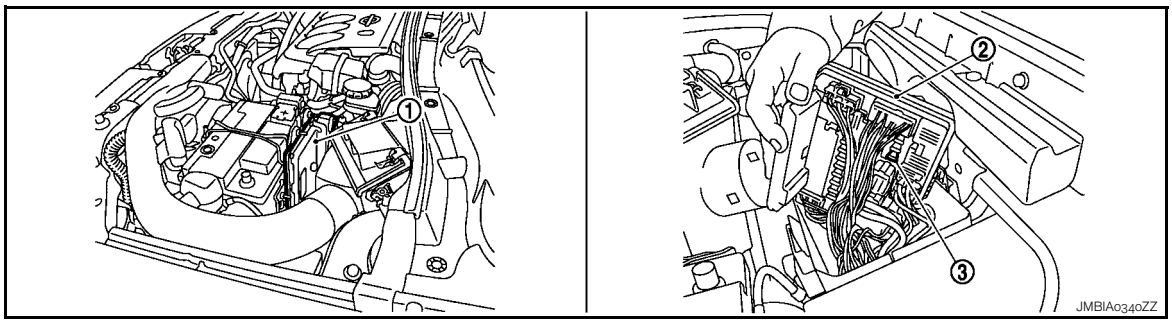
Component Parts Location

INFOID:0000000001115787

cardiagn.com

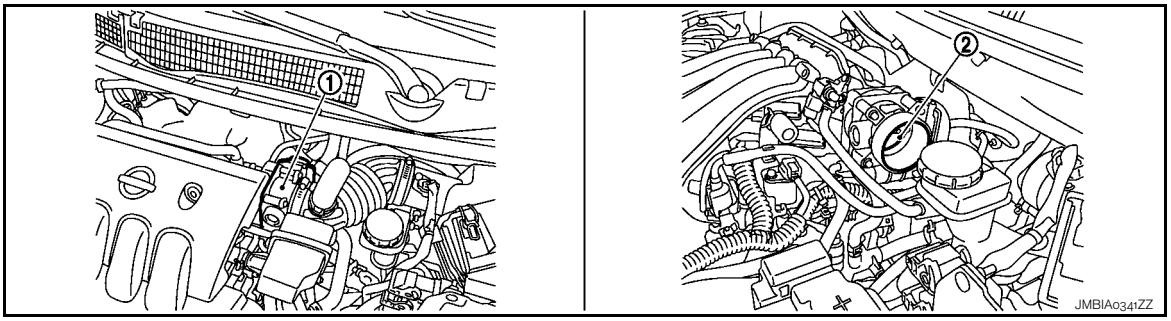


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

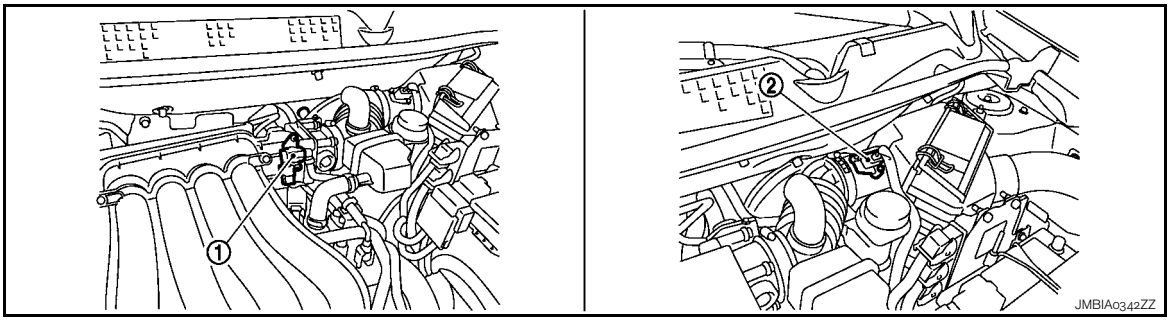


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

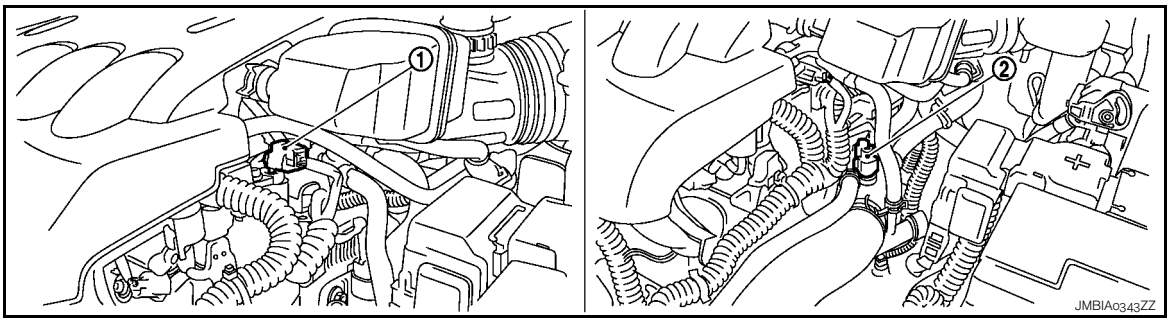
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

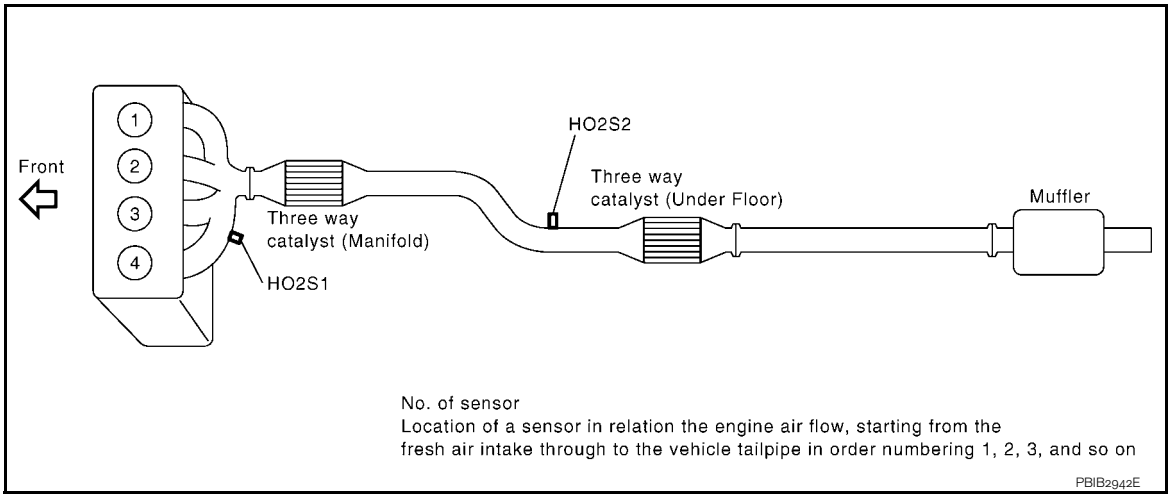


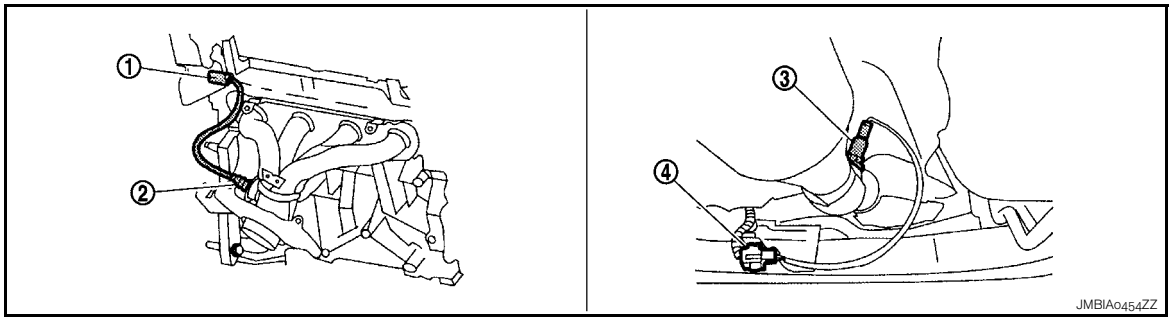
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



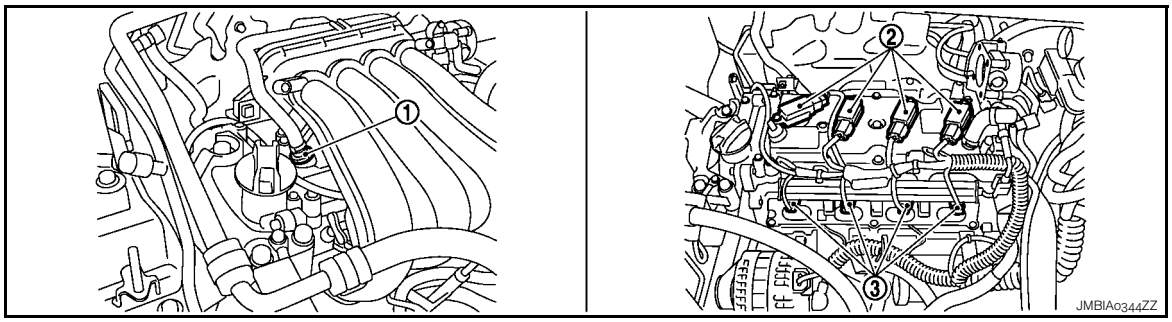
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

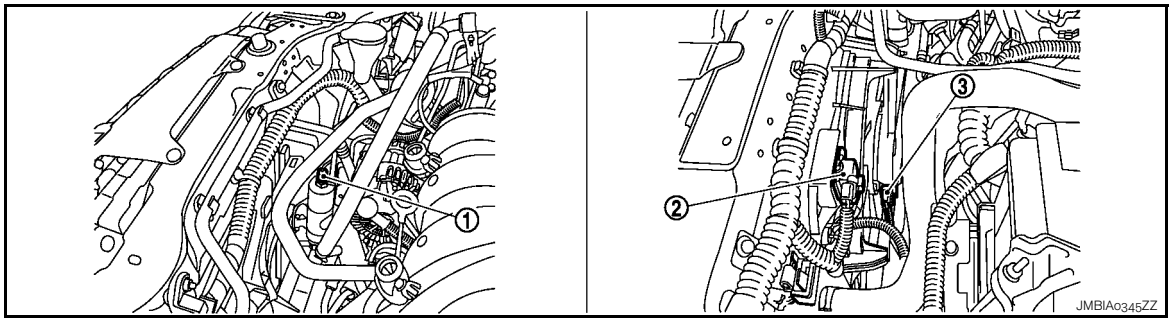




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

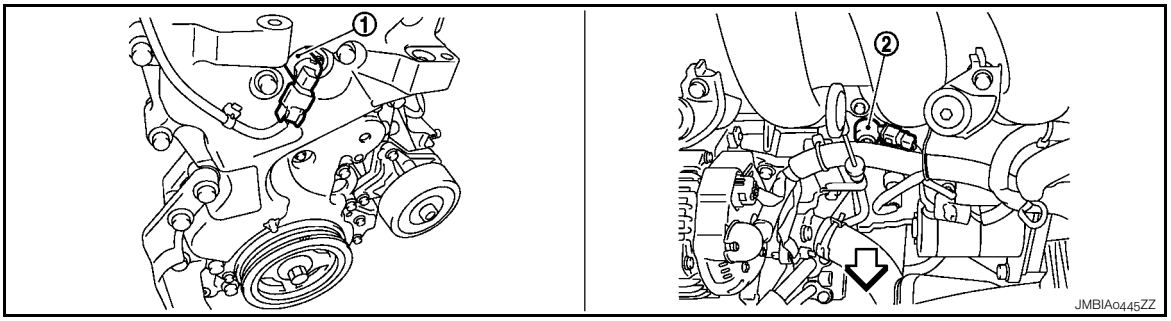


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

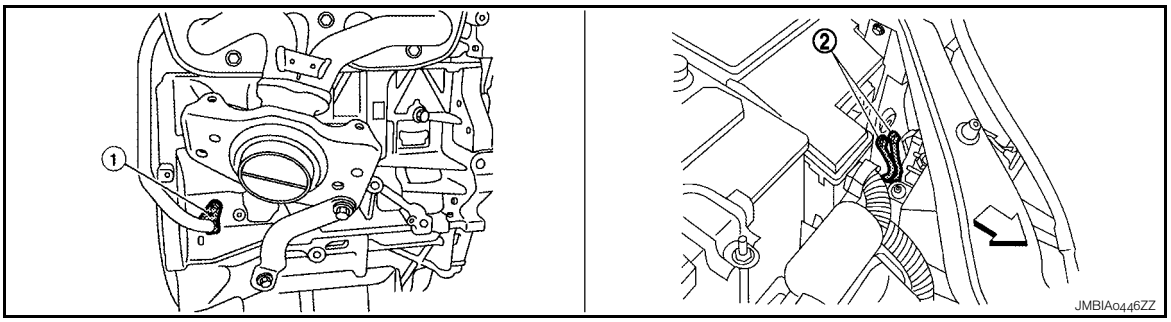


cardiagn.com

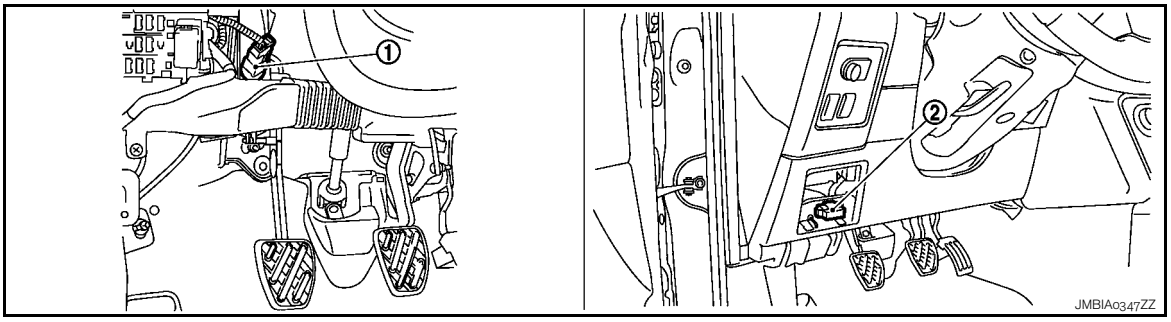
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



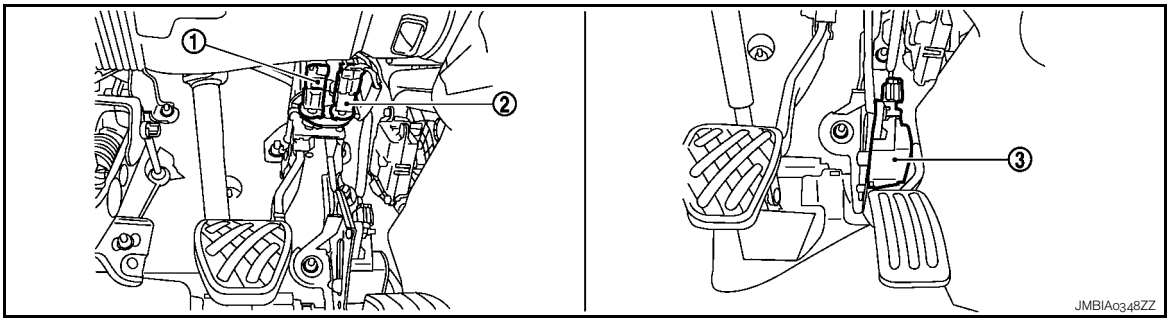
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

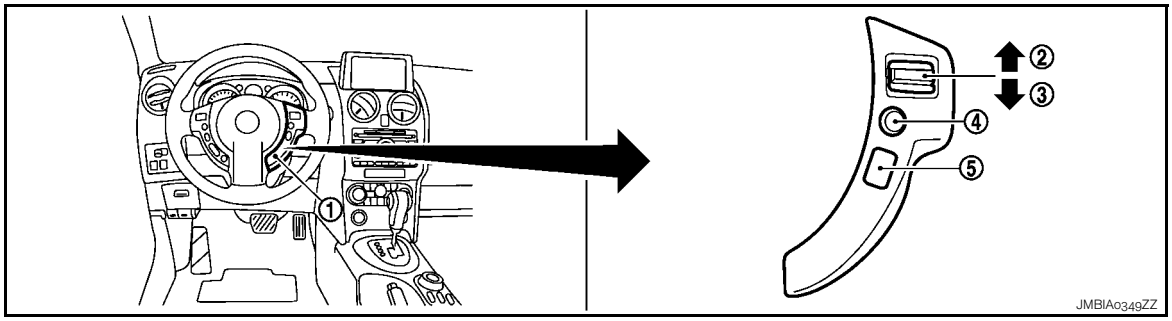


1. ASCD clutch switch 2. Data link connector

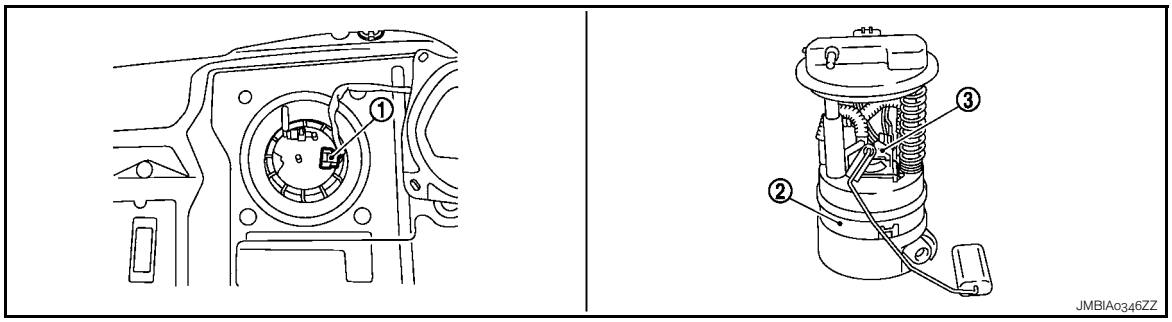


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094073

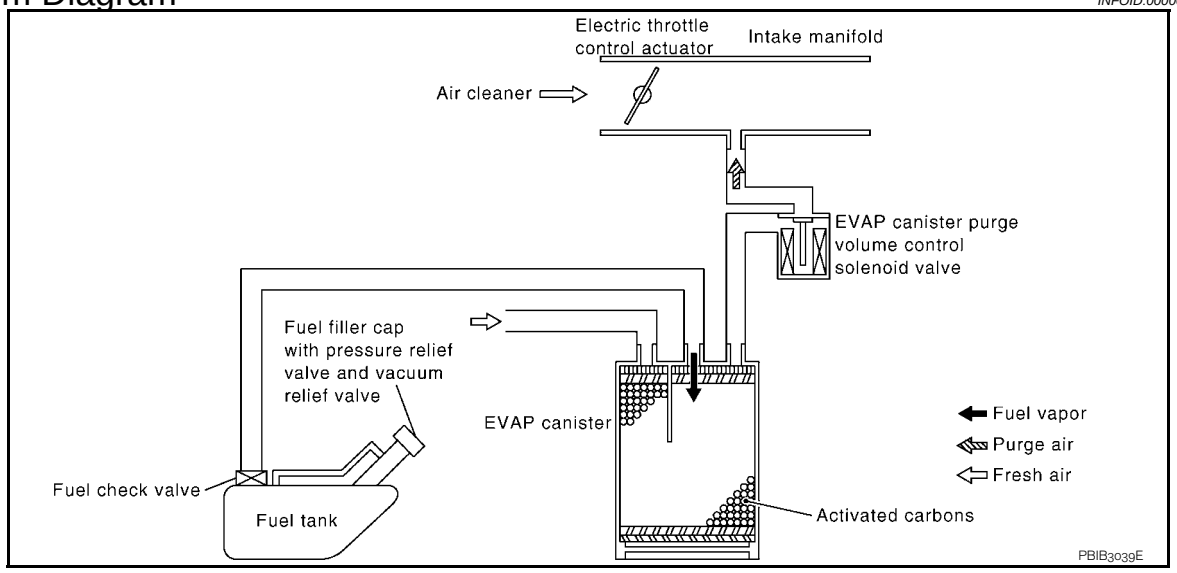
Component	Reference
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Cooling fan motor	EC-685, "System Diagram"
Engine coolant temperature sensor	EC-754, "Description"
Refrigerant pressure sensor	EC-936, "Description"

cardiagn.com

EVAPORATIVE EMISSION SYSTEM

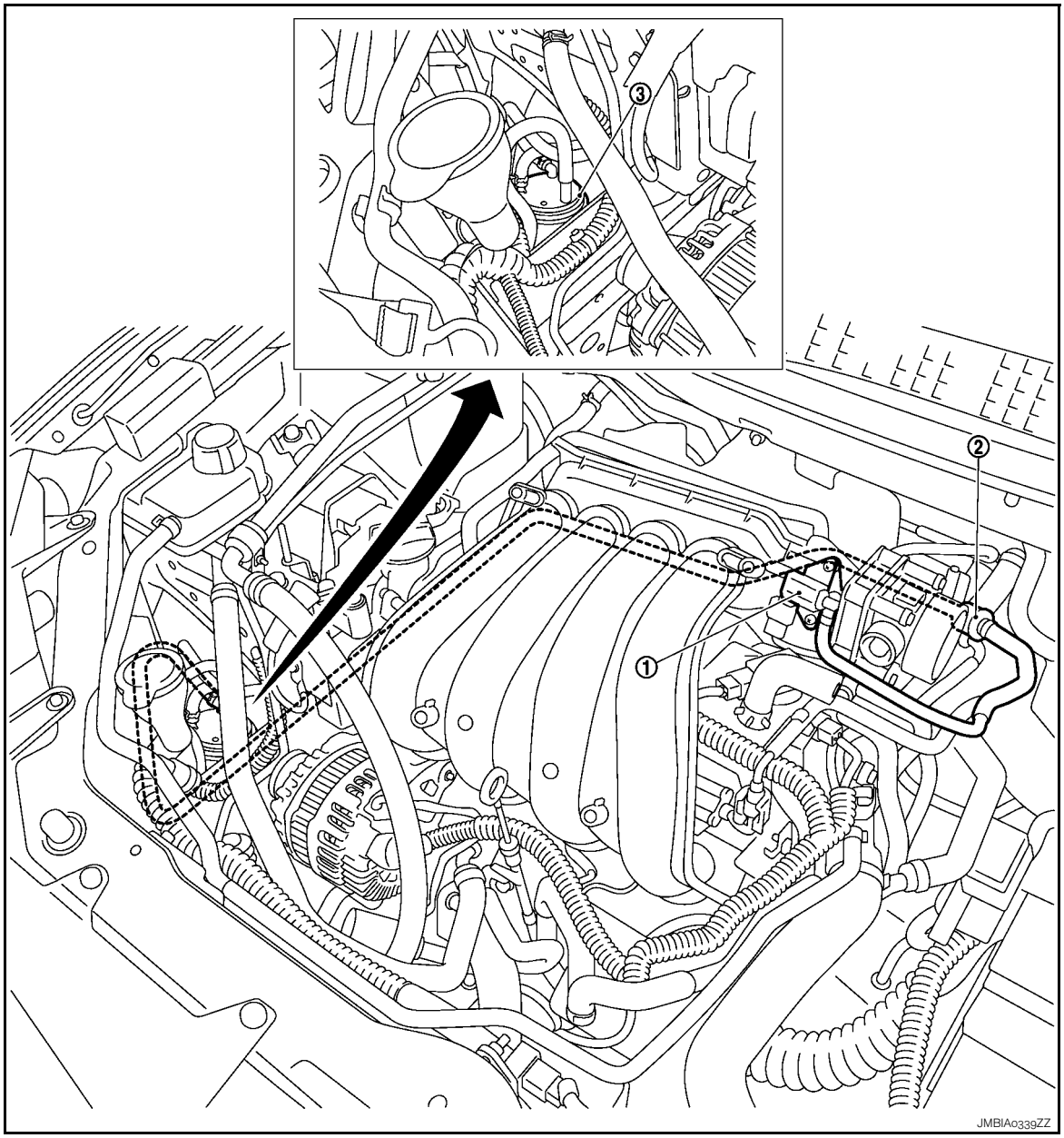
System Diagram

INFOID:0000000001094074



EVAPORATIVE EMISSION LINE DRAWING

cardiagn.com



1. EVAP canister purge volume control solenoid valve
2. EVAP purge resonator
3. EVAP canister

NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

System Description

INFOID:0000000001094075

INPUT/OUTPUT SIGNAL CHART

cardiagn.com

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Wheel sensor*2	Vehicle speed		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

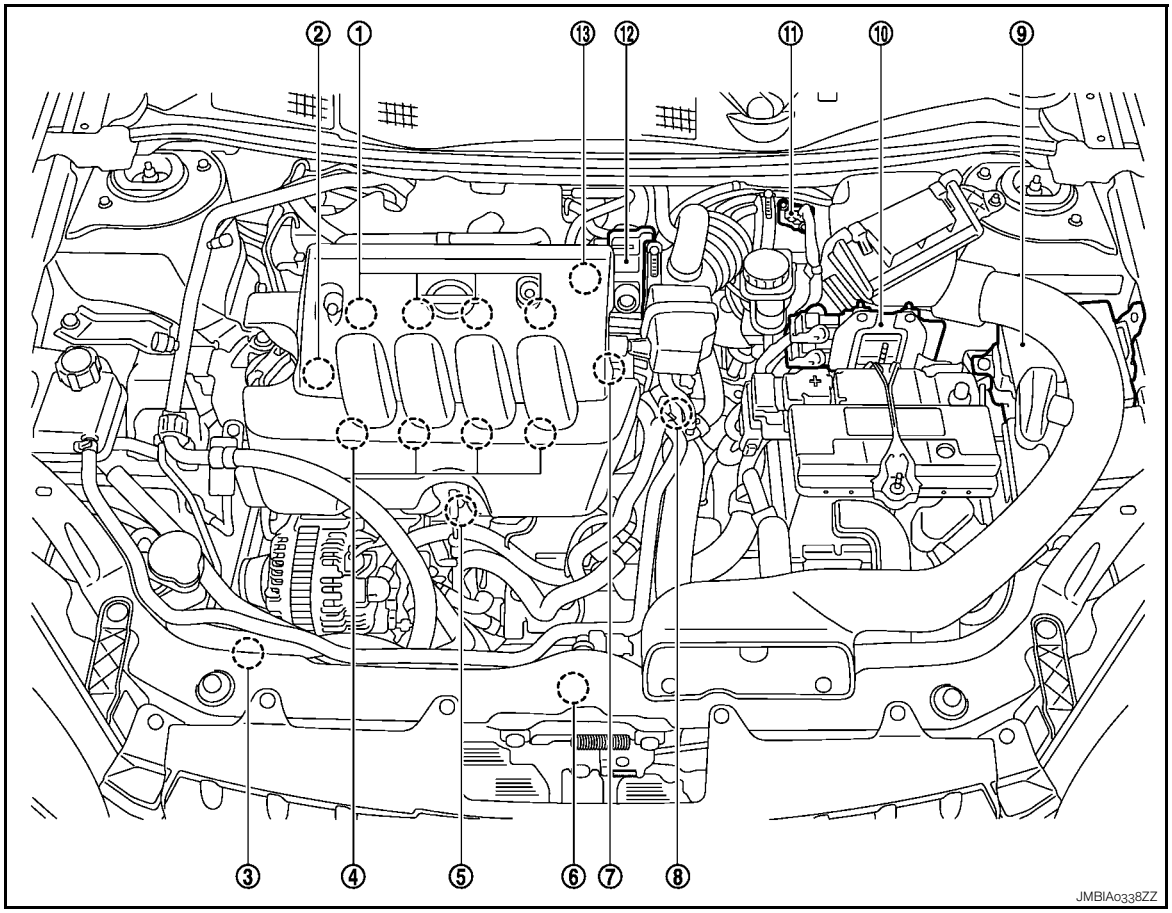
SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

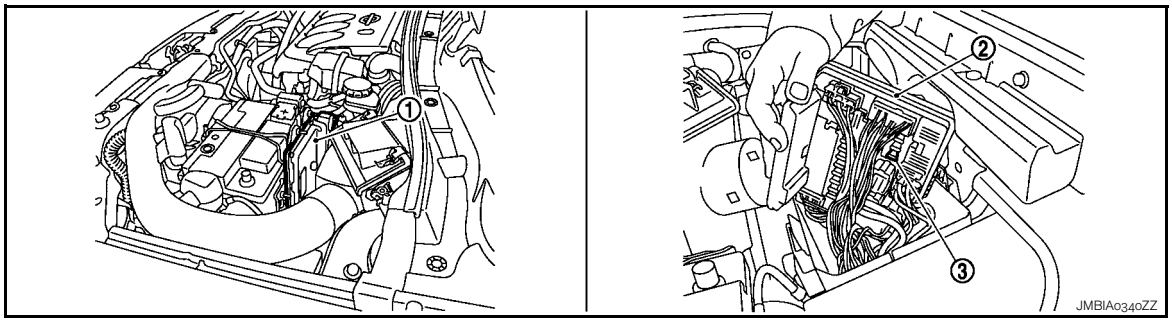
Component Parts Location

INFOID:0000000001115788

cardiagn.com

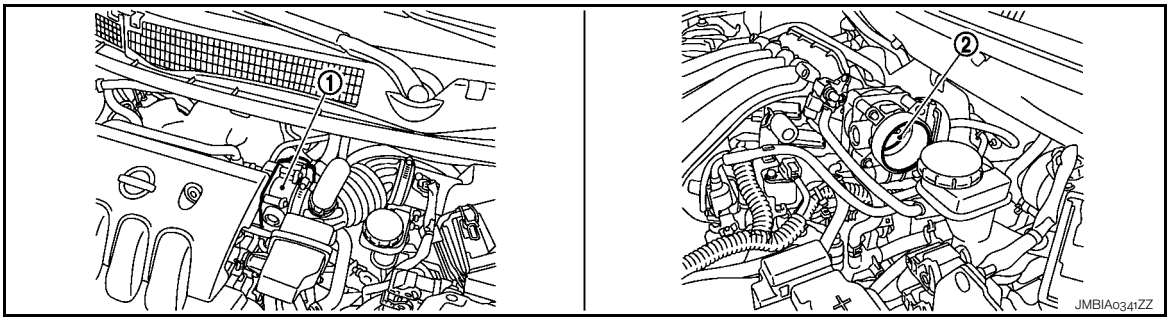


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

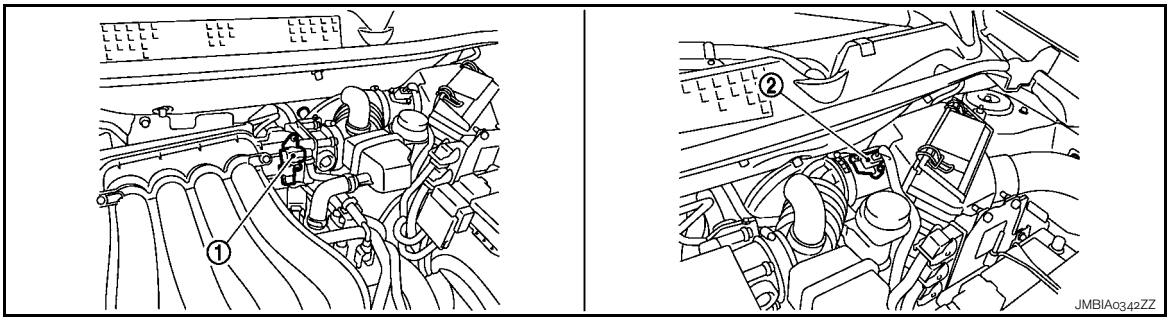


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

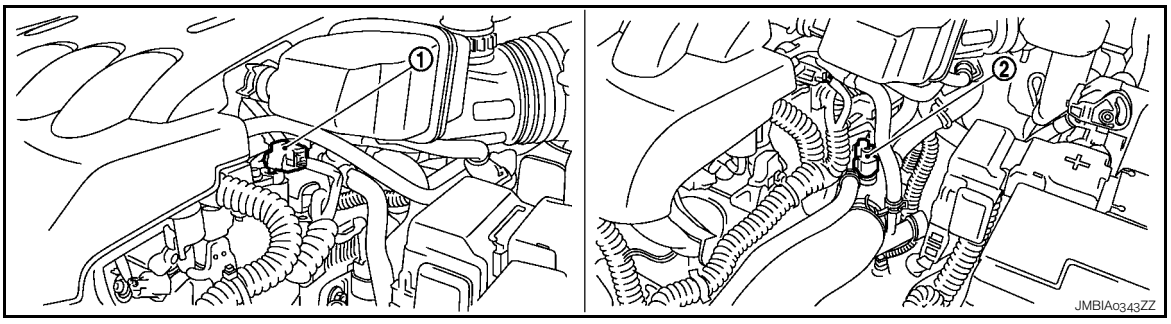
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

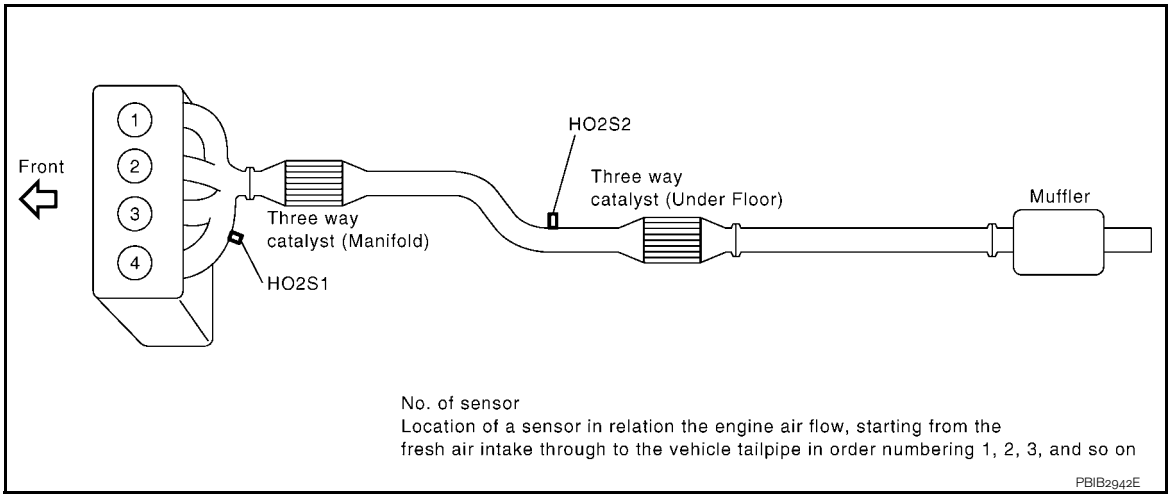


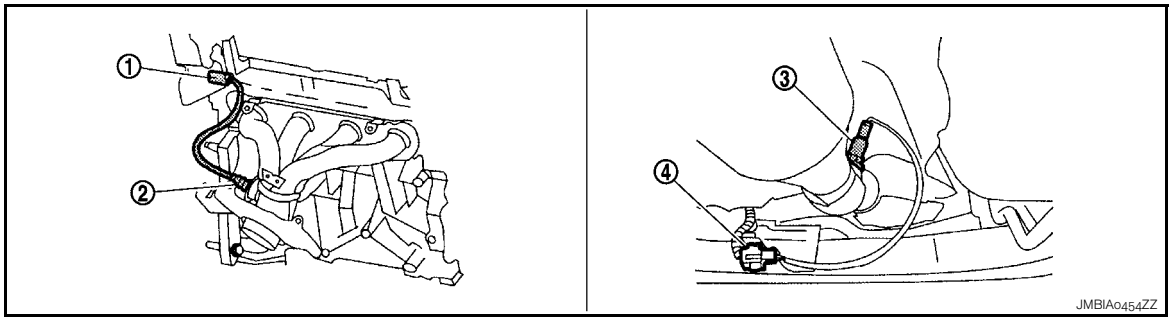
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



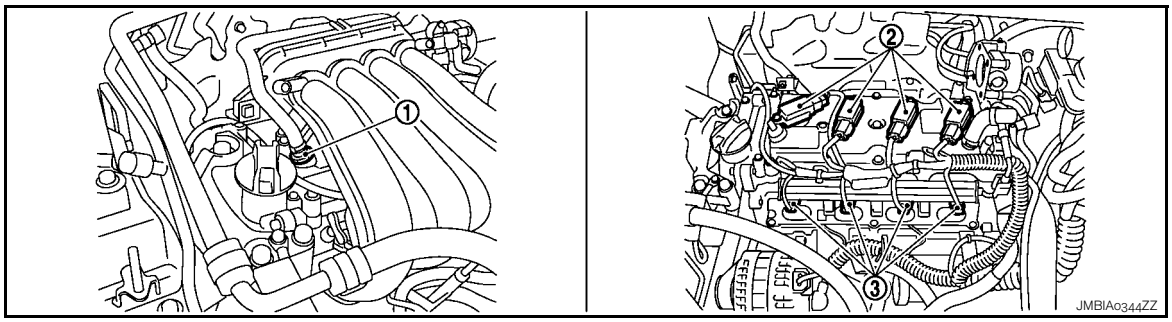
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

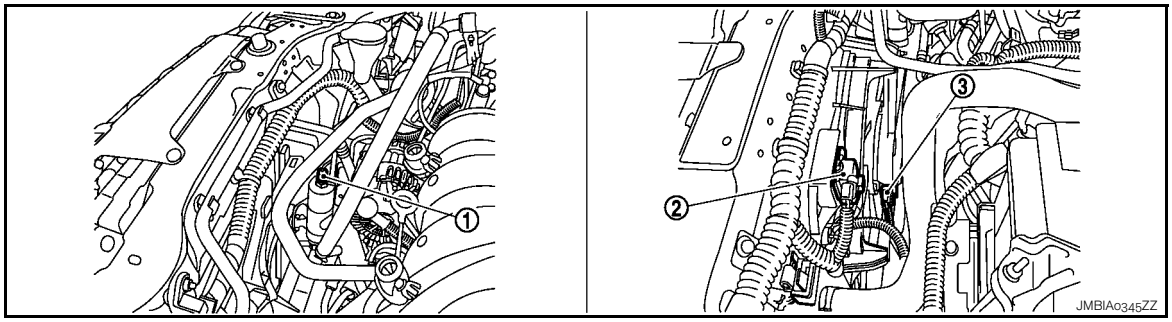




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

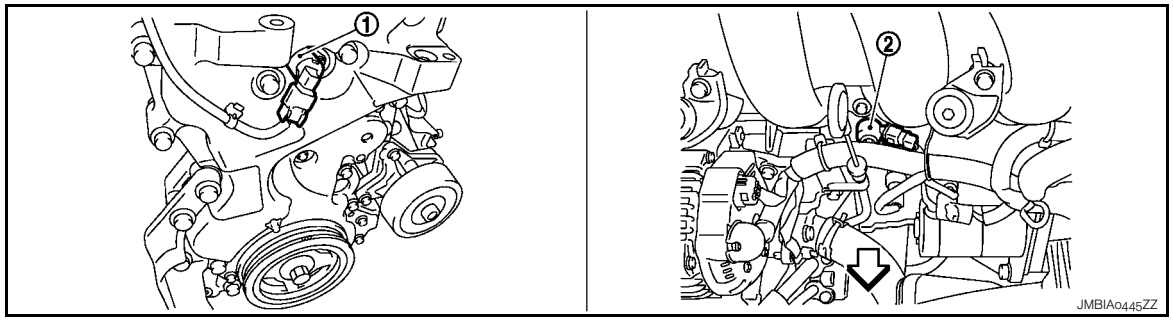


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

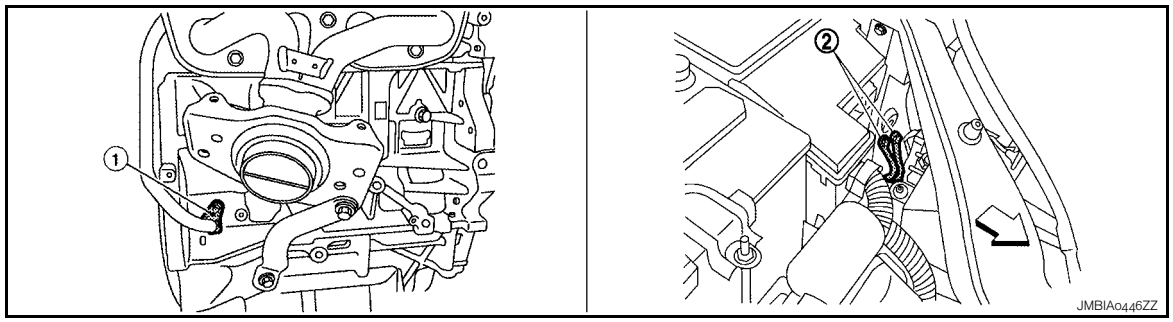


cardiagn.com

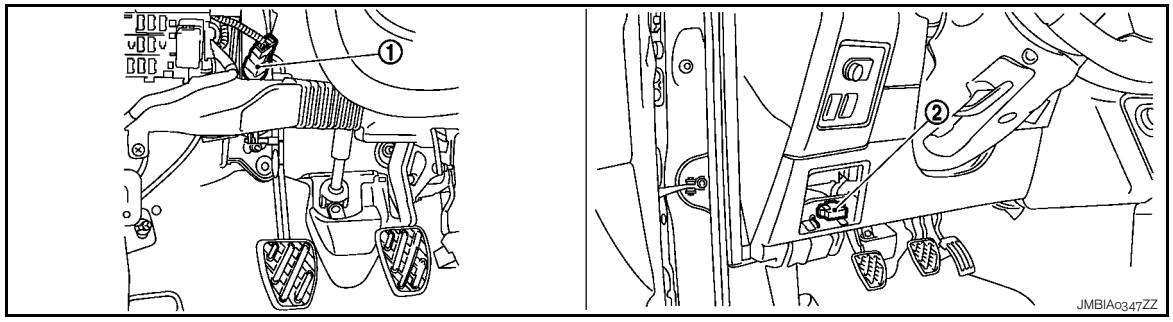
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



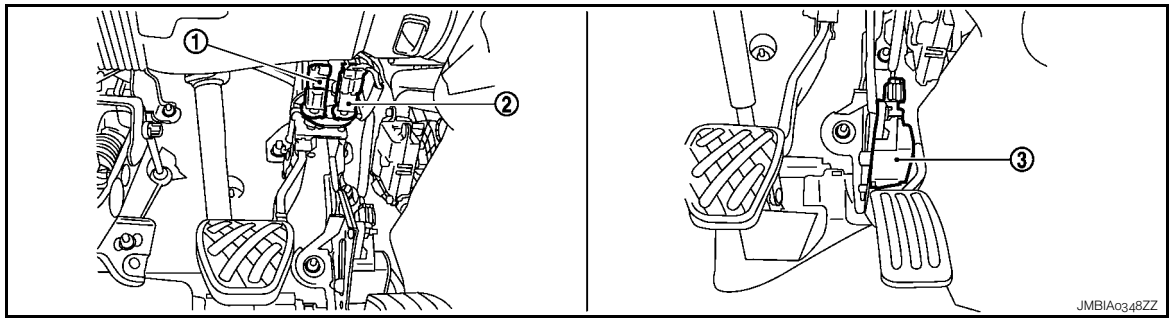
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

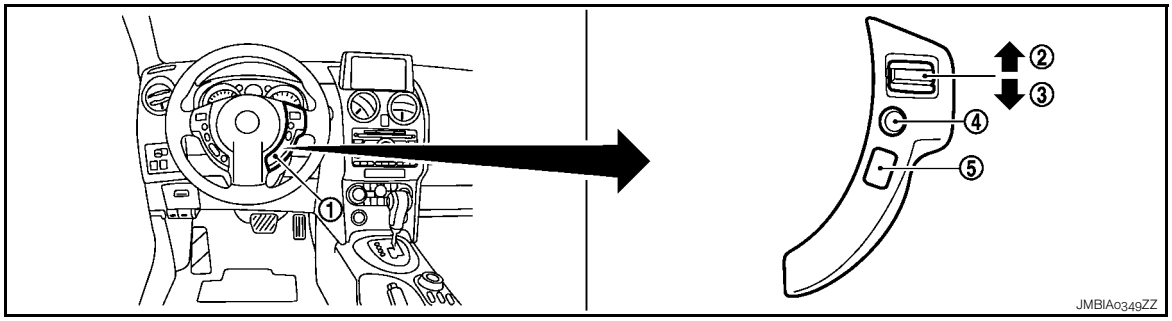


1. ASCD clutch switch 2. Data link connector

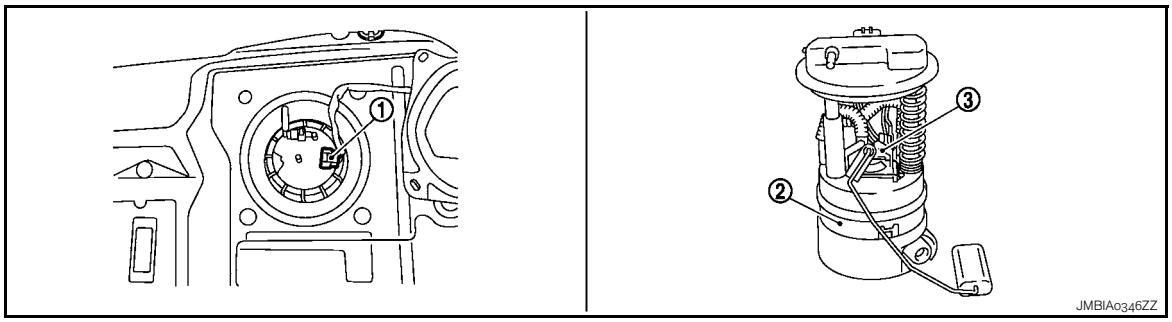


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094077

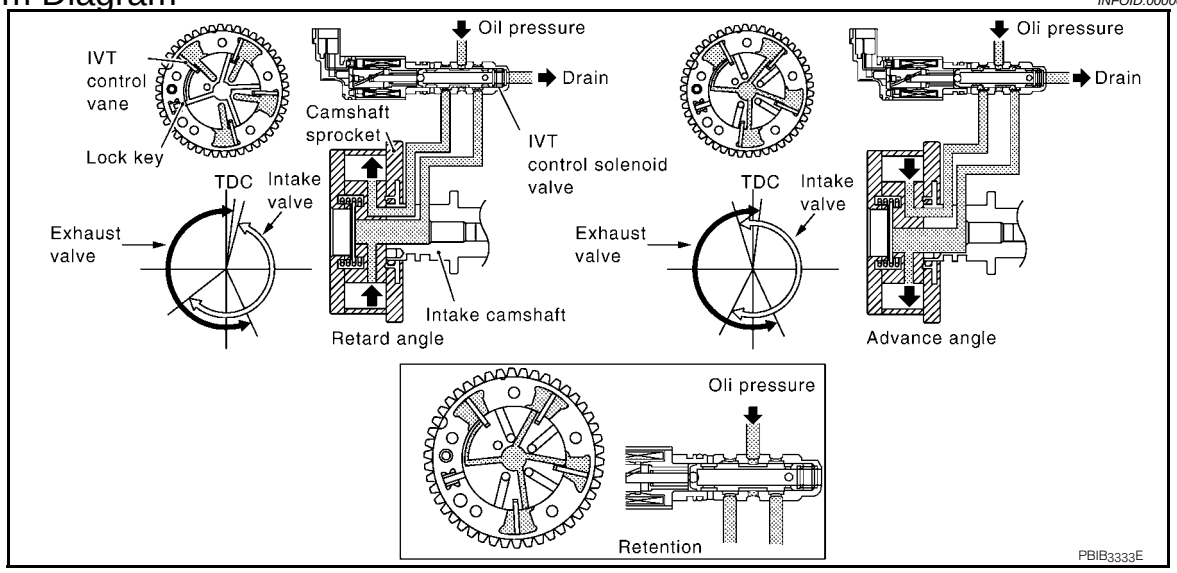
Component	Reference
Accelerator pedal position sensor	EC-909, "Description"
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
EVAP canister purge volume control solenoid valve	EC-822, "Description"
Heated oxygen sensor 1	EC-760, "Description"
Mass air flow sensor	EC-746, "Description"
Throttle position sensor	EC-757, "Description"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001094078



System Description

INFOID:0000000001094079

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

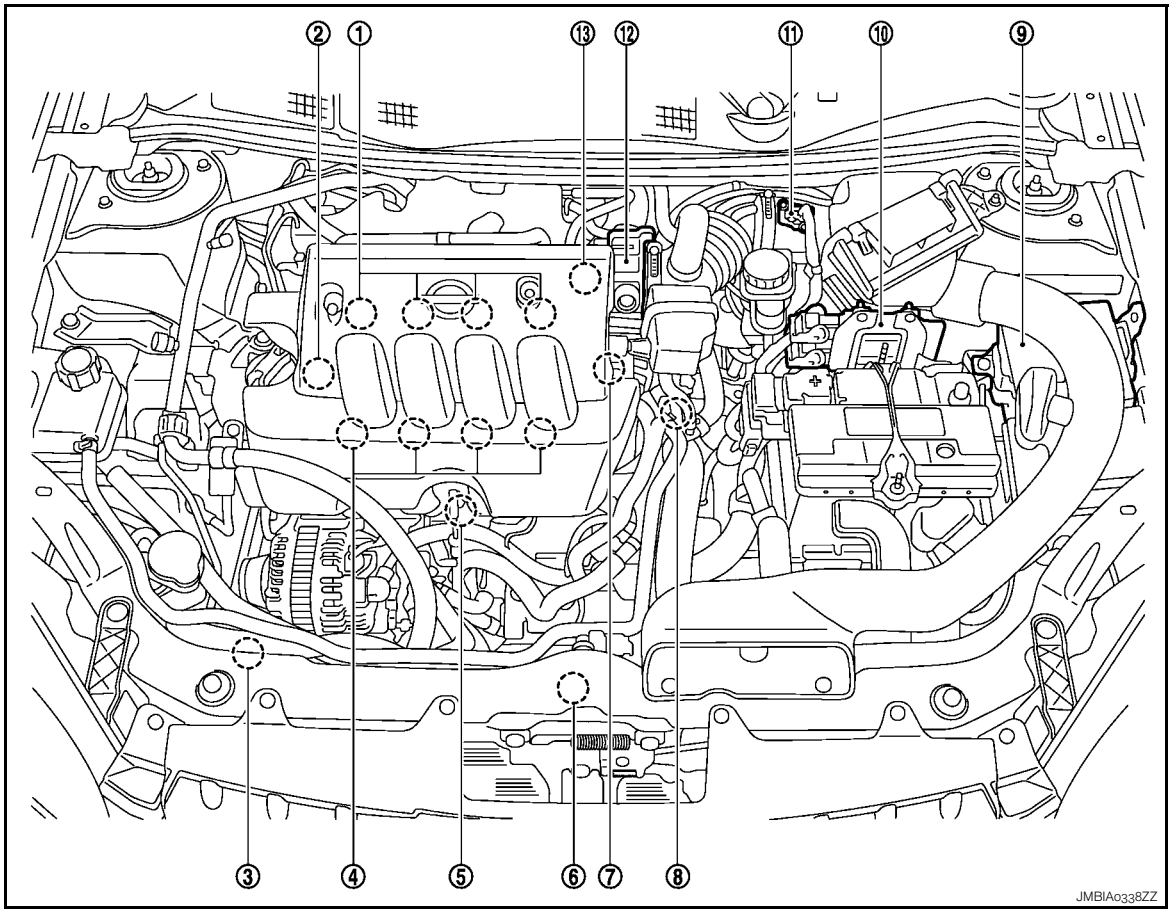
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

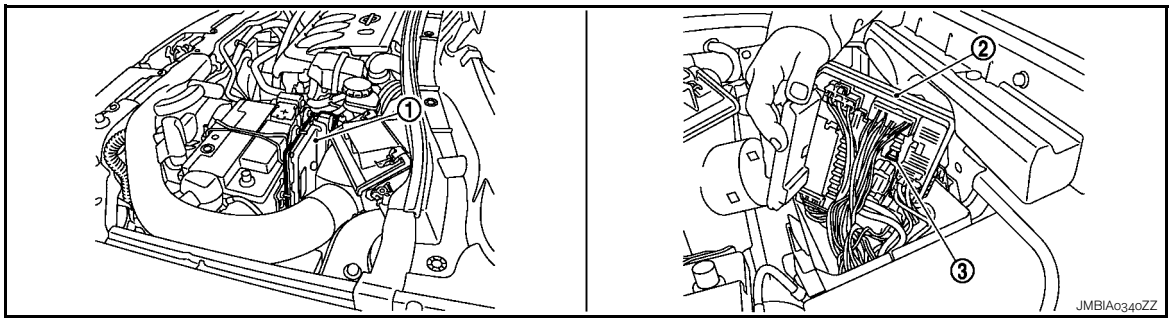
Component Parts Location

INFOID:0000000001115789

cardiagn.com

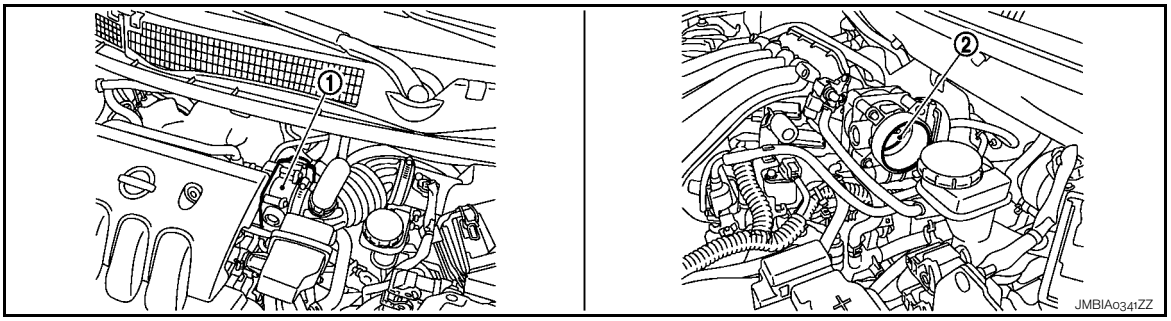


1. Ignition coil (with power transistor) and spark plug
2. PCV valve
3. Refrigerant pressure sensor
4. Fuel injector
5. Knock sensor
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. Engine coolant temperature sensor
9. IPDM E/R
10. ECM
11. Mass air flow sensor (with intake temperature sensor)
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve

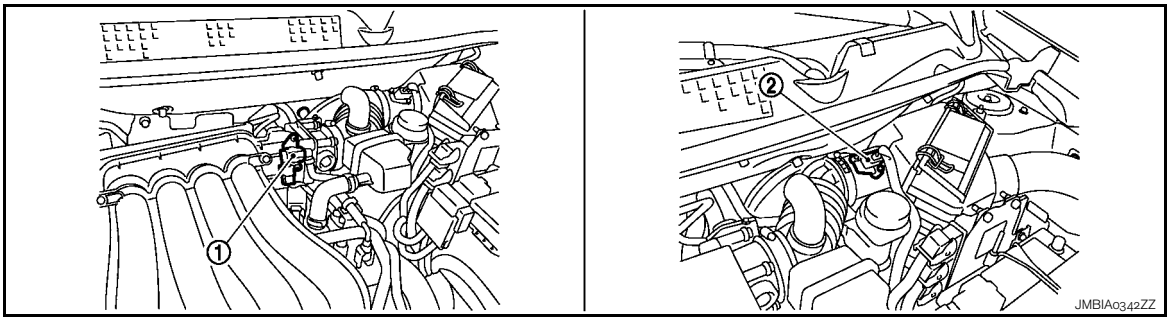


1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

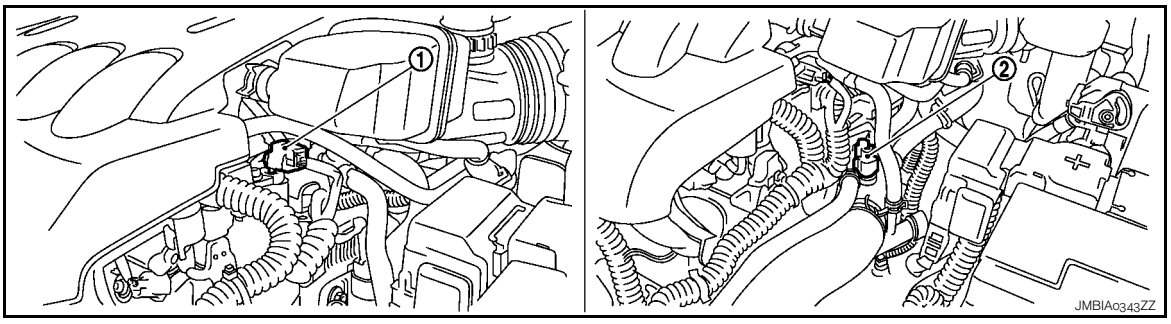
cardiagn.com



1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Throttle valve

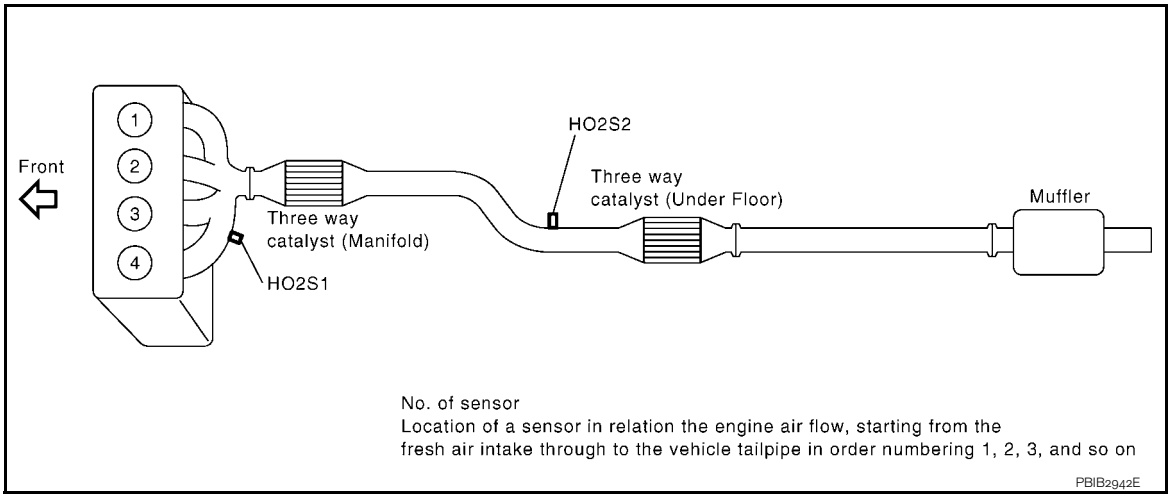


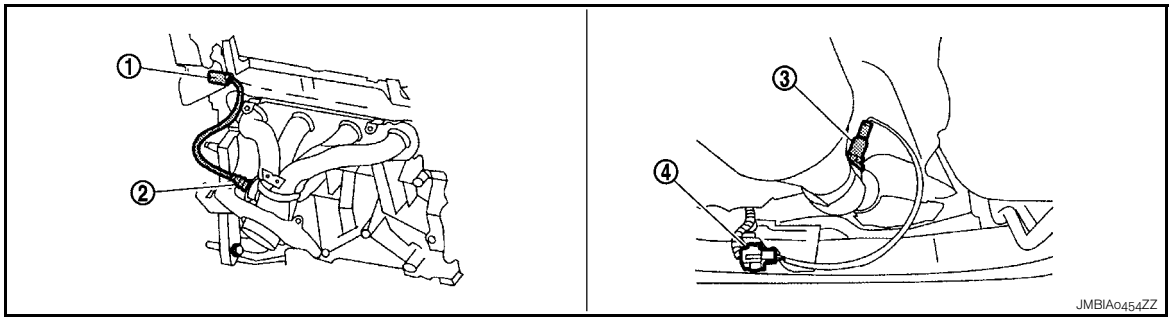
1. EVAP canister purge volume control solenoid valve
2. Mass air flow sensor (with intake air temperature sensor)



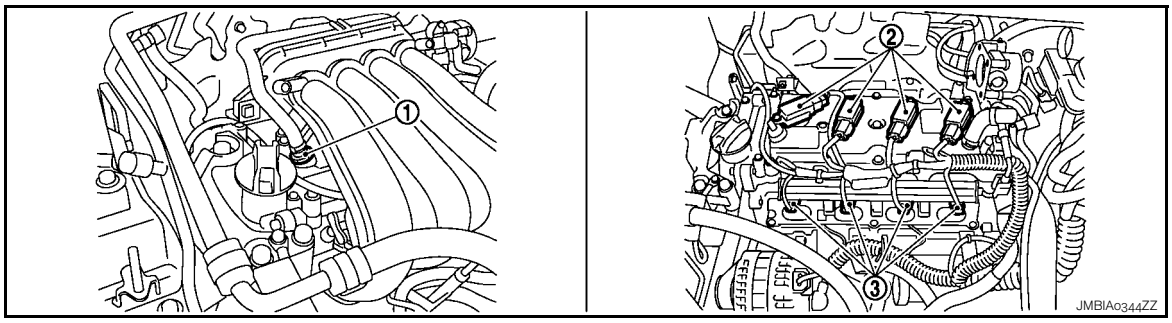
1. Camshaft position sensor
2. Engine coolant temperature sensor

cardiagn.com

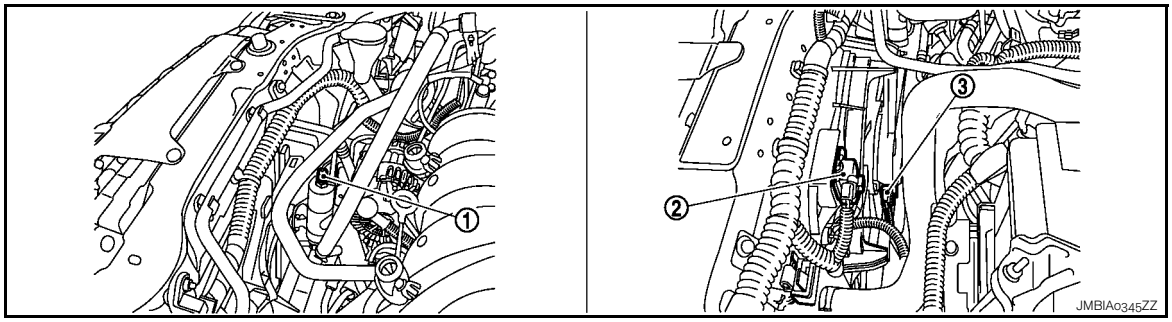




1. Heated oxygen sensor 1 harness connector
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

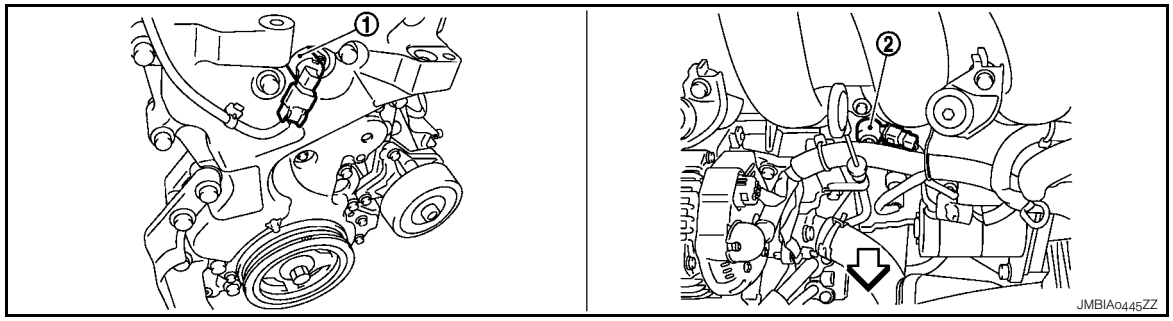


1. PCV valve
2. Ignition coil (with power transistor) and spark plug
3. Fuel injection

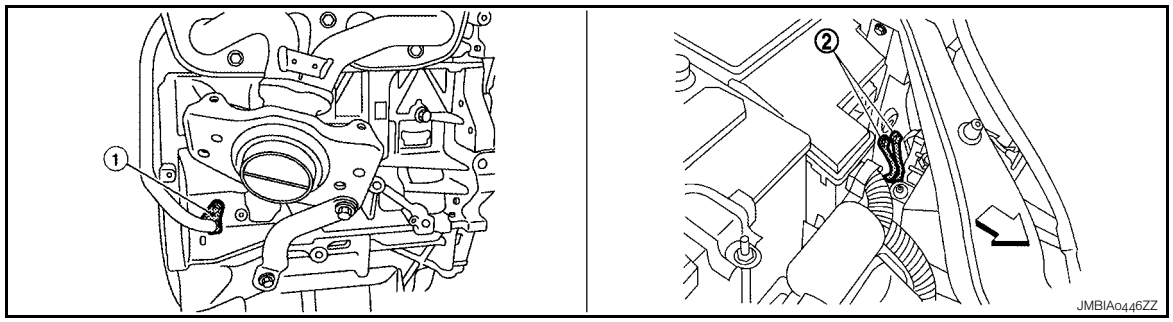


cardiagn.com

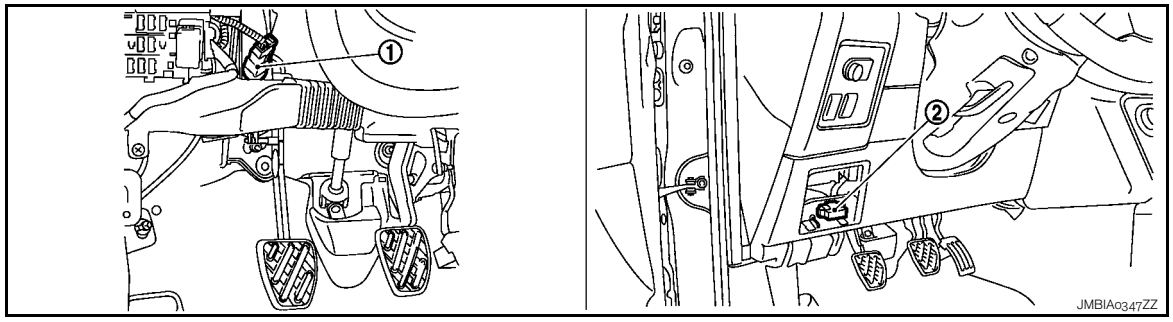
1. Refrigerant pressure sensor 2. Resister 3. Cooling fan motor



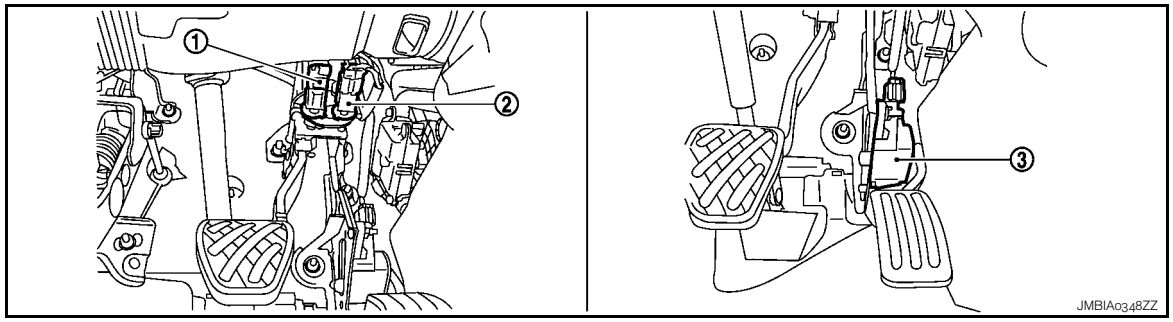
1. Intake valve timing control solenoid valve 2. Knock sensor



1. Crankshaft position sensor (POS) 2. Ground

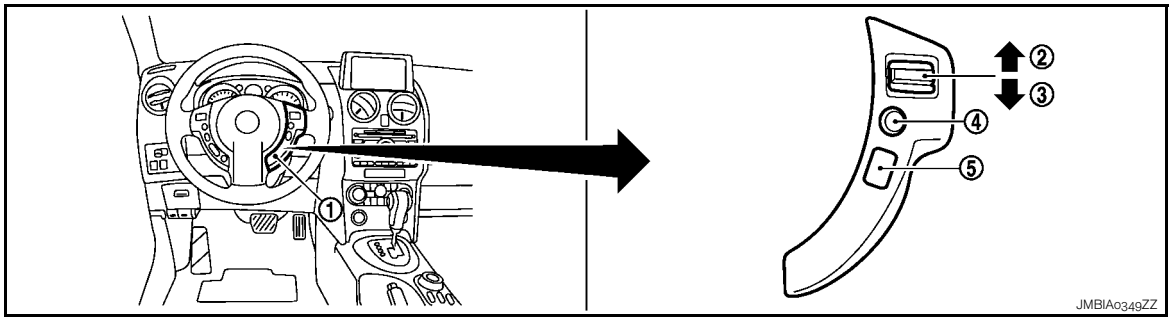


1. ASCD clutch switch 2. Data link connector

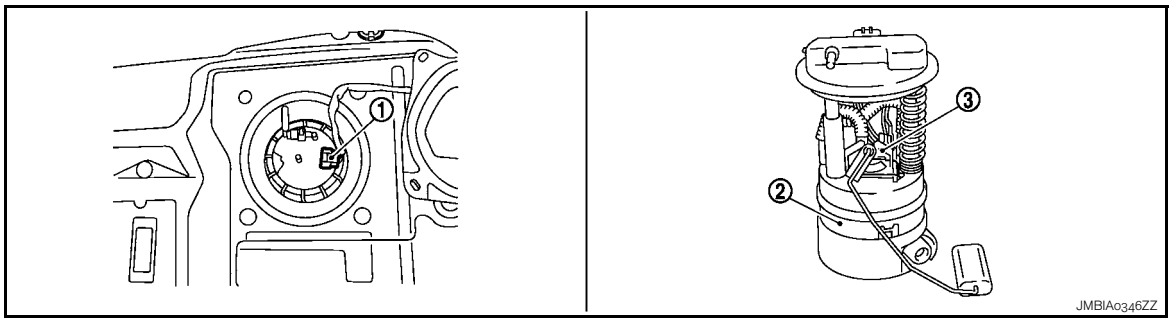


cardiagn.com

1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH
6.



1. Fuel level sensor unit and fuel pump harness connector
2. Fuel level sensor unit and fuel pump
3. Fuel pressure regulator

Component Description

INFOID:0000000001094081

Component	Reference
Camshaft position sensor (PHASE)	EC-813, "Description"
Crankshaft position sensor (POS)	EC-809, "Description"
Engine coolant temperature sensor	EC-754, "Description"
Intake valve timing control solenoid valve	EC-700, "System Diagram"
Vehicle speed sensor	EC-825, "Description"

cardiagn.com

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001094082

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information
Diagnostic Trouble Code (DTC)
Freeze Frame data
1st Trip Diagnostic Trouble Code (1st Trip DTC)
1st Trip Freeze Frame data

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-III	×	×	×	×
ECM	×	×*	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-1239, "Fail Safe".)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-982, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

cardiagn.com

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen,.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III
CONSULT-III displays the DTC in "SELF-DIAG RESULTS" mode Examples: P0117, P0340, P1217, etc.
(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III
The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0340, 1217, etc.
These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III
The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

Without CONSULT-III
NOTE:
If the DTC is not for CVT related items (see EC-1241, "DTC Index"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform TM-214, "Diagnosis Description". (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

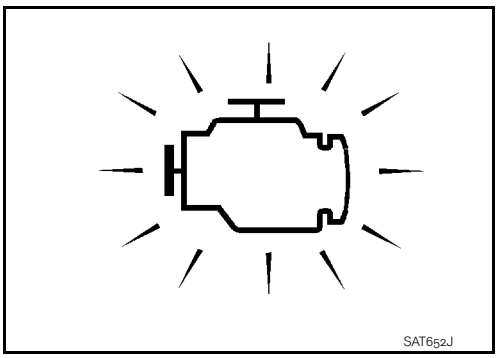
MALFUNCTION INDICATOR (MI)

Description

cardiagn.com

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".

Diagnostic Test Mode I — Malfunction Warning

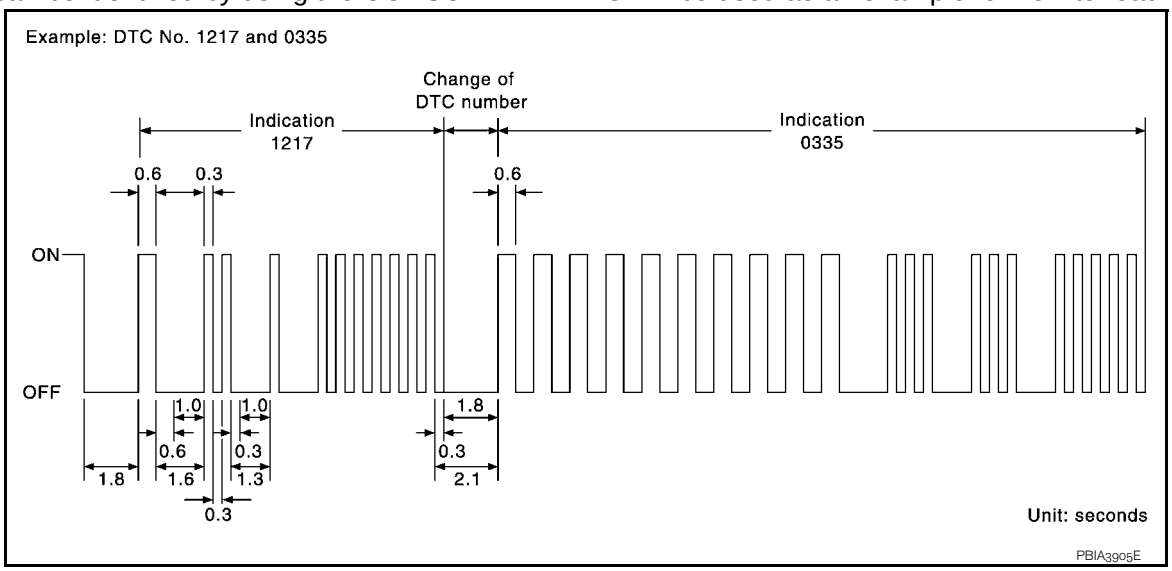
MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

cardiagn.com

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-1241, "DTC Index".)
HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to “HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULT)”.
- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor
In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load.
MI FLASHING WITHOUT DTC
If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later.
The following emission-related diagnostic information is cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes

cardiagn.com

- Freeze frame data
- 1st trip freeze frame data
- Test values

How to Switch Diagnostic Test Mode

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

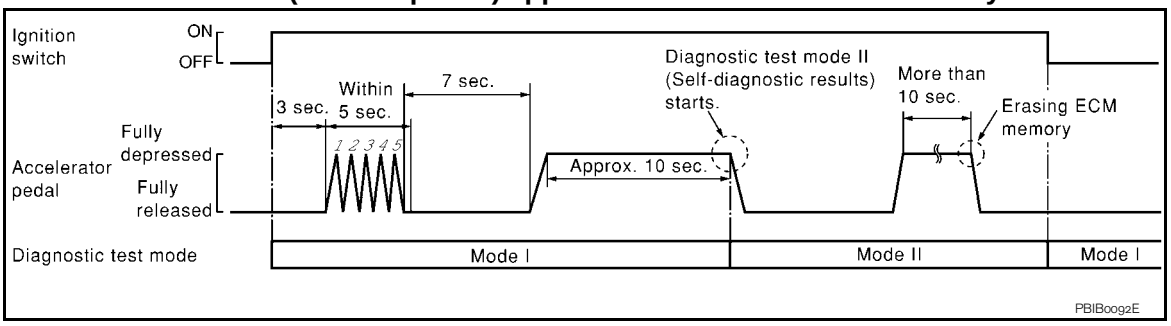
HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW to SET DIAGNOSTIC TEST MODE II (HEATED OXYGEN SENSOR 1 MONITOR)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to “HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)”.
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

HOW to ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)”.
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT-III Function

INFOID:0000000001094083

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

cardiagn.com

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE					
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2			
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×	
		Camshaft position sensor (PHASE)		×	×	×	×	
		Mass air flow sensor		×		×	×	
		Engine coolant temperature sensor		×	×	×	×	×
		Heated oxygen sensor 1		×		×	×	
		Heated oxygen sensor 2		×		×	×	
		Wheel sensor		×	×	×	×	
		Accelerator pedal position sensor		×		×	×	
		Throttle position sensor		×		×	×	
		Intake air temperature sensor		×	×	×	×	
		Knock sensor		×				
		EPS control unit				×	×	
		Refrigerant pressure sensor				×	×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×	
		Air conditioner switch				×	×	
		Park/neutral position (PNP) switch		×		×	×	
		Stop lamp switch		×		×	×	
		Battery voltage				×	×	
		Load signal				×	×	
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×
		Power transistor (Ignition timing)				×	×	×
		Throttle control motor relay		×		×	×	
		Throttle control motor		×				
		EVAP canister purge volume control solenoid valve		×		×	×	×
		Air conditioner relay				×	×	
		Fuel pump relay	×			×	×	×
		Cooling fan relay		×		×	×	×
		Heated oxygen sensor 1 heater		×		×	×	
		Heated oxygen sensor 2 heater		×		×	×	
		Intake valve timing control solenoid valve		×		×	×	×
		Calculated load value			×	×	×	

X: Applicable

cardiagn.com

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-1050, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item
Regarding items of DTC and 1st trip DTC, refer to EC-1241, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-1241, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

cardiagn.com

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
H02S1 (B1)	V	• The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: means the mixture became “lean”, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
THRTL SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2-B1			
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	

cardiagn.com

Monitored item	Unit	Description	Remarks
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM accordining to the input signals.	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	

cardiagn.com

Monitored item	Unit	Description	Remarks
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
02SEN HTR DTY	%	• Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	• Indicates [ON/OFF] condition of CVT according to the input signal from the TCM.	• For M/T models, always “OFF” is displayed.
AT OD CANCEL	ON/OFF	• Indicates [ON/OFF] condition of CVT cancel request signal.	• For M/T models, always “OFF” is displayed.
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only “#” is displayed if item is unable to be measured. • Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

cardiagn.com

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Heated oxygen sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay “ON” and “OFF” using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

cardiagn.com

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000001094085

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000001094086

1. START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-986, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

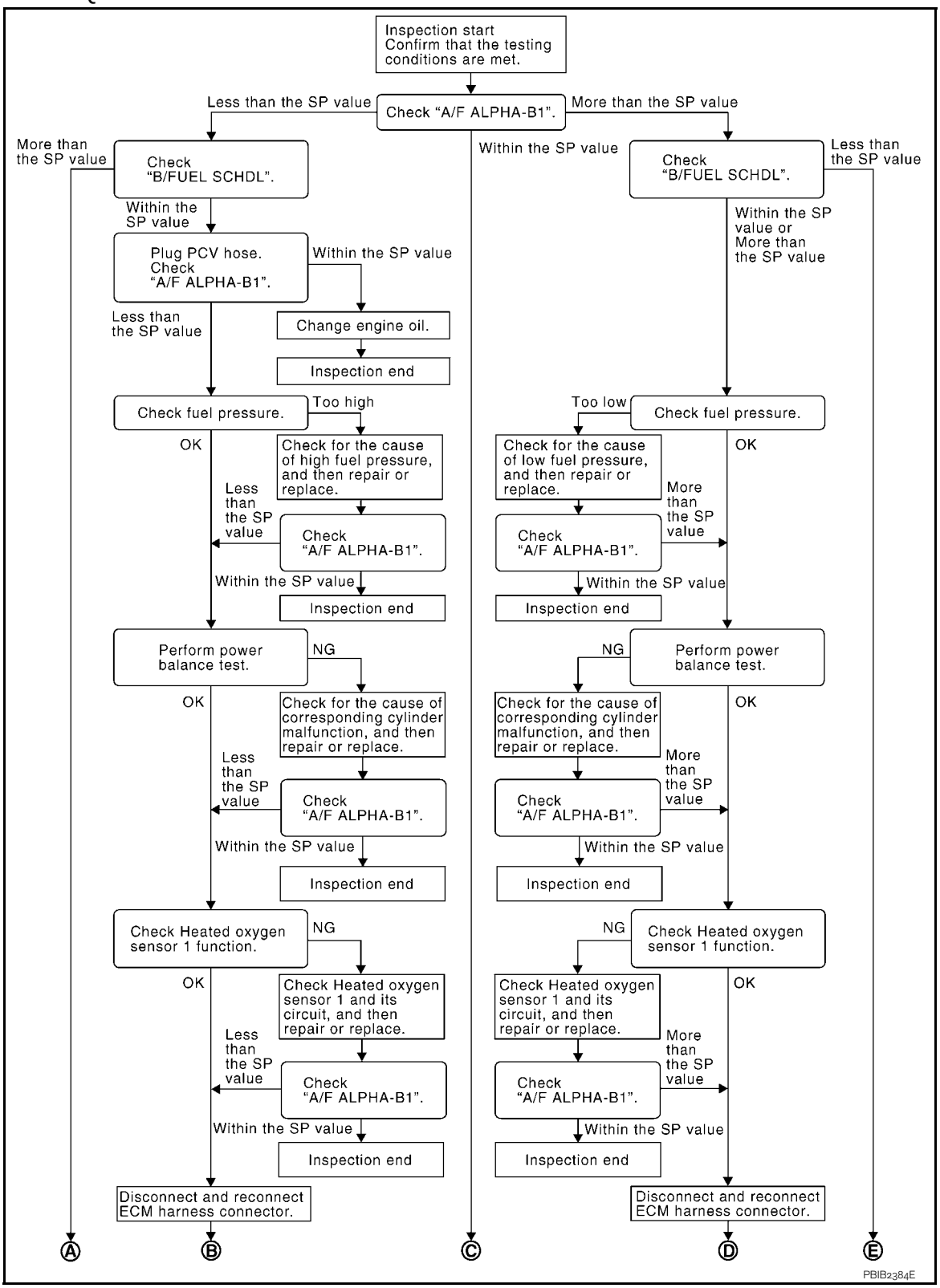
YES >> END
NO >> Go to EC-1061, "Diagnosis Procedure".

Diagnosis Procedure

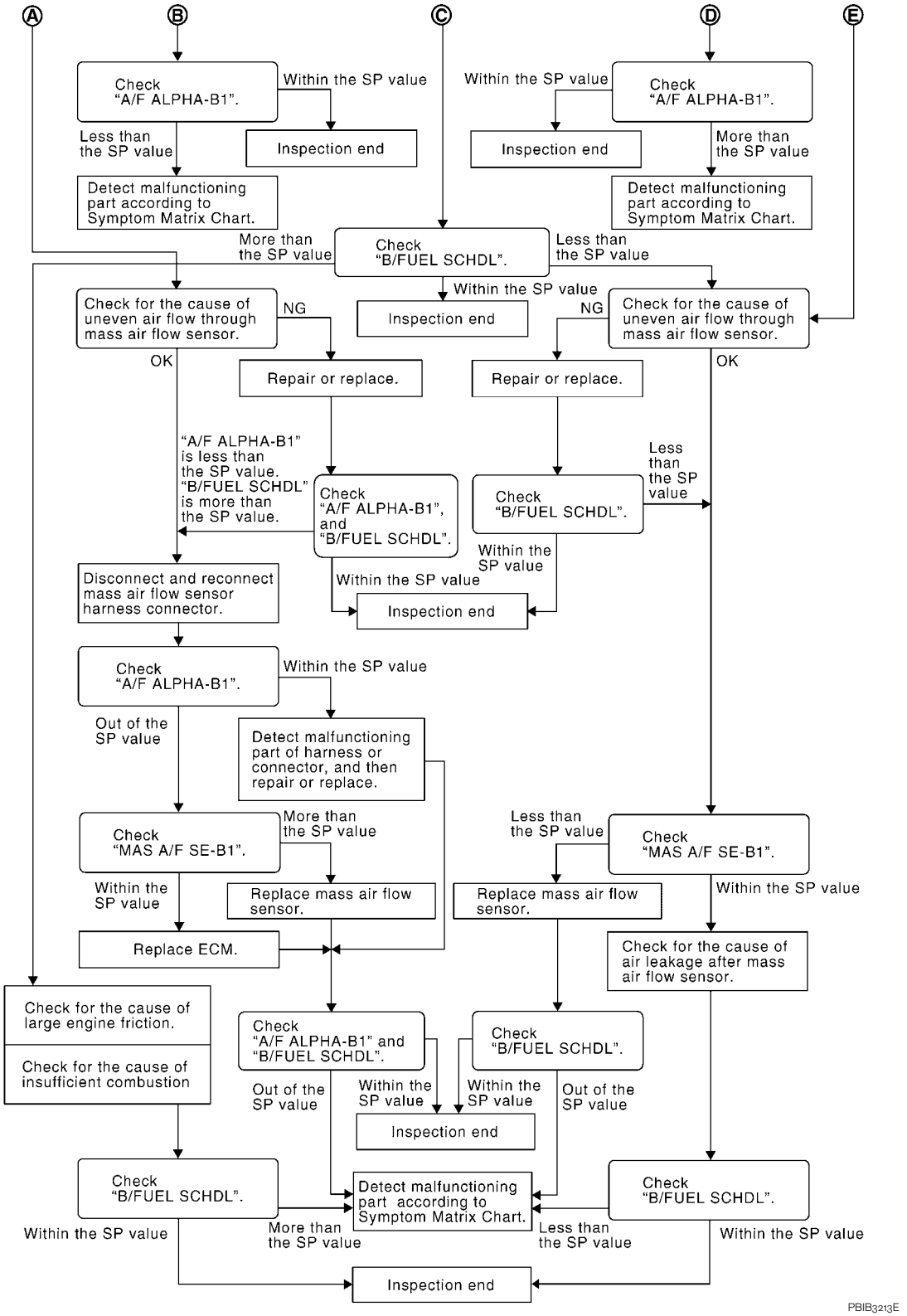
INFOID:0000000001094087

cardiagn.com

OVERALL SEQUENCE



cardiagn.com



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-1061, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

cardiagn.com

NOTE:
Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-978, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO-2 >> Fuel pressure is too low: GO TO 7.

7. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly” and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

cardiagn.com

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9.PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-929, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-923, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-142, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

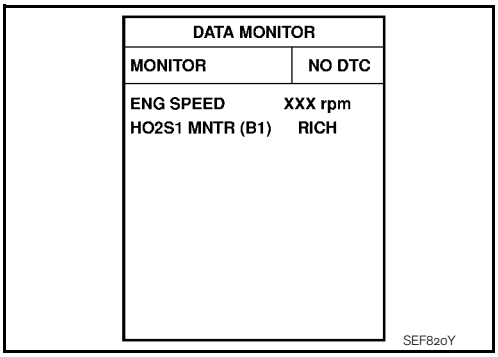
Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12.CHECK HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH



Is the inspection result more than 5 times during 10 seconds?

YES >> GO TO 15.
NO >> GO TO 13.

13.CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> GO TO 14.

14.CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

cardiagn.com

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-746, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Go to EC-645, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.
NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve

cardiagn.com

- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-967, "Symptom Table".

cardiagn.com

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001094088

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E105, M77
- 10A fuse (No. 4)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

cardiagn.com

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E11	10	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-929, "Diagnosis Procedure".
NO >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 14.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E11	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

cardiagn.com

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	32	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E6, F123
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 62) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F7	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

cardiagn.com

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

cardiagn.com

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000001094089

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001094090

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> EC-1073, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094091

Go to LAN-46, "Trouble Diagnosis Flow Chart".

cardiagn.com

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001094092

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000001094093

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1074, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094094

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See EC-1074, "DTC Logic".
5. Check DTC.

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-1074, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-989, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

cardiagn.com

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001094095

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for EC-829, "DTC Logic".

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec (CVT) More than 4.2 msec (M/T)
Shift lever	P or N position (CVT) N position (M/T)

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1076, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)

cardiagn.com

Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

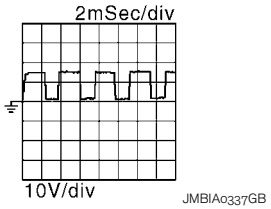
Is 1st trip DTC detected?

YES >> Go to EC-1076, "Diagnosis Procedure"
NO >> INSPECTION END

4.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

MAF sensor		Ground	Condition	Voltage
Connector	Terminal			
E18	5	Ground	At idle	Battery voltage
			When revving engine up to 2,000 rpm quickly	 JMBIA0337GB

Is the inspection result normal?

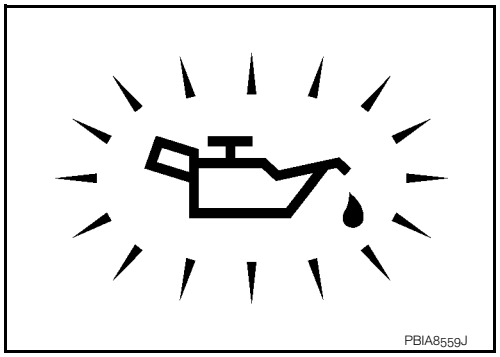
YES >> INSPECTION END
NO >> Go to EC-1076, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:0000000001094096

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.


PBIA8559J

Is oil pressure warning lamp illuminated?

YES >> Go to LU-14, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1077, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

cardiagn.com

Refer to EC-812, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

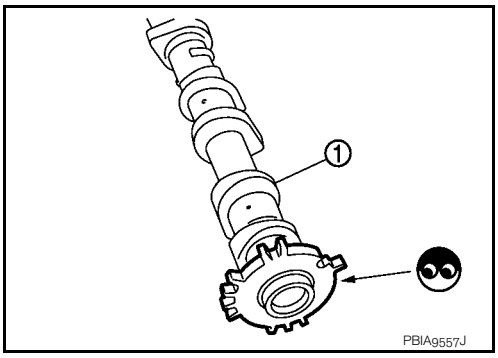
Refer to EC-815, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

Check the following.
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-163, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to EM-177, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094097

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

cardiagn.com

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

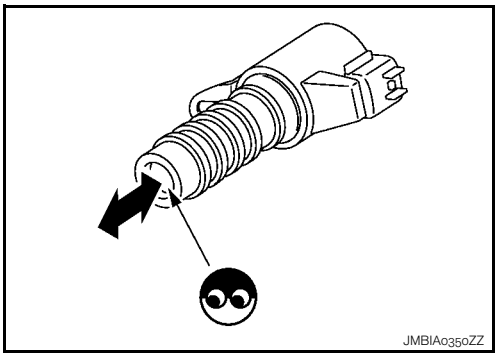
1. Remove intake valve timing control solenoid valve.
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

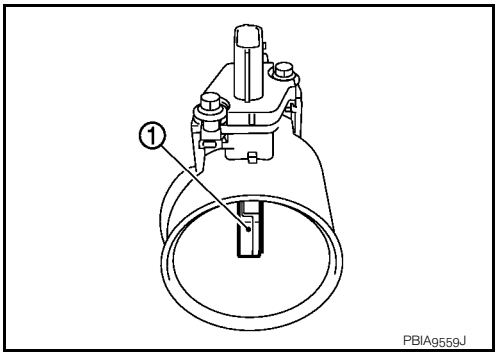
cardiagn.com

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001094098

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001094099

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1080, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1080, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1080, "Diagnosis Procedure".

cardiagn.com

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094100

1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

cardiagn.com

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Refer to EC-1081, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094101

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

cardiagn.com

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45 (MAF sensor)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.

cardiagn.com

3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	45	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

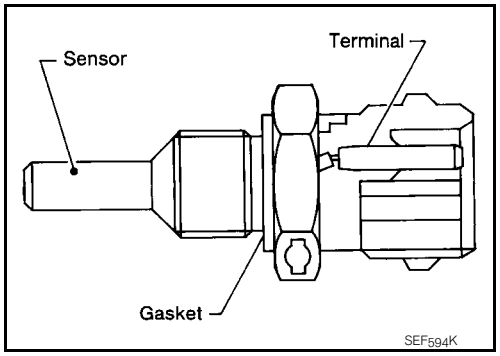
cardiagn.com

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001094106

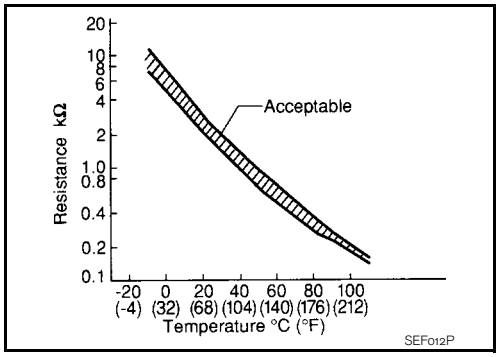
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

INFOID:0000000001094107

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1085, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001094108

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal		
F28	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1085, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

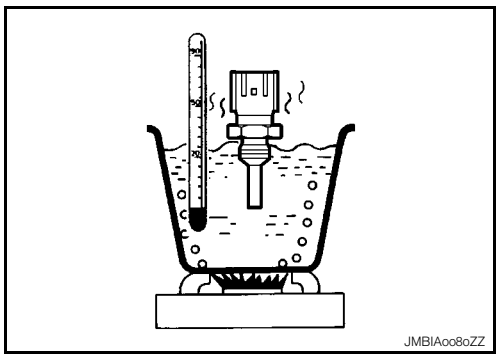
INFOID:0000000001094109

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

cardiagn.com

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

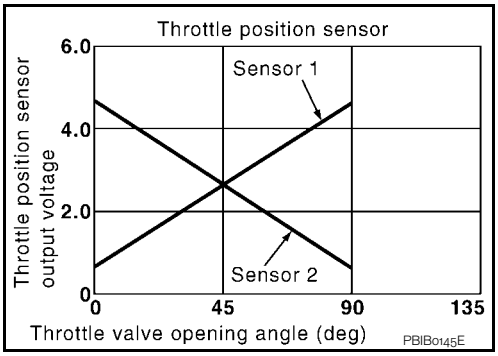
cardiagn.com

P0122, P0123 TP SENSOR

Description

INFOID:0000000001094110

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001094111

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1087, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094112

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-1088, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1089, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094113

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1089, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094114

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

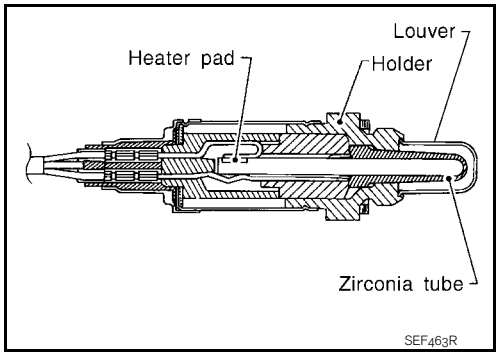
cardiagn.com

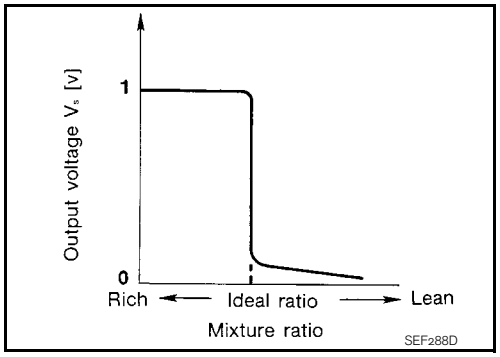
P0132 HO2S1

Description

INFOID:0000000001094115

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



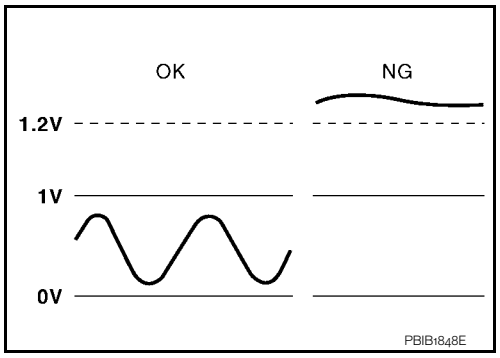


DTC Logic

INFOID:0000000001094116

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

cardiagn.com

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected.

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Perform Diagnostic Test Mode II (Self- diagnostic results) with ECM.
6. If 1st trip DTC is detected.

Is 1st trip DTC is detected?

YES >> Go to EC-1091, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094117

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 50 N·m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	existed

cardiagn.com

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-762, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001094118

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

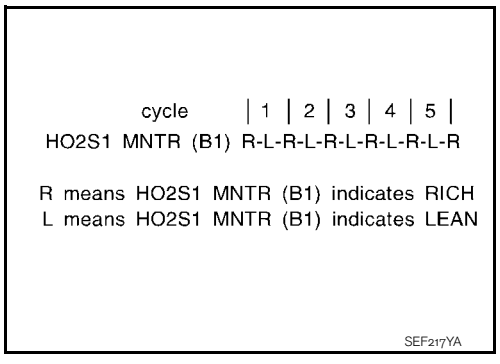
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

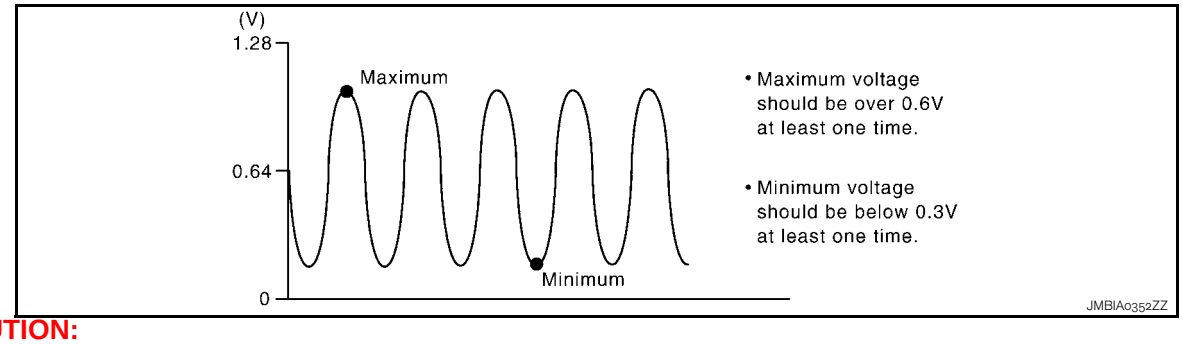
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.



cardiagn.com



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

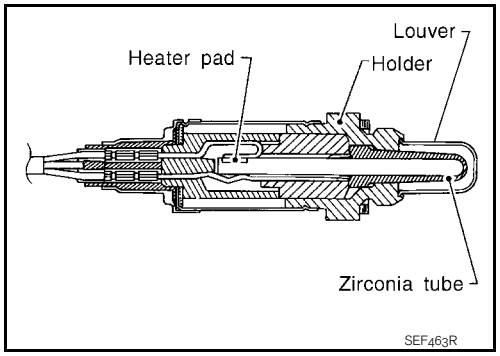
cardiagn.com

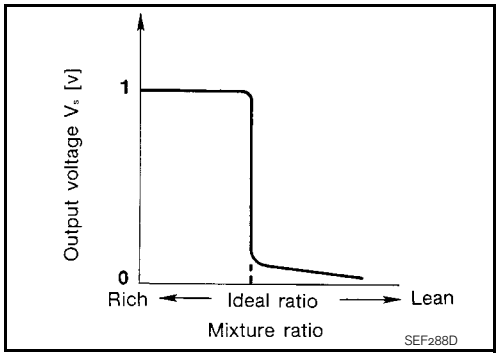
P0134 HO2S1

Description

INFOID:0000000001094124

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



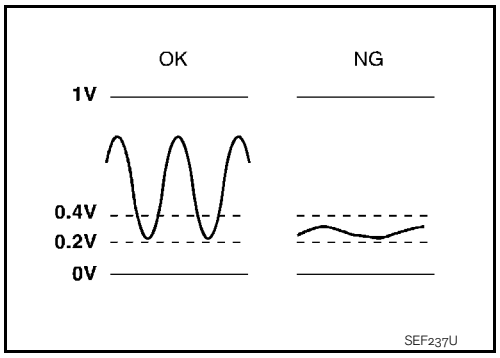


DTC Logic

INFOID:0000000001094125

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Do you have CONSULT-III?

cardiagn.com

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-III, and select "HO2S1 (B1)".
3. Hold engine speed at 2,000 rpm under no load.
4. Make sure that the indications do not remain in the range between 0.2V to 0.4V.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-765, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094126

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace ground connection.

2.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

cardiagn.com

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-772, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001094127

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

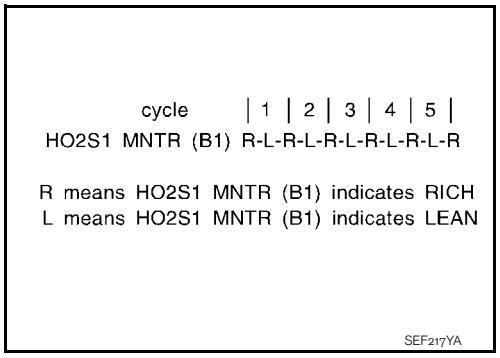
YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

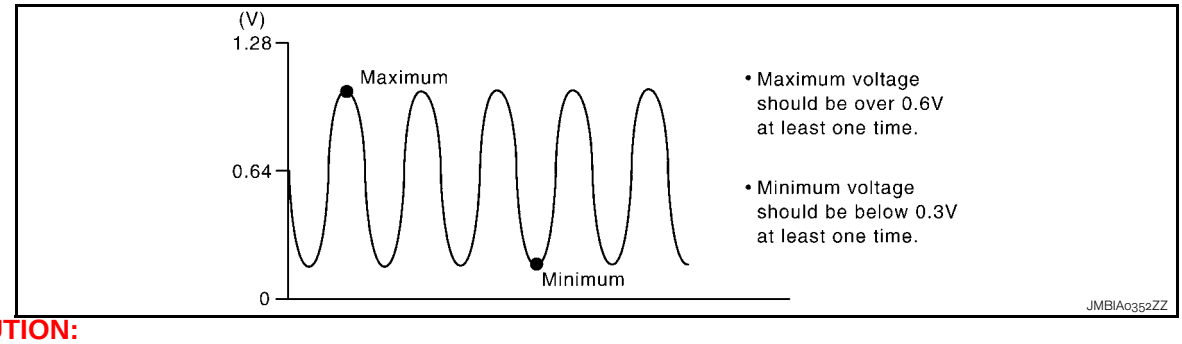
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.



cardiagn.com



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

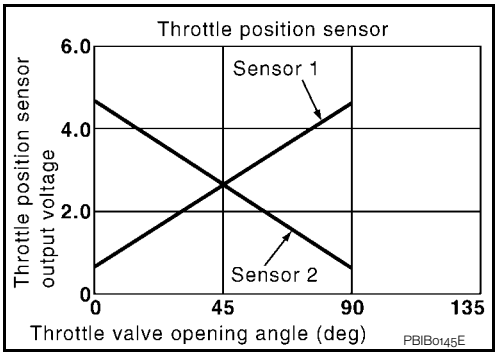
cardiagn.com

P0222, P0223 TP SENSOR

Description

INFOID:0000000001094149

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001094150

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-878, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1098, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094151

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

cardiagn.com

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-1099, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1100, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094152

cardiagn.com

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1100, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094153

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-991, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-991, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P0327, P0328 KS

Description

INFOID:0000000001094156

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001094157

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1101, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094158

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	2	F8	40	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

3.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK KNOCK SENSOR

Refer to EC-1102, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094159

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor.

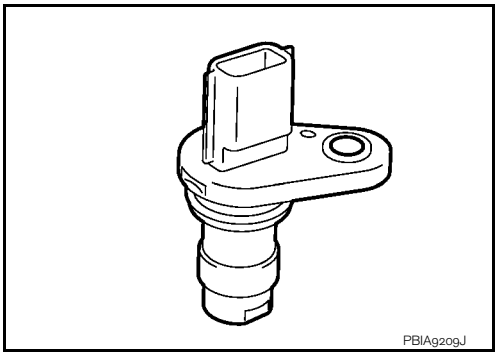
cardiagn.com

P0335 CKP SENSOR (POS)

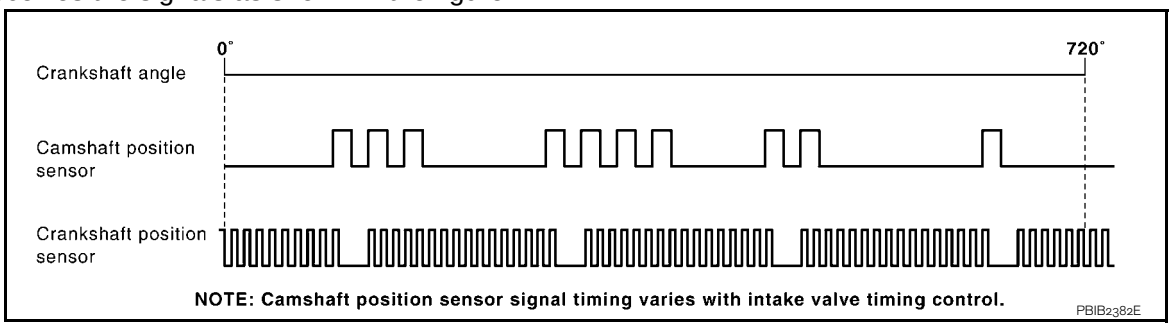
Description

INFOID:0000000001094160

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIAg209J

ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001094161

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-1104, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094162

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

cardiagn.com

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-1163, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1164, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F8	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F8	61	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1106, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

cardiagn.com

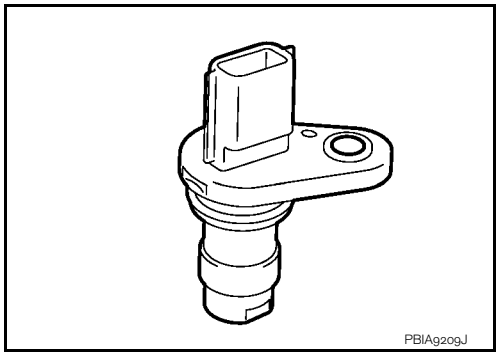
>> INSPECTION END

Component Inspection

INFOID:0000000001094163

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

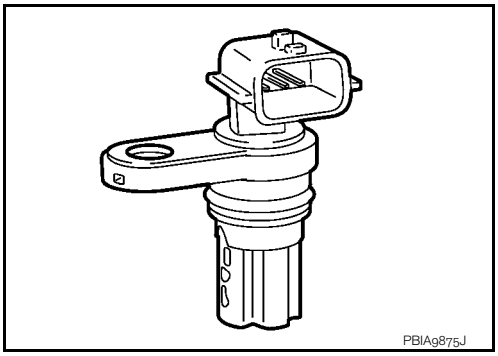
cardiagn.com

P0340 CMP SENSOR (PHASE)

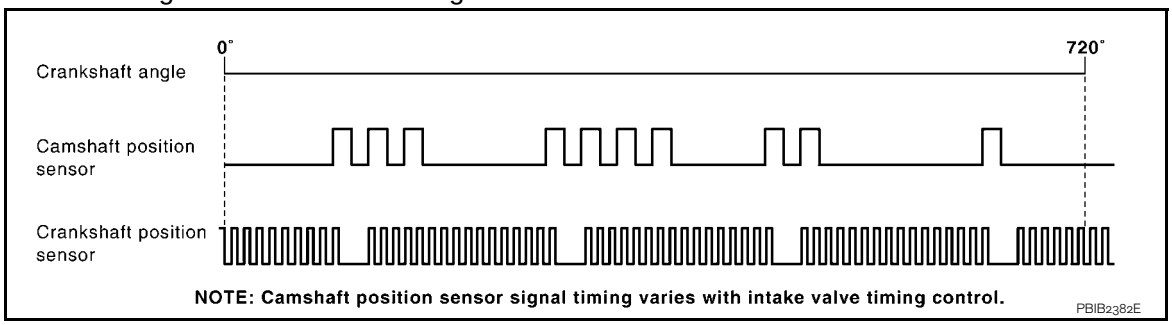
Description

INFOID:0000000001094164

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.



Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001094165

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to EC-1137, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

cardiagn.com

Is 1st trip DTC detected?

YES >> Go to EC-1108, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1108, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094166

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F8	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

cardiagn.com

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F8	65	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1109, "Component Inspection".

Is the inspection result normal?

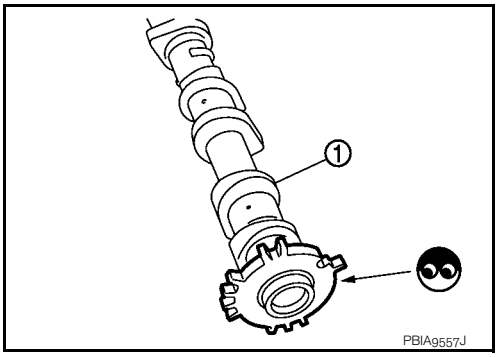
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

Check the following.
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

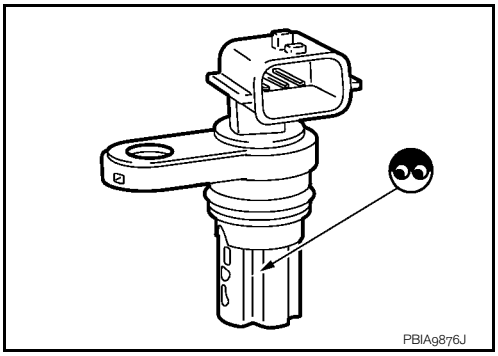
INFOID:0000000001094167

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

cardiagn.com

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

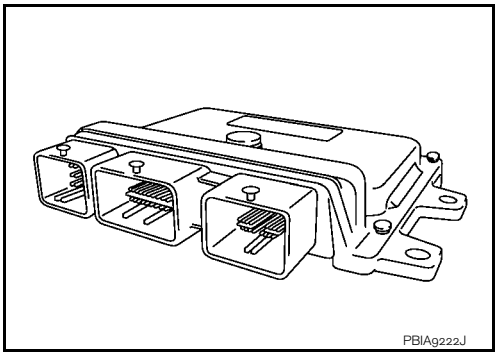
cardiagn.com

P0605 ECM

Description

INFOID:0000000001094179

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001094180

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1112, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1112, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1112, "Diagnosis Procedure".
NO >> INSPECTION END

cardiagn.com

Diagnosis Procedure

INFOID:0000000001094181

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-1111, "DTC Logic".

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the diagnostic Test Mode II (Self-diagnostic results) memory.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-1111, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-989, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

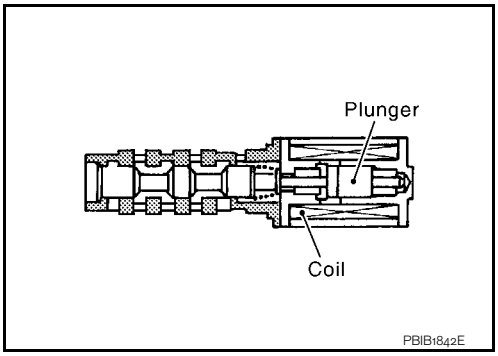
cardiagn.com

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001094182

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:0000000001094183

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094184

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F41	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTION PART

cardiagn.com

Check the following.
- Harness connectors E7, F121
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	1	F8	73	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1114, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094185

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

cardiagn.com

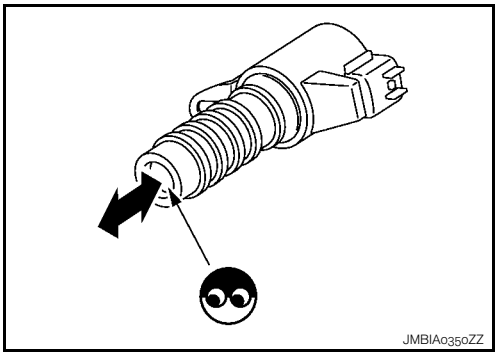
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

cardiagn.com

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001094186

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001094187

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P (CVT) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set shift lever to P (CVT) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-1116, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to N, P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-1116, "Diagnosis Procedure".
NO >> INSPECTION END

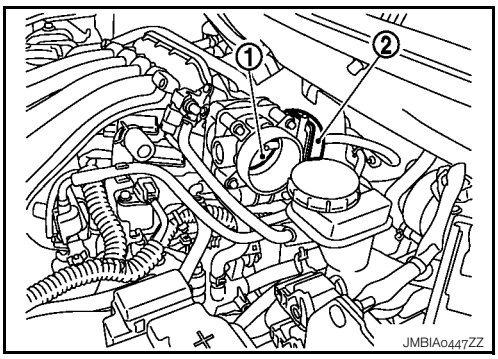
Diagnosis Procedure

INFOID:0000000001094188

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

cardiagn.com

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1117, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094189

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001094190

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001094191

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-1122, "DTC Logic" or EC-1116, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-1118, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001115766

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	25	F7	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

6.CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

5. Also check harness for short to ground and short to power.

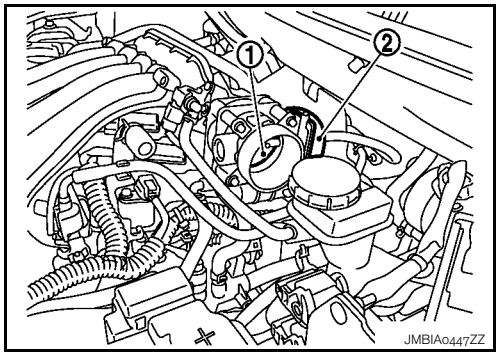
Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

2. Electric throttle control actuator



Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-837, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

cardiagn.com

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-837, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001094193

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1121, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094194

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001094195

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001094196

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P1126	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P1126 >> GO TO 2.
P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-1122, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094197

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Voltage
Connector	Terminal		
F7	15	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E12.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	25	F7	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

4.CHECK FUSE

1. Disconnect 15A fuse (No. 51) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	32	F7	2	Existed

2. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

cardiagn.com

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001094198

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001094199

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-1125, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094200

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F7	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1126, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1126, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001094201

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1126, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094202

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001094224

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001094225

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-869, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094226

Go to BRC-74, "Work Flow".

cardiagn.com

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001094227

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relay-1) • Cooling fan relay -3 • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-30, "Inspection". Also, replace the engine oil. Refer to LU-15, "Draining".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-21, "SAE Viscosity Number".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1129, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1130, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001094228

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

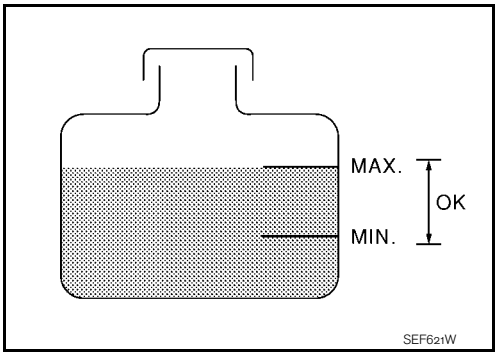
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

cardiagn.com

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-1130, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-1130, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-9, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1130, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094229

1.INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

2.CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check cooling fan control circuit.

3.CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III
1. Touch “HIGH” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan control circuit.

4.CHECK COOLING FAN LOW SPEED OPERATION

cardiagn.com

Without CONSULT-III
1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Check cooling fan low speed control circuit.

5.CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-III
1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan high speed control circuit.

6.CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-30, "Inspection".

Is leakage detected?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following for leak. Refer to CO-30, "Inspection".
- Hose
- Radiator
- Water pump
- Reservoir tank

>> Repair or replace.

8.CHECK RESERVOIR TANK CAP

Check radiator cap. Refer to CO-33, "RESERVOIR TANK CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace radiator cap.

9.CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace thermostat.

10.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor.

Is the inspection result normal?

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11.CHECK MAIN 13 CAUSES

If the cause cannot be isolated, check the following.

cardiagn.com

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-21, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-30, "Inspection"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-35, "Removal and Installation"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-30, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-41, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-920, "Component Inspection (Cooling Fan Motor)"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-30, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-30, "Inspection"
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-44, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-186, "Removal and Installation"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-191, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-26, "Troubleshooting Chart".

>> INSPECTION END

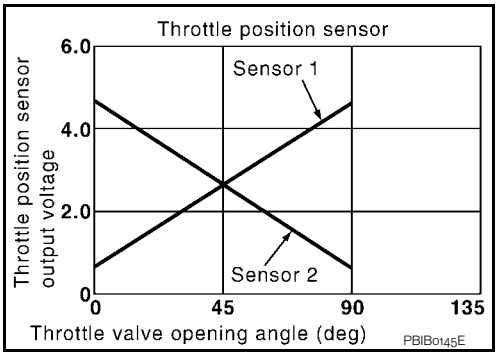
cardiagn.com

P1225 TP SENSOR

Description

INFOID:0000000001094230

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001094231

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1133, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

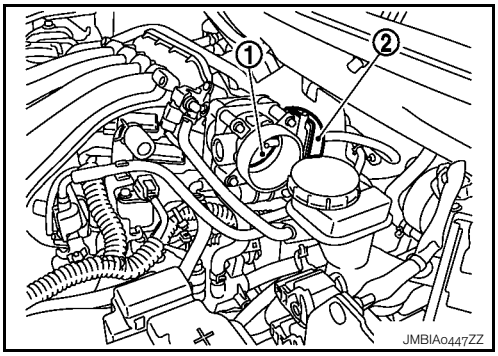
INFOID:0000000001094232

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1134, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094233

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

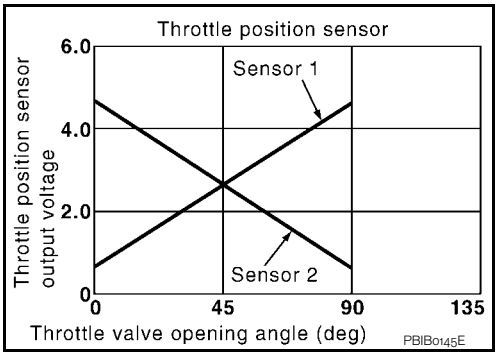
cardiagn.com

P1226 TP SENSOR

Description

INFOID:0000000001094234

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001094235

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1135, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

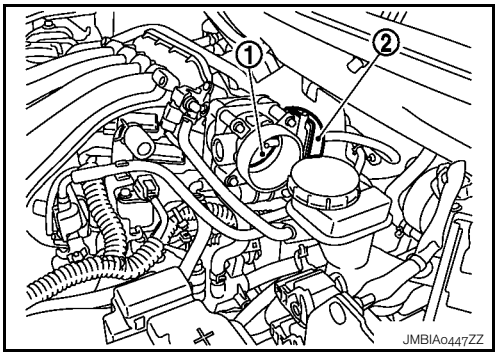
INFOID:0000000001094236

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

cardiagn.com

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1134, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094237

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

cardiagn.com

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001094238

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1137, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094239

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

cardiagn.com

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	72	Electric throttle control actuator	F29	1
	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	4

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMSHAFT PSITION SENSOR

Refer to EC-1109, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-833, "Special Repair Requirement".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-901, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001116077

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-677, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116078

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to EC-1139, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116079

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

cardiagn.com

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E16	94 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector M352.
4. Check the continuity between ASCD steering switch and ECM harness connector.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Check the continuity between ECM harness connector and ASCD steering switch.

ASCD steering switch	ECM		Continuity
Terminal	Connector	Terminal	
14	E16	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCE steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1141, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001116080

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M325	14 and 15	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch

cardiagn.com

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001116081

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-677, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001116082

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572	ASCD brake switch	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T) • Stop lamp switch • ASCD brake switch • ASCD clutch switch (M/T) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation (M/T) • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

cardiagn.com

Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1144, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1144, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component check. Refer to EC-1143, "Component Function Check"
Use component function check to check the overall function of the ASCD brake circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1144, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001116275

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-826, "Diagnosis Procedure".

cardiagn.com

2.PERFORM COMPONENT FUNCTION CHECK-II

Without CONSSULT-III
Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-826, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001116083

1.CHECK OVERALL FUNCTION-I

With CONSULT-III
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> CVT models: GO TO 3.
NO-1 >> M/T models: GO TO 7.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III
Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III
Check the voltage between ECM harness connector and ground.

cardiagn.com

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 14.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM ASCD harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-1148, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

cardiagn.com

ASCD Clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 8.

8.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E105, M77
- 10A fuse (No.4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11.CHECK ASCD BRAKE SWITCH

Refer to EC-888, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

12.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ASCD brake switch harness connector.

cardiagn.com

ECM		ASCD brake switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	100	E112	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to EC-888, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD clutch switch.

14. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.11)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E114 (M/T) E115 (CVT)	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.
NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

18. CHECK STOP LAMP SWITCH

Refer to EC-889, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace stop lamp switch.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001116084

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001116085

1. CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".

cardiagn.com

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001116086

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

cardiagn.com

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001116087

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-677, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001116088

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-741, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-825, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-827, "DTC Logic"**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (CVT models) • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-1150, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001116089

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-214, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

cardiagn.com

P1706 PNP SWITCH

Description

INFOID:0000000001094253

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001094254

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-1153, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,500 - 6,375 rpm M/T: 1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

cardiagn.com

B/FUEL SCHDL	CVT: 2.4 - 31.8 msec M/T: 3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1153, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1153, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1153, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001094255

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	69 (PNP switch signal)	Ground	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
				Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1153, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094256

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F21 (CVT)	7	Ground	Battery voltage
F46 (M/T 2W)	2		
F48 (M/T 4W)	2		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123

cardiagn.com

• Harness for open or short between PNP switch and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	6	E10	102	Existed
F46 (M/T 2W)	3			
F48 (M/T 4W)	1			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO-1 >> Repair open circuit or short to ground or short to power in harness or connectors. (M/T)
NO-2 >> GO TO 4. (CVT)

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	7	E11	14	Existed

2. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM		Continuity
Connector	Terminal	Connector	Terminal	
F8	69	E11	14	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PNP SWITCH

Refer to TM-227, "Component Inspection" (CVT) or TM-54, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P1805 BRAKE SWITCH

Description

INFOID:0000000001094260

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001094261

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1155, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094262

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

YES >> GO TO 4
NO >> GO TO 2

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E114 (M/T)	1	Ground	Battery voltage
E115 (CVT)			

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connector.

3.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E114 (M/T)	2	Existed
		E115 (CVT)		

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M77, E105
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to EC-1156, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001094263

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to EC-897, "Component Inspection (Stop Lamp Switch)".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> Replace stop lamp switch.

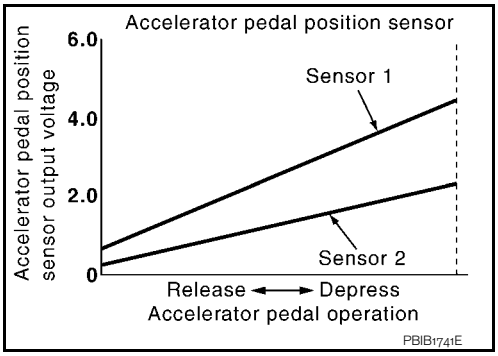
cardiagn.com

P2122, P2123 APP SENSOR

Description

INFOID:0000000001094264

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001094265

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1137, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1158, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094266

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	9	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1160, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1160, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection

INFOID:0000000001094267

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1160, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094268

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

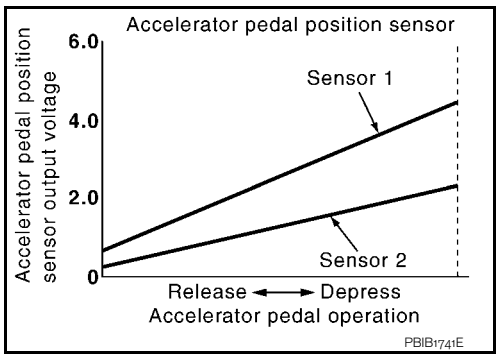
cardiagn.com

P2127, P2128 APP SENSOR

Description

INFOID:0000000001094269

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001094270

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1161, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094271

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-1106, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

cardiagn.com

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-1163, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1164, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094272

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1164, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094273

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

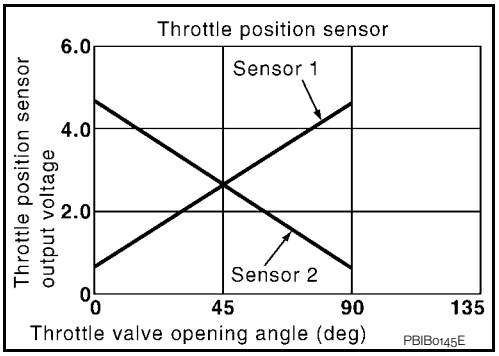
cardiagn.com

P2135 TP SENSOR

Description

INFOID:0000000001094274

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001094275

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1137, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1165, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094276

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F8	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F8	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-1167, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

cardiagn.com

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-1167, "Special Repair Requirement"

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094277

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-1167, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
F8	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-1167, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094278

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

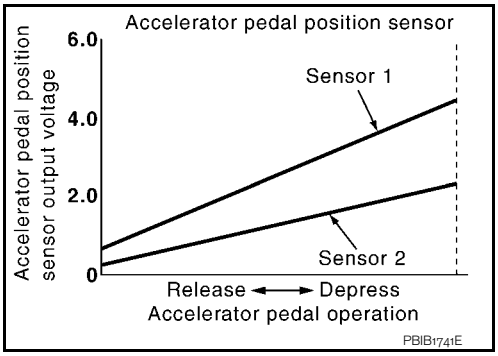
cardiagn.com

P2138 APP SENSOR

Description

INFOID:0000000001094279

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001094280

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1137, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-1168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001094281

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

cardiagn.com

2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

cardiagn.com

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-1106, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-936, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	2	E16	111	Existed
	1		104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-1170, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1171, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001094282

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

cardiagn.com

2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E110	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9V
				Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6V
				Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-1171, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001094283

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-647, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-647, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-647, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

cardiagn.com

ASCD BRAKE SWITCH

Description

INFOID:0000000001094284

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-677, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001094285

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-1172, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094286

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

cardiagn.com

- Junction block connector M77, E105
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH

Refer to EC-1174, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E112	1	Ground	Clutch pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 7.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

cardiagn.com

Check the following.
- Junction block connector M77,E105
- 10A fuse (No. 4)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	1	E111	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD CLUTCH SWITCH

Refer to EC-888, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD clutch switch.

11.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector
3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E16	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK ASCD BRAKE SWITCH

Refer to EC-888, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

13.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001094287

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

cardiagn.com

3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD miodels) orBR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001094288

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

cardiagn.com

ASCD INDICATOR

Description

INFOID:0000000001094289

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-677, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001094290

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1176, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094291

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-740, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

COOLING FAN

Description

INFOID:0000000001094292

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-685, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001094293

1.CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fans operates at low speed.

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check cooling fan low speed control circuit.

2.CHECK COOLING FAN HIGH SPEED FUNCTION

With CONSULT-III

1. Touch “HI” on the CONSULT-III screen.
2. Make sure that cooling fans operates at higher speed than low speed.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit.

Diagnosis Procedure

INFOID:0000000001094294

1.CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector and cooling fan relay-3 harness connector.
3. Check the voltage between IPDM E/R harness connector or cooling fan relay-3 harness connector and ground.

IPDM E/R		cooling fan relay-3		Ground	Voltage
Connector	Terminal	Connector	Terminal		
E14	53	E59	1	Ground	Battery voltage
			3		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

cardiagn.com

- 50A fusible link (letter M)
- Harness for open or short between IPDM E/R cooling fan relay-3 and battery

>> Repair or replace malfunctioning part.

3. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector or cooling fan relay-3 harness connector and cooling fan motor harness connector.

Cooling fan relay-3		IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	Connec-tor	Terminal	
E59	2	E14	52	E3	1	Existed

3. Check the continuity between cooling fan relay-3 harness connector and IPDM E/R harness connector.

Cooling fan relay-3		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E59	4	E13	48	Existed

4. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E10	5	Ground	Existed
			6		

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and cooling fan relay
- Harness for open or short between cooling fan relay-3 and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground
- Resistor E57

>> Repair or replace malfunctioning part.

5. CHECK GROUND CONNECTION

Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace ground connection.

6. CHECK COOLING FAN RELAYS

Refer to EC-1179, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning cooling fan relay.

cardiagn.com

7.CHECK COOLING FAN MOTOR

Refer to EC-1179, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning cooling fan motor.

8.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001094295

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fans operates .

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

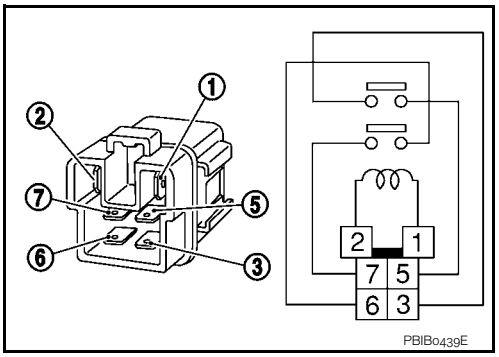
Component Inspection (Cooling Fan Relay)

INFOID:0000000001094296

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay-3.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
1 and 2	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

cardiagn.com

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001094297

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001094298

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-1180, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-1180, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1180, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094299

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-1180, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-4, "System Diagram".

cardiagn.com

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-11, "System Diagram" (XENON TYPE) or EXL-191, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

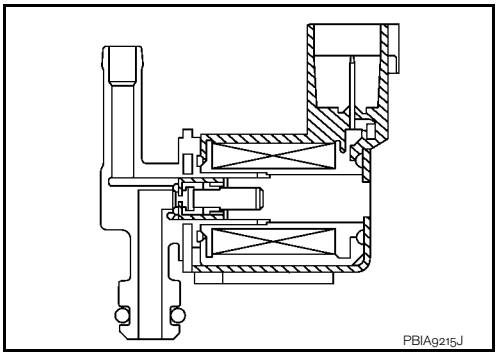
cardiagn.com

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001102408

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



Component Function Check

INFOID:0000000001102409

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE FUNCTION

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle.
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode wit CONSULT-III.
5. Touch “Qu” and “Qd” on CONSULT-III screen to adjust “PURG VOL CONT/V” and check vacuum existence under the following conditions.

PURG VOL CONT/V	Vacuum
100%	Existed
0 %	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle for at least 100 seconds.
4. Check vacuum existence under the following conditions.

Condition	Vacuum
At idle	Not existed
About 2,000 rpm	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1182, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102410

1.CHECK EVAP CANISTER

Refer to EC-636, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repaor or replace.

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.

cardiagn.com

3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 5.
YES-2 >> Without CONSULT-III: GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1184, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

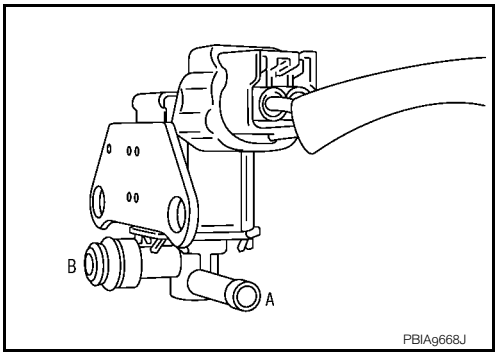
Component Inspection

INFOID:0000000001102411

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

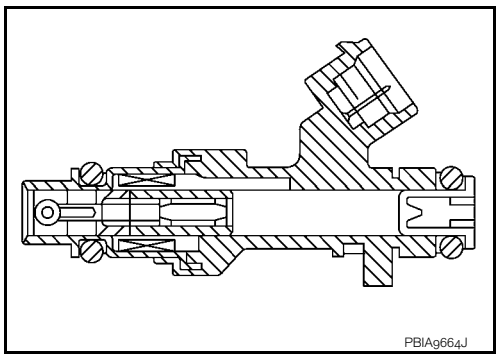
cardiagn.com

FUEL INJECTOR

Description

INFOID:0000000001094300

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000001094301

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-1185, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

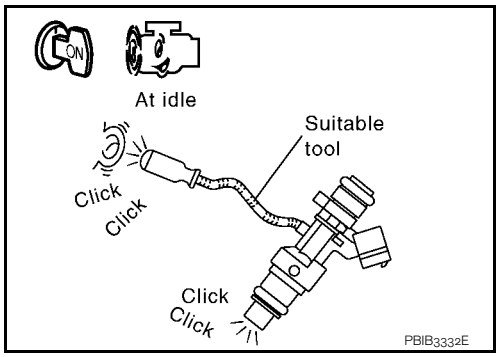
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1185, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094302

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

cardiagn.com

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F37	1	Ground	Battery voltage
2	F38	1		
3	F39	1		
4	F40	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 58)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F37	2	F7	31	Existed
2	F38	2		30	
3	F39	2		29	
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-1186, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001094303

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

cardiagn.com

Terminals	Resistance [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

cardiagn.com

FUEL PUMP

Description

INFOID:0000000001094304

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

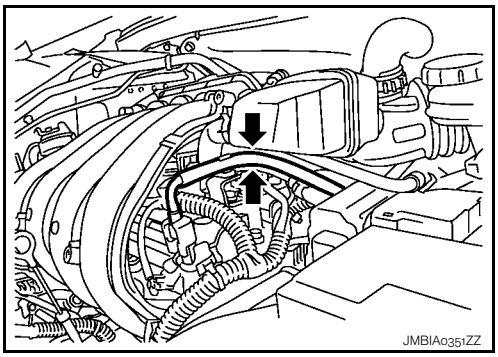
Component Function Check

INFOID:0000000001094305

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-1188, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094306

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F7	23	E13	33	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E6, F123.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 10A fuse (No. 57) from IPDM E/R.
3. Check 10A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
F13	42	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

cardiagn.com

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-1190, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001094307

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

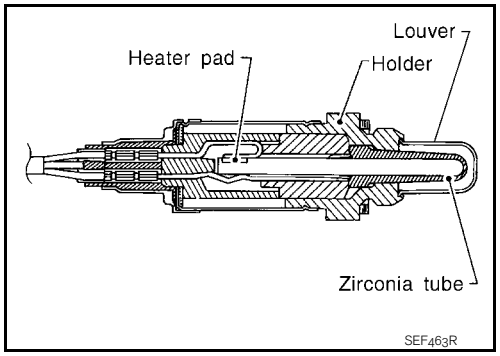
cardiagn.com

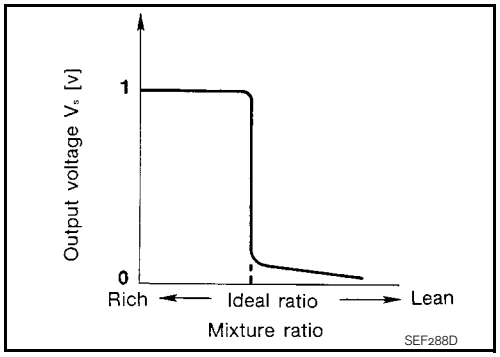
HO2S1

Description

INFOID:0000000001102117

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





Component Function Check

INFOID:0000000001102118

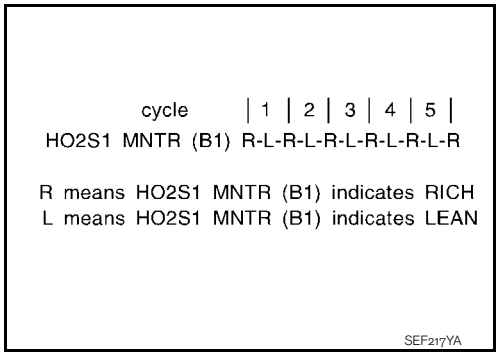
1. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNITOR (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuates between LEAN and RICH more than five times in 10 seconds.

1 times: RICH →LEAN→ RICH

2 times: RICH →LEAN→RICH→LEAN→ RICH

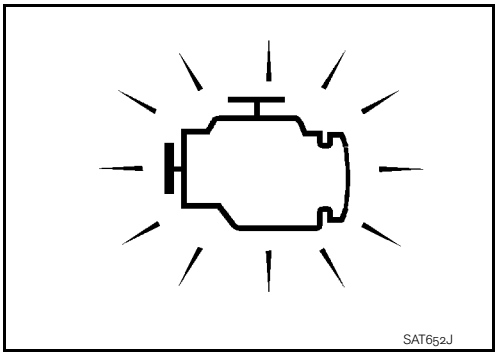


Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Set ECM in Diagnostic test mode - II (Heated oxygen sensor 1 monitor).

cardiagn.com

4. Keep the engine speed at 2,000 rpm under no load, and make sure that the MI comes ON more than five times in 10 seconds.



Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-146, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102119

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

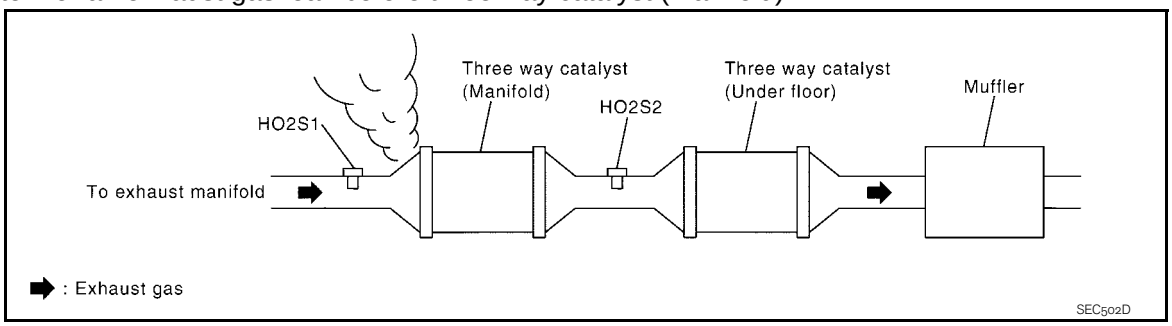
Loosen and retighten the heated oxygen sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

cardiagn.com

2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

2. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-1081, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK PCV VALVE

Refer to EC-935, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace PCV valve.

9.CHECK HEATED OXYGEN SENSOR 1

Perform EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heated oxygen sensor 1.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001102120

cardiagn.com

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

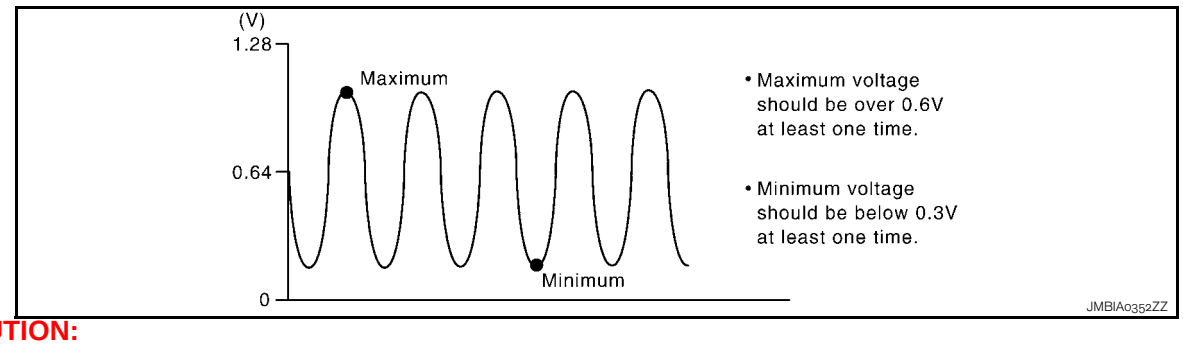
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

cardiagn.com

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

HO2S1 HEATER

Description

INFOID:0000000001102121

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the Heated oxygen sensor 1 heater corresponding to the engine operating condition to keep the temperature of Heated oxygen sensor 1 element at the specified range.

OPERATION

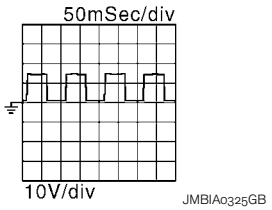
Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up	ON

Component Function Check

INFOID:0000000001102122

1.PERFORM COMPONENT FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Set tester prove between ECM harness connectior and ground.
5. Start engine and let it idle.
6. Check the woltage under the following conditions.Verify that the oscilloscope screen shows the signal waves as shown below.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	3 (HO2S1 HEATER signal)	Ground	At idlw	Approximately 7.0★  JMBIA0325GB
			Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-146, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102123

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect HO2S1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F30	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- IPDM E/R harness connector E11
- 10A fuse (No. 63)
- Harness for open or short between HO2S1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F7	3	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S1 HEATER

Refer to EC-1198, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace HEATED OXYGEN SENSOR 1.

CAUTION:
- **Discard any heated oxygen sensor 1 which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor 1, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

cardiagn.com

>> Repair or replace.

Component Inspection

INFOID:0000000001102124

1.CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

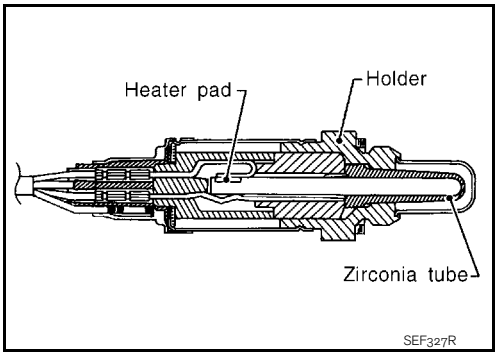
cardiagn.com

HO2S2

Description

INFOID:0000000001102125

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



Component Function Check

INFOID:0000000001102126

1. PERFORM COMPONENT FUNCTION CHECK-I

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain inthe range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage does not remain inthe range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position with OD “OFF”(CVT), 3rd gear position	The voltage does not remain inthe range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1200, "Diagnosis Procedure".

cardiagn.com

Diagnosis Procedure

INFOID:0000000001102127

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E58	4	F7	5	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1201, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001102128

1. INSPECTION START

Do you have CONSULT-III?

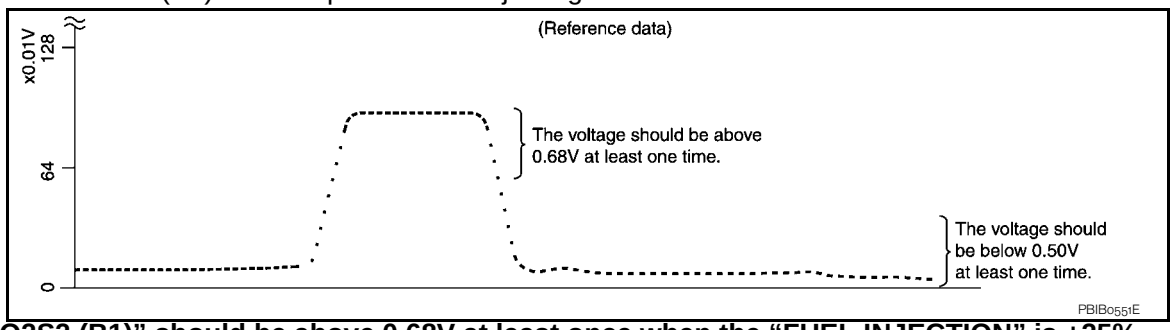
Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position with OD “OFF”(A/T), 3rd gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

cardiagn.com

HO2S2 HEATER

Description

INFOID:0000000001102129

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

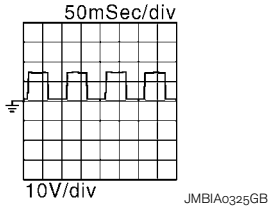
Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,900	OFF
Below 3,900 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Component Function Check

INFOID:0000000001102130

1. CHECK HEATED OXYGEN SENSOR 2 HRATER FUNCTION

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage signal
Connector	Terminal			
F7	5 [HO2S2 heater signal]	Ground	At idle	Approx. 10V★ 
			Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1196, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102131

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

cardiagn.com

NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect HO2S2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E11
- 10A fuse (No. 63)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E58	3	F7	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between heated oxygen sensor 2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK HO2S2 HEATER

Refer to EC-1205, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

cardiagn.com

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001102132

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

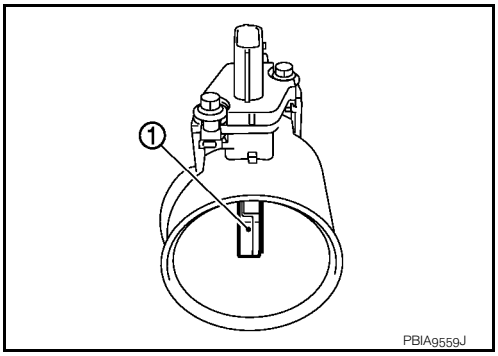
cardiagn.com

IAT SENSOR

Description

INFOID:0000000001102133

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



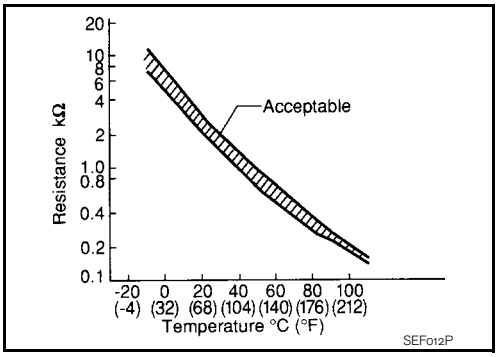
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 50 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



Component Function Check

INFOID:0000000001102134

1.CHECK INTAKE AIR TEMPERATURE SENSOR FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	46	Ground	Approx. 0 - 4.8V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1206, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102135

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

cardiagn.com

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F8	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1207, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001102136

1. CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Resistance [°C (77°F)]
1 and 2	1.800 - 2.200 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

cardiagn.com

IGNITION SIGNAL

Description

INFOID:0000000001094308

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001094309

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-1208, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

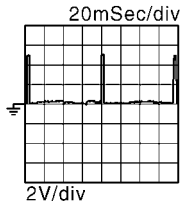
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1208, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal
Connector	Terminal		
F7	17	Ground	
	18		
	21		
	22		

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1208, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094310

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

cardiagn.com

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-736, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E11	9	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-736, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER

Refer to EC-1211, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

cardiagn.com

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F7	17	Existed
2	F34	1		18	
3	F35	1		22	
4	F36	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1211, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001094311

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

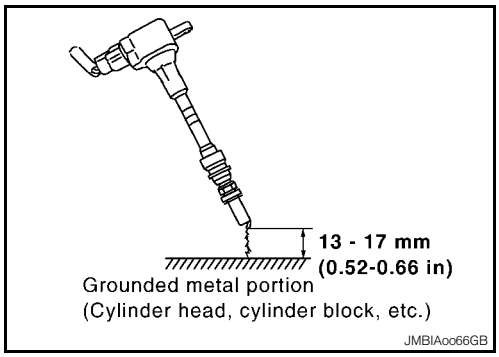
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001094312

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

cardiagn.com

3. Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

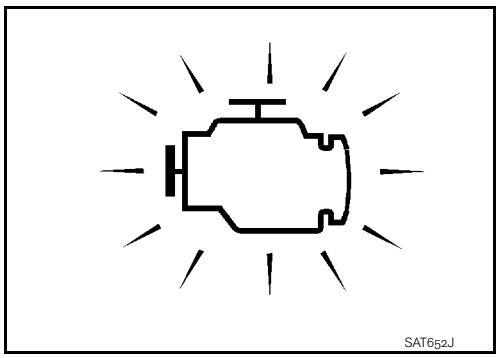
cardiagn.com

MALFUNCTION INDICATOR

Description

INFOID:0000000001094313

The Malfunction Indicator (MI) is located on the combination meter. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-1213, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001094314

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1213, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094315

1.CHECK DTC

Check that DTC U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1001. Refer to EC-740, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

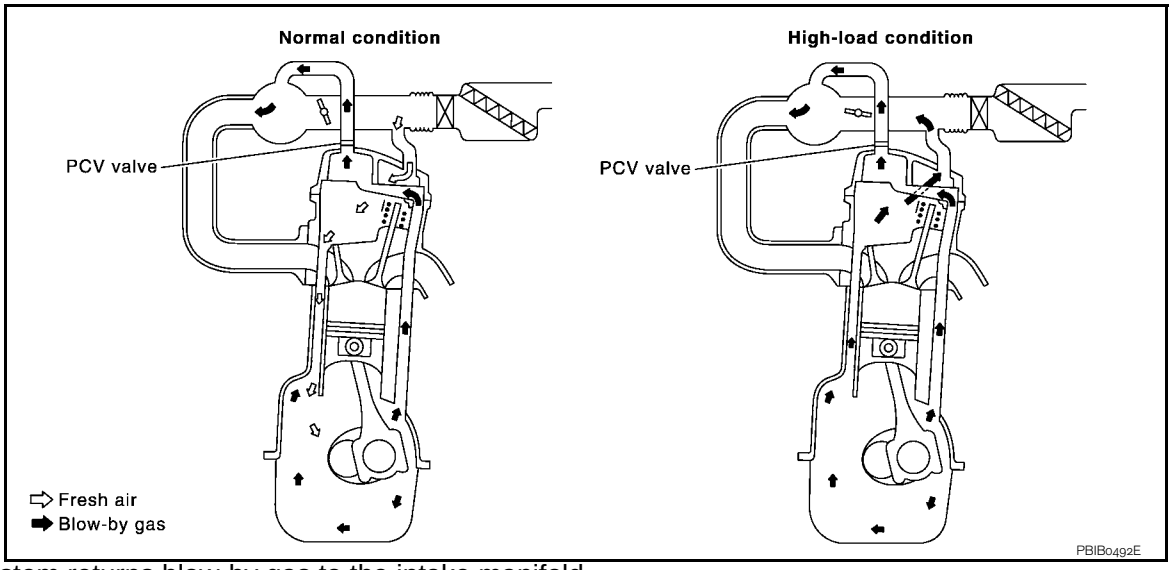
YES >> Replace combination meter.
NO >> Repair or replace.

cardiagn.com

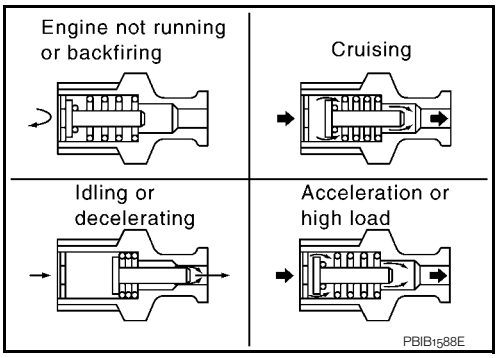
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001094316



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

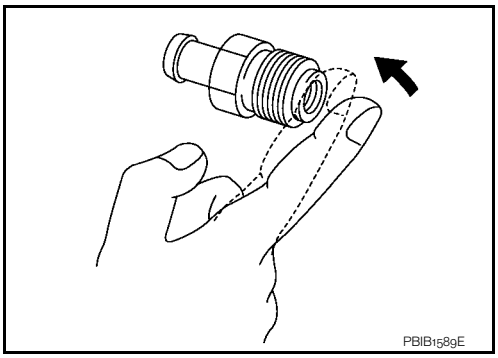


Component Inspection

INFOID:0000000001094317

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve.

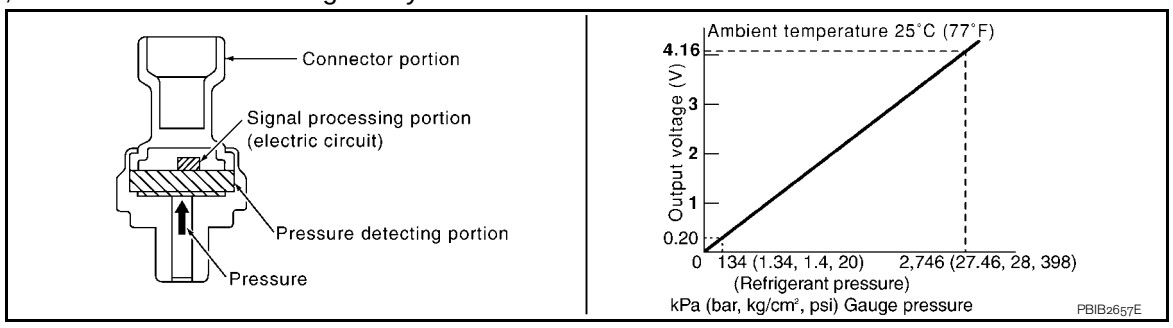
cardiagn.com

REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001094318

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001094319

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1215, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001094320

1.CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

cardiagn.com

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F8	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F8	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

cardiagn.com

VSS

Description

INFOID:0000000001102137

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

Diagnosis Procedure

INFOID:0000000001102139

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III.
5. Select “VHCL SPEED SE” indication whe n rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to @@@.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK COMBINATION METER FUNCTION

Refer to @@@.

>> INSPECTION END

cardiagn.com

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001094321

VALUES ON THE DIAGNOSIS TOOL

Remarks:

l Specification data are reference values.

l Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-1061, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-1061, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-1061, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→→RICH Change more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

cardiagn.com

Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	20% - 90%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	Approx. 0% - 60%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON

cardiagn.com

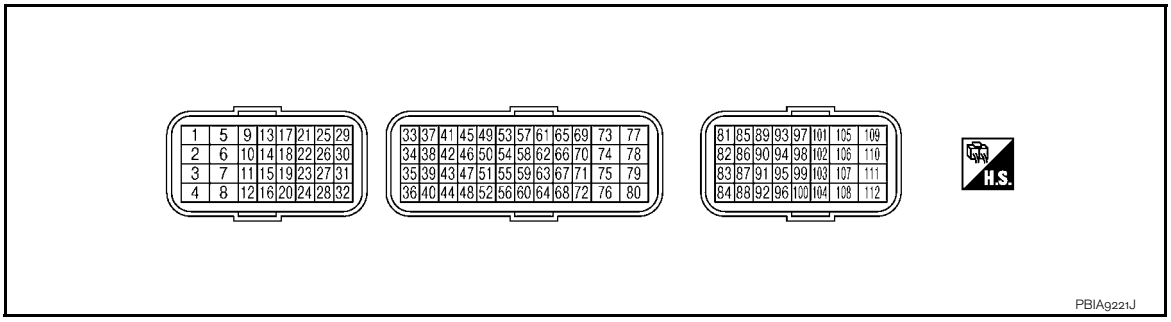
Monitor Item	Condition		Values/Status
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 94 °C (201°F) or less.	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW*2
		Engine coolant temperature is 100°C (212°F) or more	HIGH*2
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Above 3,600 rpm		ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	• Engine speed: Above 3,600 rpm		OFF
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
O2SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176°F) • Engine speed: below 3,600 rpm		Approx. 30%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF

cardiagn.com

Monitor Item	Condition		Values/Status
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

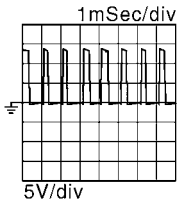
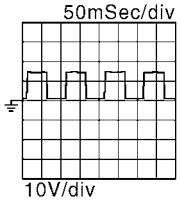
TERMINAL LAYOUT



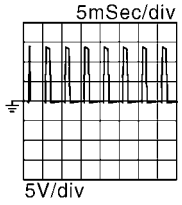
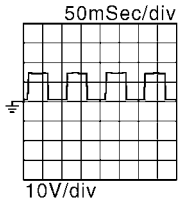
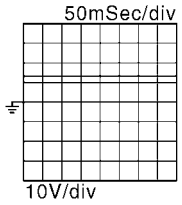
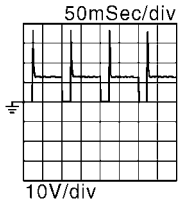
PHYSICAL VALUES

NOTE:
- ECM is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

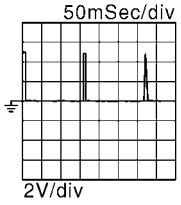
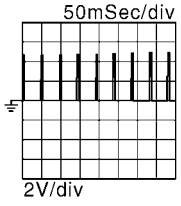
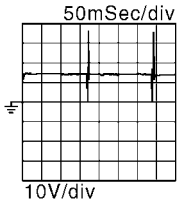
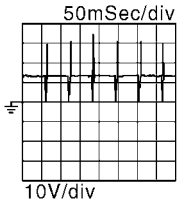
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/Output	Condition	Value (Approx.)
1	Ground	L	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	3.2V★  JMBIA0324GB
2	Ground	Y/R	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3	Ground	BR/Y	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm-up condition • Engine speed: Below 3,600 rpm	2.9 - 8.8V★  JMBIA0325GB
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: below 3,600 rpm	BATTERY VOLTAGE (11-14V)

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8V★  JMBIA0326GB
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  JMBIA0325GB
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/D	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  JMBIA0327GB
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	 JMBIA0328GB
10 11	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground
15	Ground	G	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V

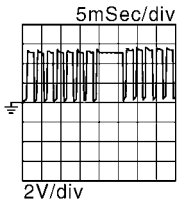
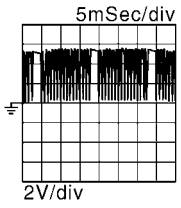
cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
17 18 21 22	Ground	V BR/Y O Y	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★ 
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5V★ 
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
25 29 30 31	Ground	R U GR L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★ 
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 
					[Engine is running] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
32	Ground	R/B	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

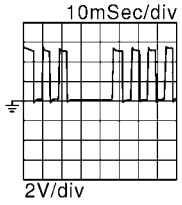
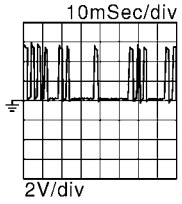
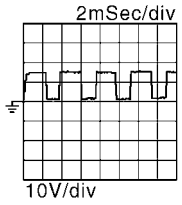
cardiagn.com

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
33	Ground	Y	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	R	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Ground	B	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	P	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	B	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
44	Ground	O	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2V
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.5 - 1.8V
46	Ground	Y	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48	Ground	R/B	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
49	Ground	Y	Heated oxygen sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V
50	Ground	Y	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	B	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0 - 4.8V Output voltage varies with engine coolant temperature.
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	Y	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0V★  JMBIA0333GB
					[Engine is running] • Engine speed: 2,000 rpm	4.0V★  JMBIA0334GB
62	Ground	B	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	B	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
65	Ground	R	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★  JMBIA0335GB
					[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★  JMBIA0336GB
69	Ground	W/B	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above	0V
72	Ground	L	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
73	Ground	Y/R	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0V
					[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 10V★  JMBIA0337GB
74	Ground	L	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5V
75	Ground	G	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	LG	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III : Disconnected	10.5V
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

cardiagn.com

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	Ground	G/B	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (CVT) • Brake pedal and clutch pedal: Slightly depressed (M/T)	0V
					[Ignition switch: ON] • Brake pedal: Fully released (CVT) • Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
104	Ground	B	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	O	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground
110	Ground	R	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V

cardiagn.com

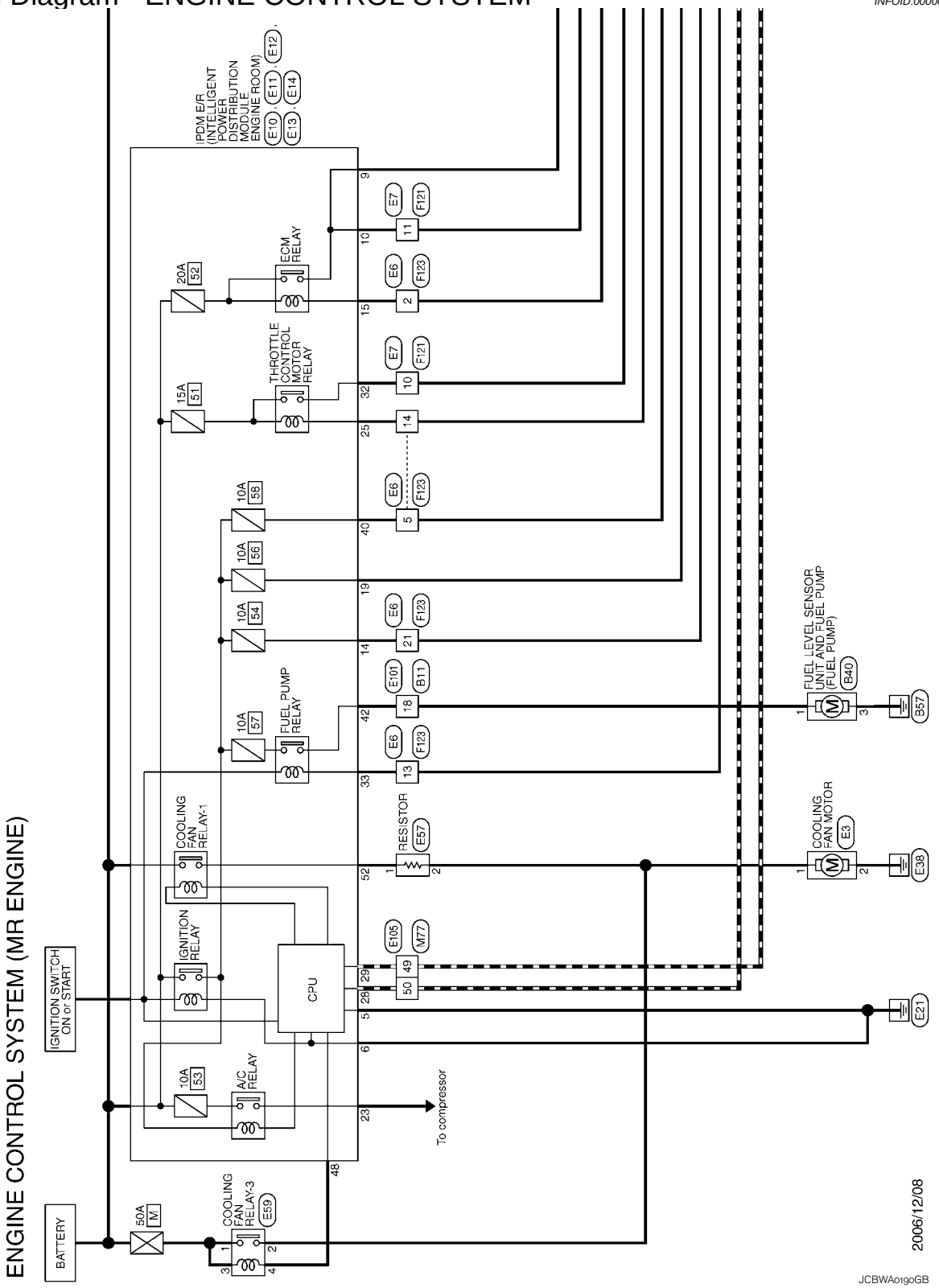
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
103	Ground	GR	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
111	Ground	B/Y	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

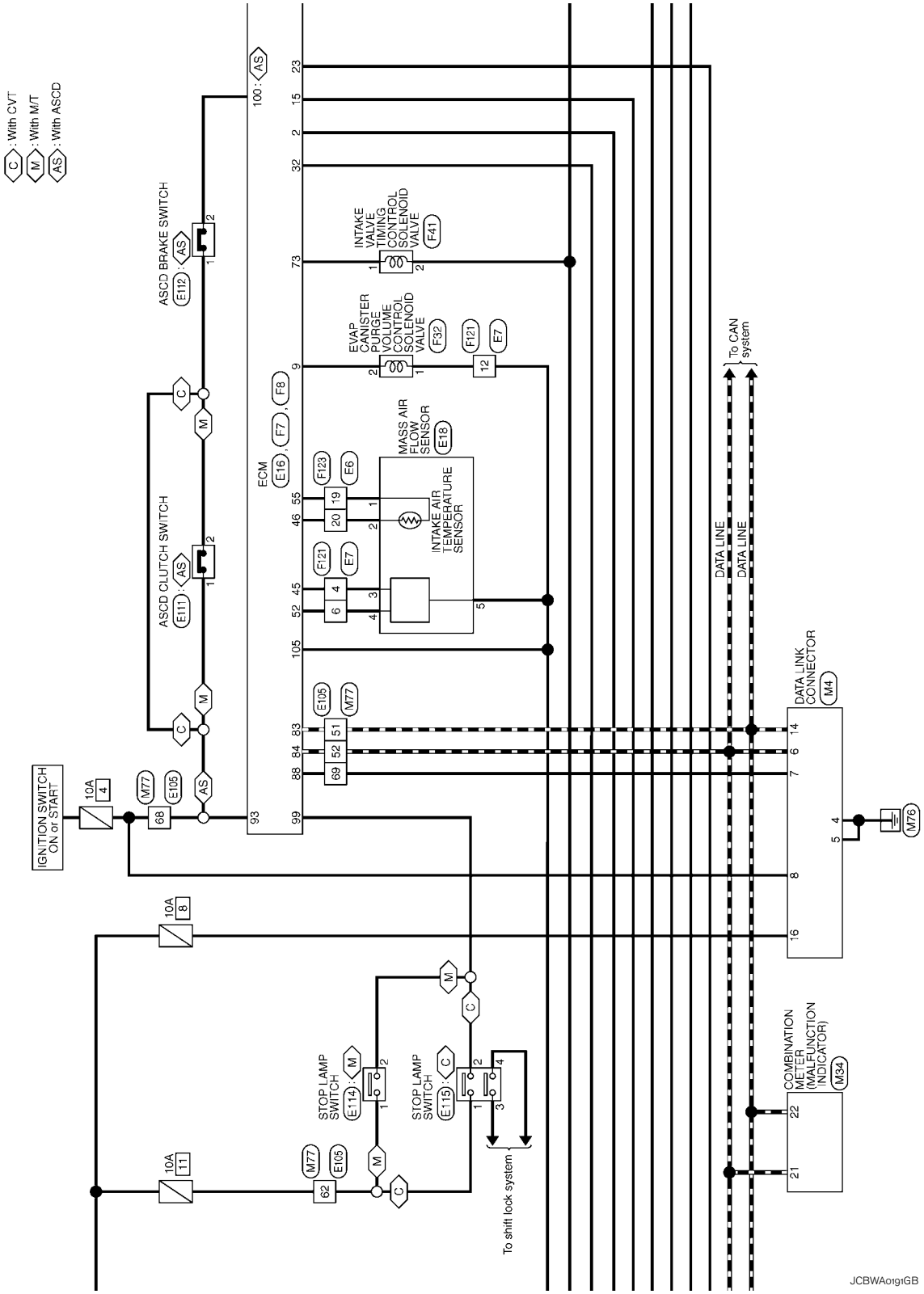
cardiagn.com

Wiring Diagram - ENGINE CONTROL SYSTEM -

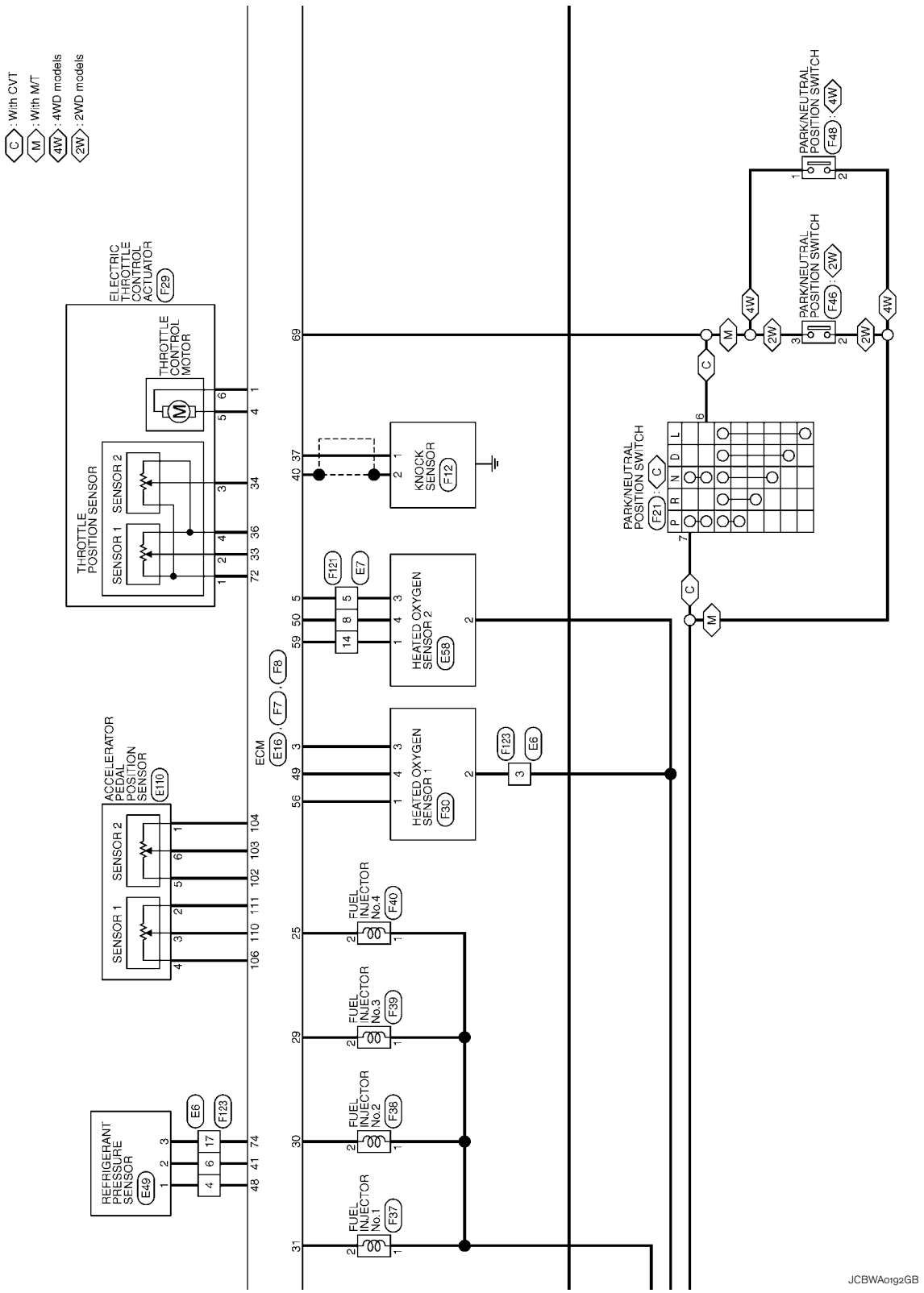
INFOID:0000000001094322



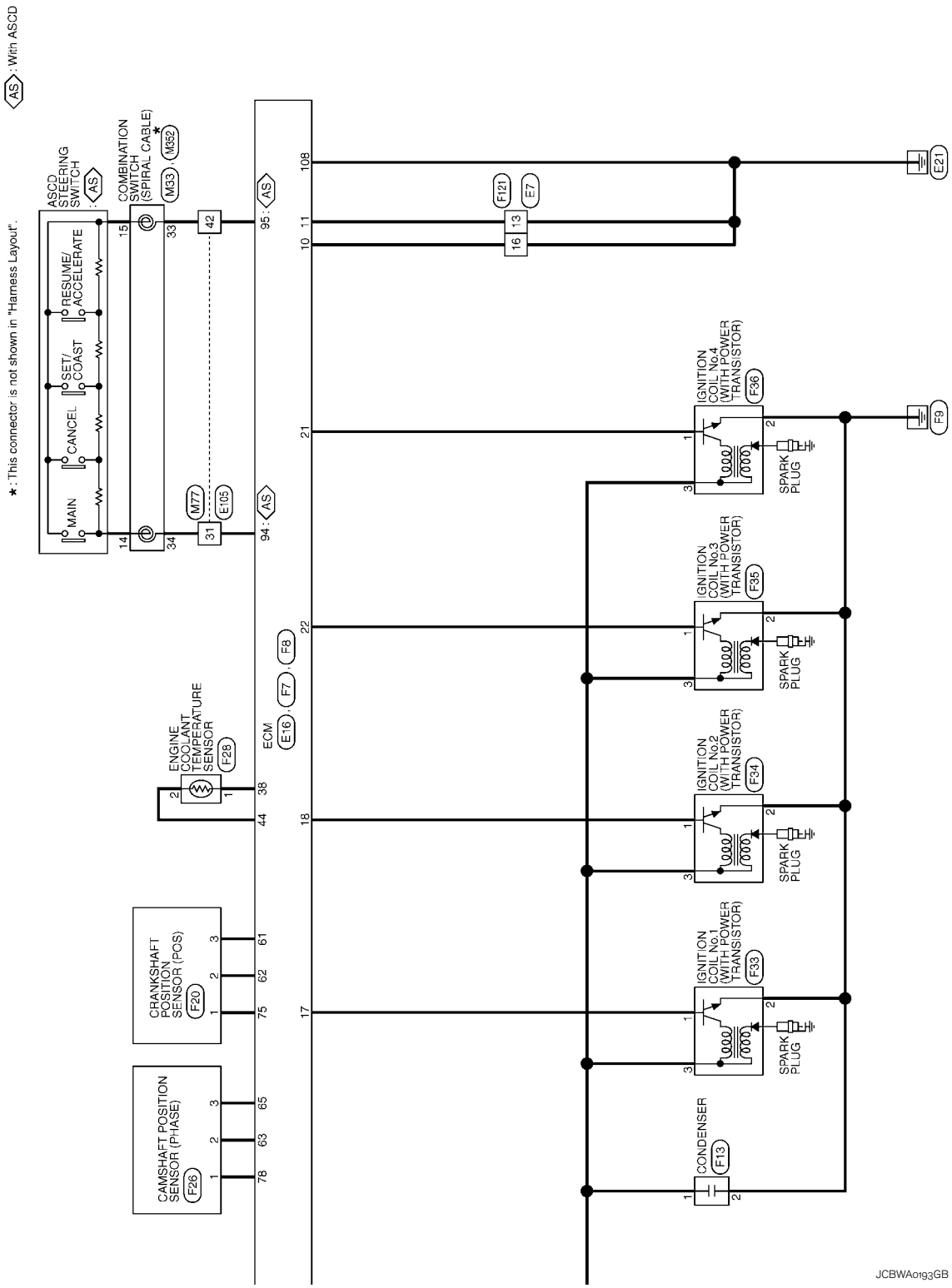
cardiagn.com



cardiagn.com

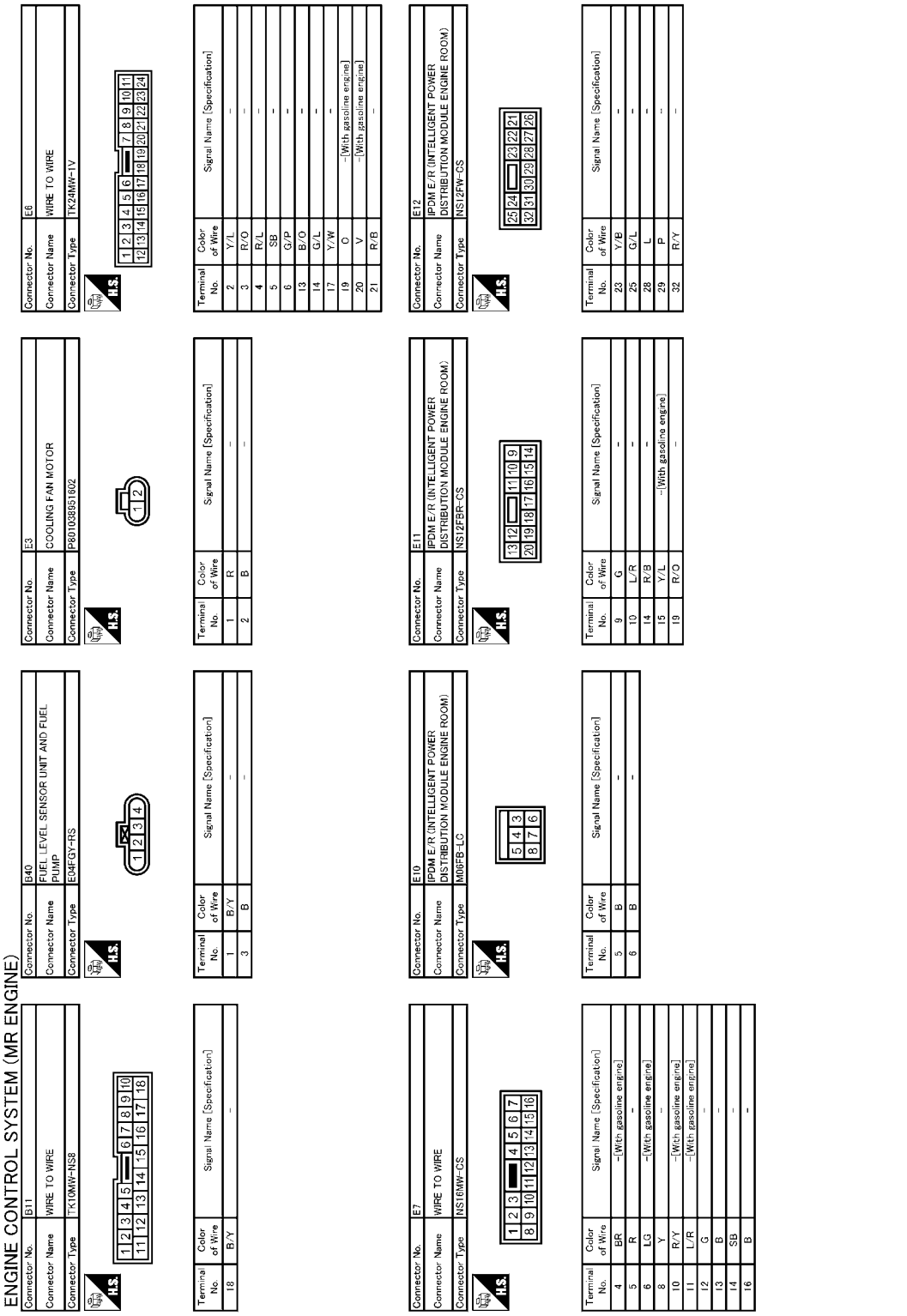


cardiagn.com



cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

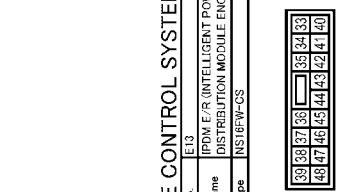


JCBWA0194GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS



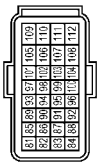
Terminal No.	Color of Wire	Signal Name [Specification]
33	B/O	–
40	SB	– [With MR engine]
42	B/Y	–
48	Y	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	Y2ZK 7283-5591-40-F



Terminal No.	Color of Wire	Signal Name [Specification]
52	W	–

Connector No.	E16
Connector Name	ECM
Connector Type	MAA24FB-ME48-LH



Terminal No.	Color of Wire	Signal Name [Specification]
83	P	CAN-L1
84	L	CAN-H1
88	O	K-LINE
93	W/L	IGN SW
94	V	ASCD STRG SW
95	B	GND ASCD STRG SW
99	R/W	BRAKE
100	R	BNCSW(BNC)
102	BR/Y	AVCC-APS2 [With MR engine]
103	GR	APS2
104	B	GND-A-APS2 [With MR engine]

105	G	VBR
106	O	AVCC-APS1 [With MR engine]
108	B	GND
110	W	APS1 [With MR engine]
111	B/Y	GND-A-APS1 [With MR engine]

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	V	–
3	BR	–
4	LG	–
5	G	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	–
2	G/P	–
3	Y/W	–

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P801038951602



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	R	–

Connector No.	E58
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AF204FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–
3	R	–
4	Y	–

JCBWA0195GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	E59
Connector Name	COOLING FAN RELAY-3
Connector Type	24347 9F900

Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	–
2	R	–
3	W/B	–
4	W	–

Connector No.	E101
Connector Name	WIRE TO WIRE
Connector Type	TK10FW-NS8

Terminal No.	Color of Wire	Signal Name [Specification]
18	B/Y	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-NS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
31	V	–
42	B	–
49	P	–
50	L	–
51	P	–
52	L	–
62	V	–
68	W/L	–
69	O	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH08FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–[Except HR engine]
2	B/Y	–[With MR engine]
3	W	–[Except HR engine]
4	O	–[With MR engine]
5	BR/Y	–[With MR engine]
6	GR	–[Except K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	W/L	–[With gasoline engine]
2	O	–[With gasoline engine]

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–[With M/T]
1	W/L	–[With CVT]
2	R	–

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB

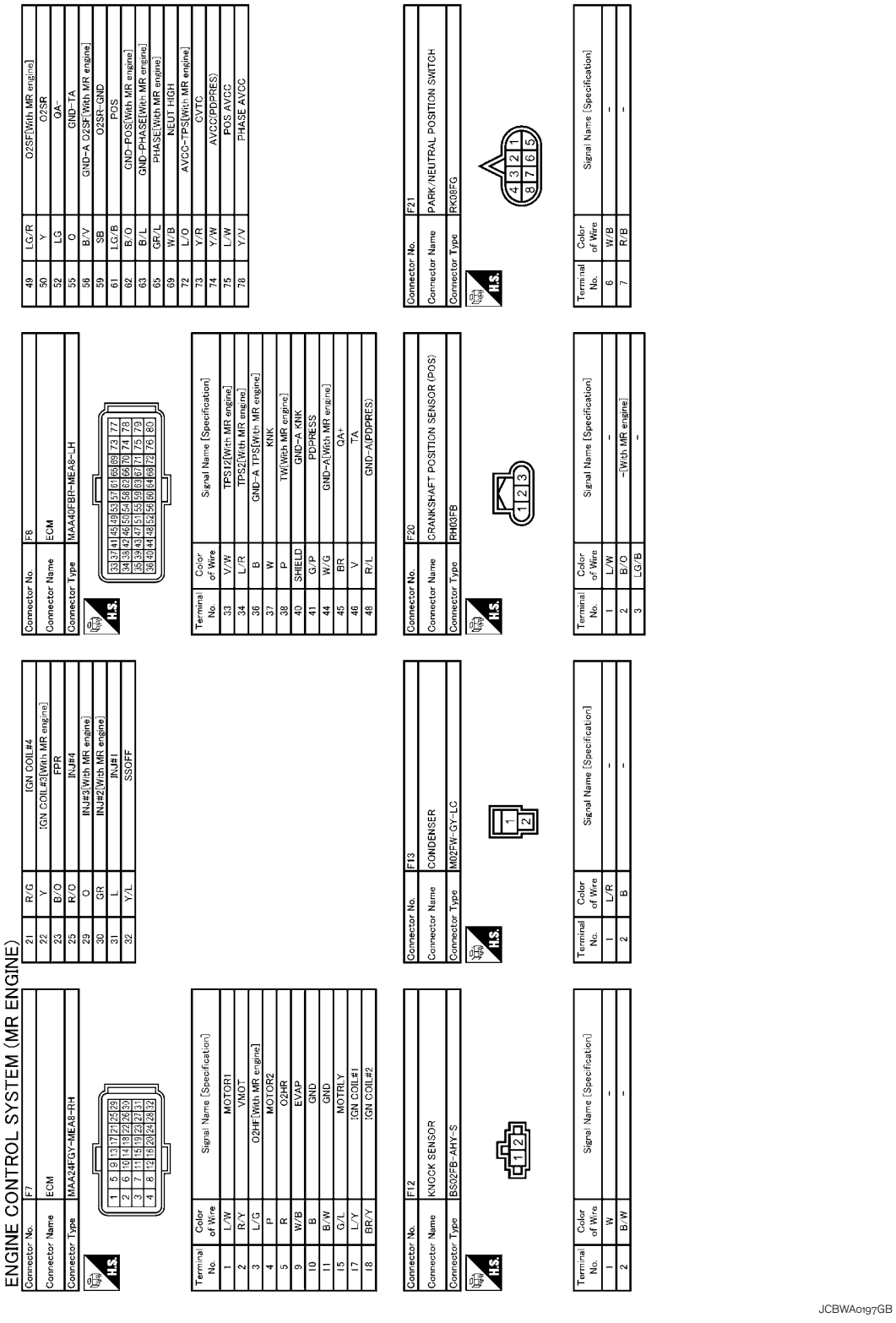
Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–
3	G	–[With CVT]
4	B	–[With CVT]

JCBWA0196GB

cardiagn.com



cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F28
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/V	–
2	B/L	–[With MR engine]
3	GR/L	–[With MR engine]

Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With MR engine]
2	W/G	–[With MR engine]

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/O	–[With MR engine]
2	V/W	–[With MR engine]
3	L/R	–[With MR engine]
4	B	–[With MR engine]
5	P	–
6	L/W	–

Connector No.	F30
Connector Name	HEATED OXYGEN SENSOR 1
Connector Type	AF204FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	B/V	–[With MR engine]
2	R/O	–
3	L/G	–[With MR engine]
4	LG/R	–[With MR engine]

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL-RS-LGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	W/B	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	–
2	B	–
3	L/R	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR/Y	–
2	B	–
3	L/R	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–[With MR engine]
2	B	–
3	L/R	–

JCBWA0198GB

cardiagn.com

ENGINE CONTROL SYSTEM (MR ENGINE)

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/G	–
2	B	–
3	L/R	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	L	–

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	GR	–[With MR engine]

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	O	–[With MR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R/O	–

Connector No.	F41
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y/R	–
2	L/R	–

Connector No.	F46
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	FEA03FG

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	R/B	–
3	W/B	–

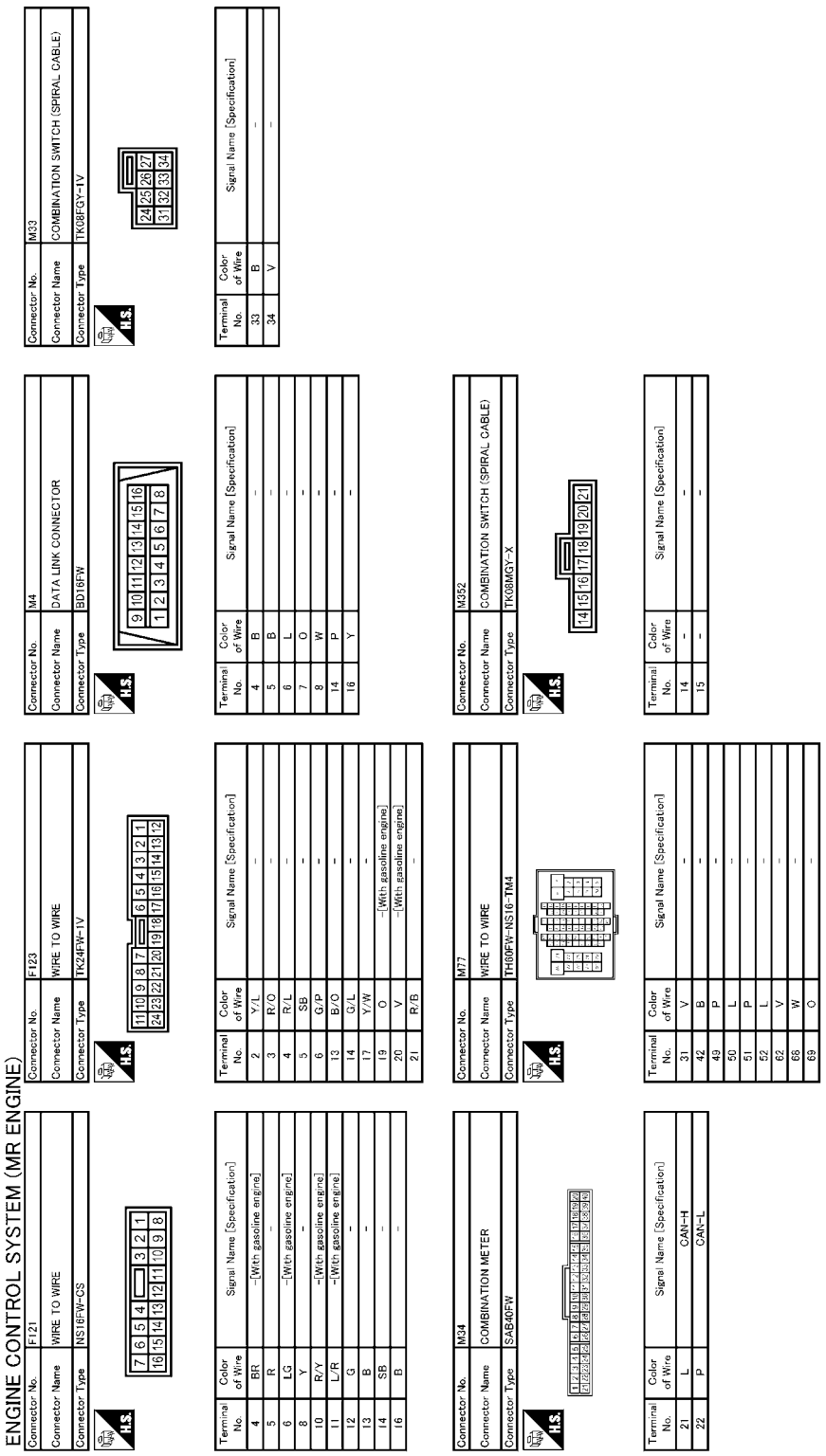
Connector No.	F48
Connector Name	PARK/NEUTRAL POSITION SWITCH
Connector Type	RK02FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	–
2	R/B	–

JCBWA0199GB

cardiagn.com



JCBWA0200GB

Fail Safe

INFOID:0000000001094323

NON DTC RELATED ITEM

cardiagn.com

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	EC-1213

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

cardiagn.com

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition / Driving condition
		When engine is idling / Normal
		When accelerating / Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000001094324

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1001 CAN communication line • U1010 CAN communication • P0102 P0103 Mass air flow sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0605 ECM • P1229 sensor power supply • P1610 P1611 P1612 P1615 NATS • P1706 Park/Neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0134 Heated oxygen • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch
3	• P0011 Intake valve timing control • P1121 Electric throttle motor actuator • P1212 TCS communication line

DTC Index

INFOID:0000000001096238

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
U1001	1001*3	CAN COMM CIRCUIT	2	—	EC-1073
U1010	1010	CONTROL UNIT(CAN)	1 (CVT) 2 (M/T)	× —	EC-1074
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	Flashing*4	—

cardiagn.com

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
P0011	0011	INT/V TIM CONT-B1	2	—	EC-1075
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	EC-1079
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	EC-1079
P0117	0117	ECT SEN/CIRC	1	×	EC-1084
P0118	0118	ECT SEN/CIRC	1	×	EC-1084
P0122	0122	TP SEN 2/CIRC-B1	1	×	EC-1087
P0123	0123	TP SEN 2/CIRC-B1	1	×	EC-1087
P0132	0132	HO2S1 (B1)	2	×	EC-1090
P0134	0134	HO2S1 (B1)	2	×	EC-1094
P0222	0222	TP SEN 1/CIRC-B1	1	×	EC-1098
P0223	0223	TP SEN 1/CIRC-B1	1	×	EC-1098
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-1101
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-1101
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-1103
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-1107
P0605	0605	ECM	1 or 2	× or —	EC-1111
P1111	1111	INT/V TIM C/CIRC	1	×	EC-1113
P1121	1121	ETC ACTR -B1	1	×	EC-1116
P1122	1122	ETC FUNCTION/CIRC-B1	1	×	EC-1118
P1124	1124	ETC MOT PWP	1	×	EC-1122
P1126	1126	ETC MOT PWP-B1	1	×	EC-1122
P1128	1128	ETC MOT-B1	1	×	EC-1125
P1212	1212	TCS/CIRC	2	—	EC-1128
P1217	1217	ENG OVER TEMP	1	×	EC-1129
P1225	1225	CTP LEARNING-B1	2	—	EC-1133
P1226	1226	CTP LEARNING-B1	2	—	EC-1135
P1229	1129	SENSOR POWER/CIRC	1	×	EC-1137
P1610	1610	LOCK MODE	2	—	SEC-44
P1611	1611	ID DISCARD IMM-ECM	2	—	SEC-36
P1612	1612	CHAIN OF ECM-IMMU	2	—	SEC-38
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-35
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-1152
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-1155
P2122	2122	APP SEN 1/CIRC	1	×	EC-1158
P2123	2123	APP SEN 1/CIRC	1	×	EC-1158
P2127	2127	APP SEN 2/CIRC	1	×	EC-1161
P2128	2128	APP SEN 2/CIRC	1	×	EC-1161
P2135	2135	TP SENSOR-B1	1	×	EC-1165
P2138	2138	APP SENSOR	1	×	EC-1168

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: The troubleshooting for this DTC needs CONSULT-III.

*4: When engine is running, MI may flash. For details, refer to EC-1050, "Diagnosis Description".

cardiagn.com

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000001094328

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-926
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-978
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-923
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1036
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-935
	Incorrect idle speed adjustment						1	1	1	1		1			EC-646
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-832, EC-834
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-646
	Ignition circuit	1	1	2	2	2		2	2			2			EC-929
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-1069
Mass air flow sensor circuit		1			2										EC-746
Engine coolant temperature sensor circuit							3			3					EC-1084
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-760, EC-764, EC-770, EC-844, EC-849
Throttle position sensor circuit							2			2					EC-1087, EC-799, EC-874, EC-876, EC-906
Accelerator pedal position sensor circuit				3	2	1									EC-899, EC-902, EC-906
Knock sensor circuit				2								3			EC-807
Crankshaft position sensor (POS) circuit		2	2												EC-809

cardiagn.com

	SYMPTOM													
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	3	2												EC-813
Vehicle speed signal circuit		2	3		3						3			EC-825
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-827
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-829
PNP switch circuit			3		3		3	3			3			EC-892
Refrigerant pressure sensor circuit		2				3			3		4			EC-936
Electrical load signal circuit							3							EC-921
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HA-12
ABS actuator and electric unit (control unit)			4											BRC-9

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FL-15, FL-17
	Fuel piping			5	5	5		5	5			5			EM-155
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct														EM-146
	Air cleaner														EM-144
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5	5	5	5	5	5	5	5	5		5			EM-146
	Electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-118
	Generator circuit														CHG-8
	Starter circuit	3													STR-8
	Signal plate	6													EM-195, EM-199
	PNP switch	4													TM-226 or TM-324
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-186
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-187
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

cardiagn.com

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-163
	Camshaft														EM-163
	Intake valve timing control														EM-163
	Intake valve												3		EM-163
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-149, EX-10
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-152, LU-18, LU-17,
	Oil level (Low)/Filthy oil														LU-14
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-35
	Thermostat									5					CO-41
	Water pump														CO-39
	Water gallery														CO-24, CO-25
	Cooling fan									5					CO-37
	Coolant level (Low)/Contaminated coolant														CO-30
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												SEC-14

1 - 6: The numbers refer to the order of inspection.

cardiagn.com

NORMAL OPERATING CONDITION

Description

INFOID:0000000001094329

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-1001, "System Diagram".

cardiagn.com

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001099092

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

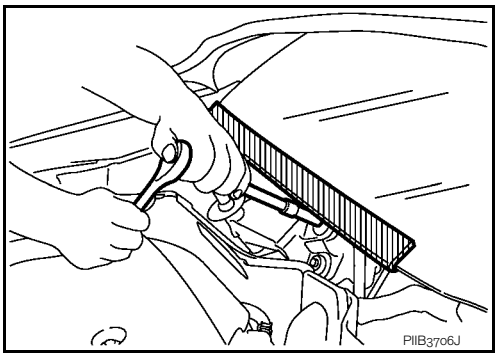
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRC section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001099093

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000001099094

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

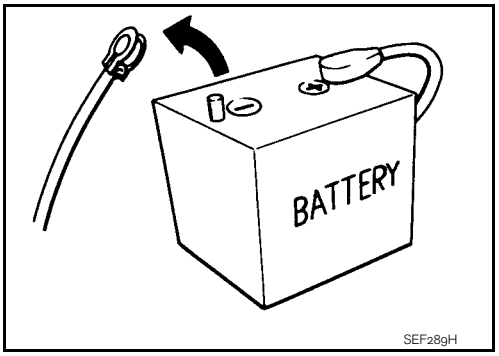
- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-105, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

General Precautions

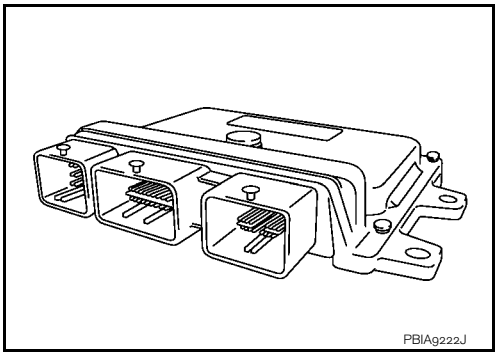
INFOID:0000000001099095

cardiagn.com

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

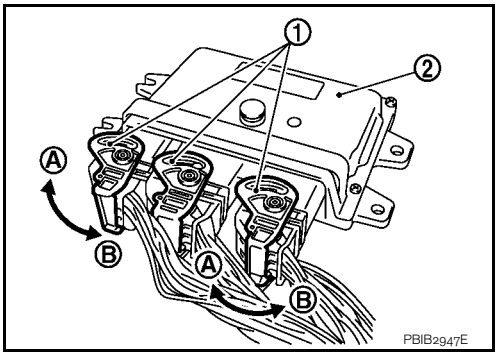


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**

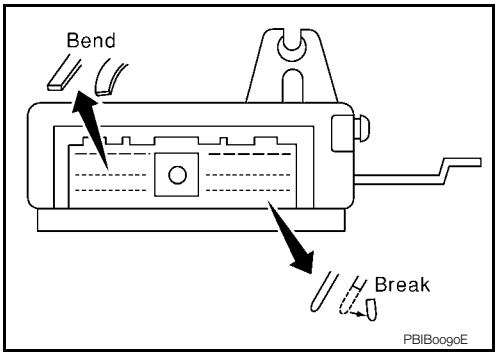


- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

2. ECM
A. Loosen

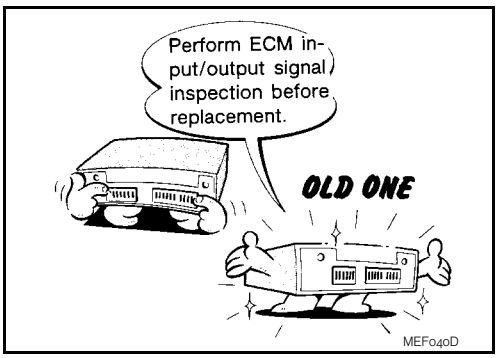


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**

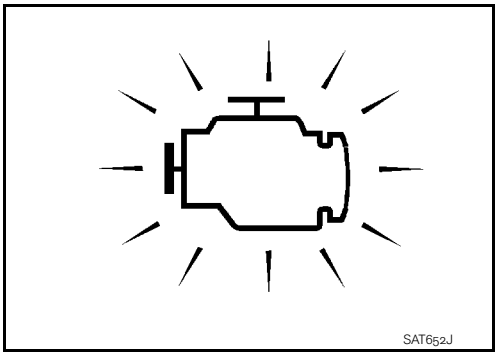


cardiagn.com

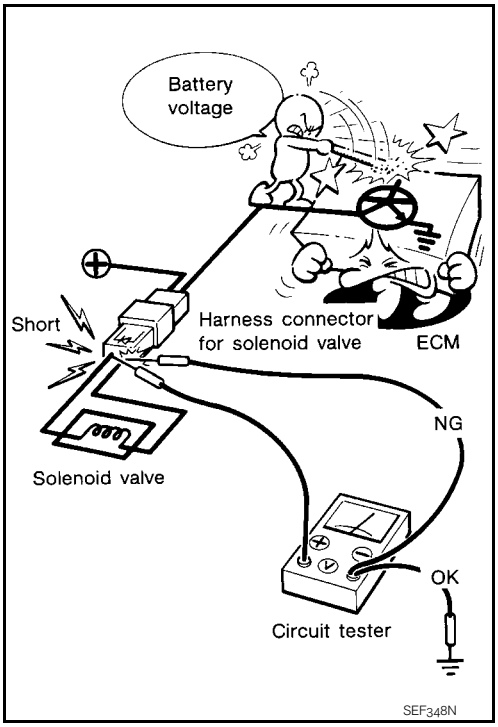
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-938, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



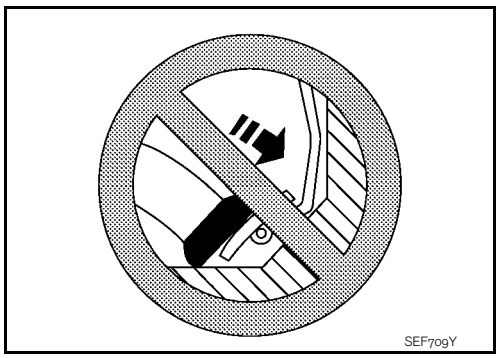
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



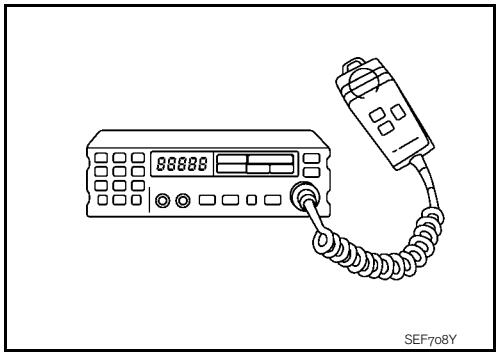
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

cardiagn.com

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



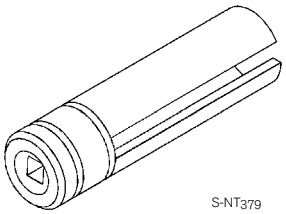
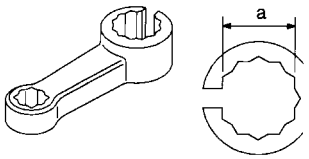
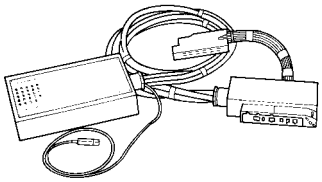
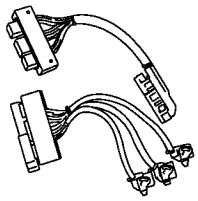
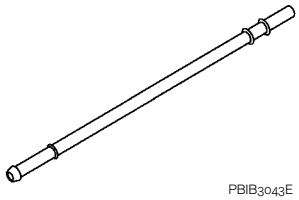
cardiagn.com

PREPARATION

PREPARATION

Special Service Tools

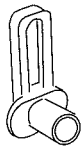
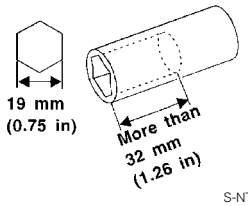
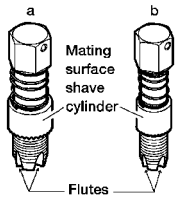
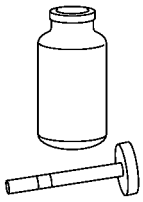
INFOID:0000000001094332

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
EG17550000 Break-out box  ZZA1194D	Measuring ECM signals with a circuit tester
EG17680000 Y-cable adapter  PBIA9379J	Measuring ECM signals with a circuit tester
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001115677

cardiagn.com

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

cardiagn.com

ON-VEHICLE REPAIR

FUEL PRESSURE

Inspection

INFOID:0000000001094334

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

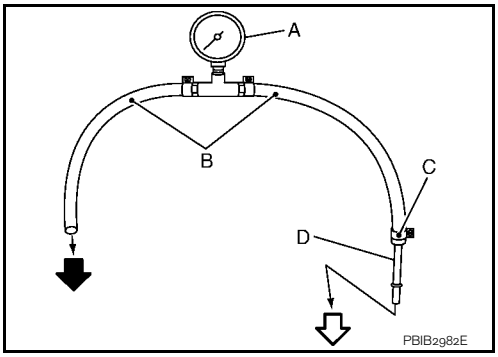
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

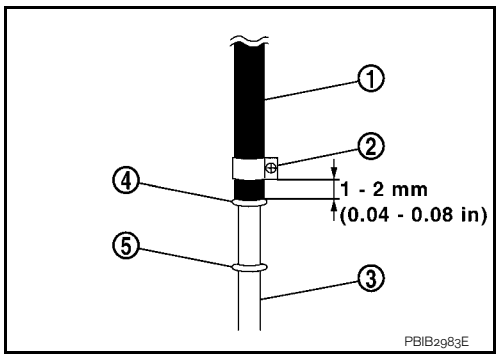
1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

cardiagn.com

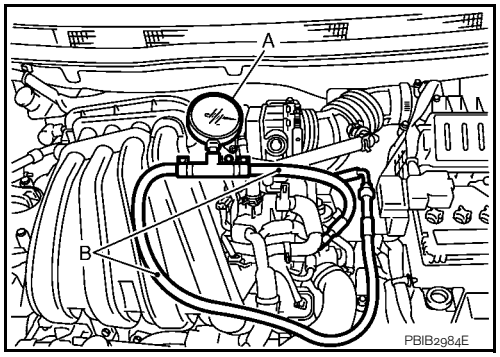
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

cardiagn.com

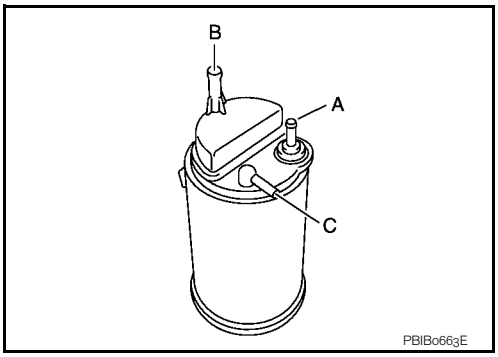
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000001094335

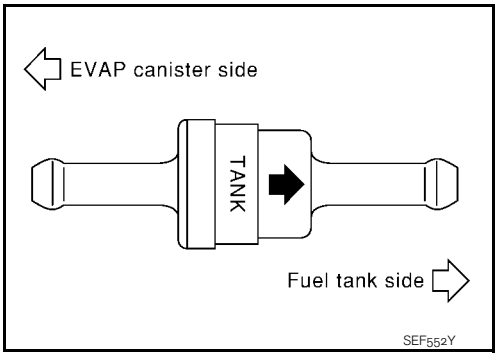
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).



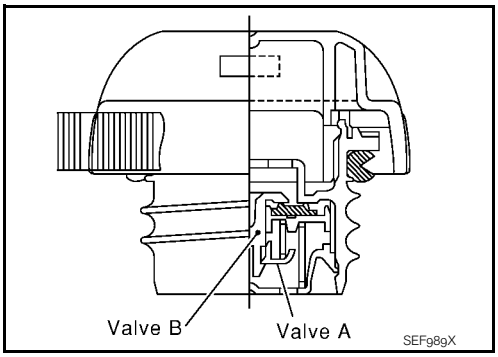
3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.
c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

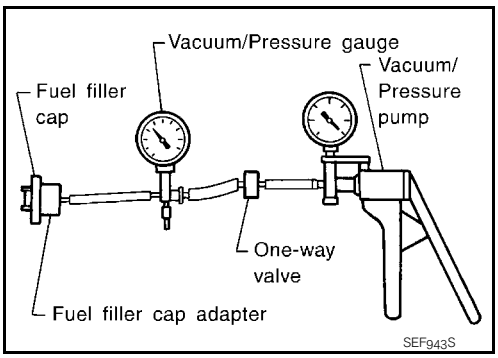
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



cardiagn.com

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001094336

Transmission	Condition	Specification
CVT	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	700 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001094337

Transmission	Condition	Specification
CVT	No load* (in P or N position)	15 ± 5° BTDC
M/T	No load* (in Neutral position)	15 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

INFOID:0000000001094339

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.3V*

*: Engine is warmed up to normal operating temperature and running under no load.

cardiagn.com

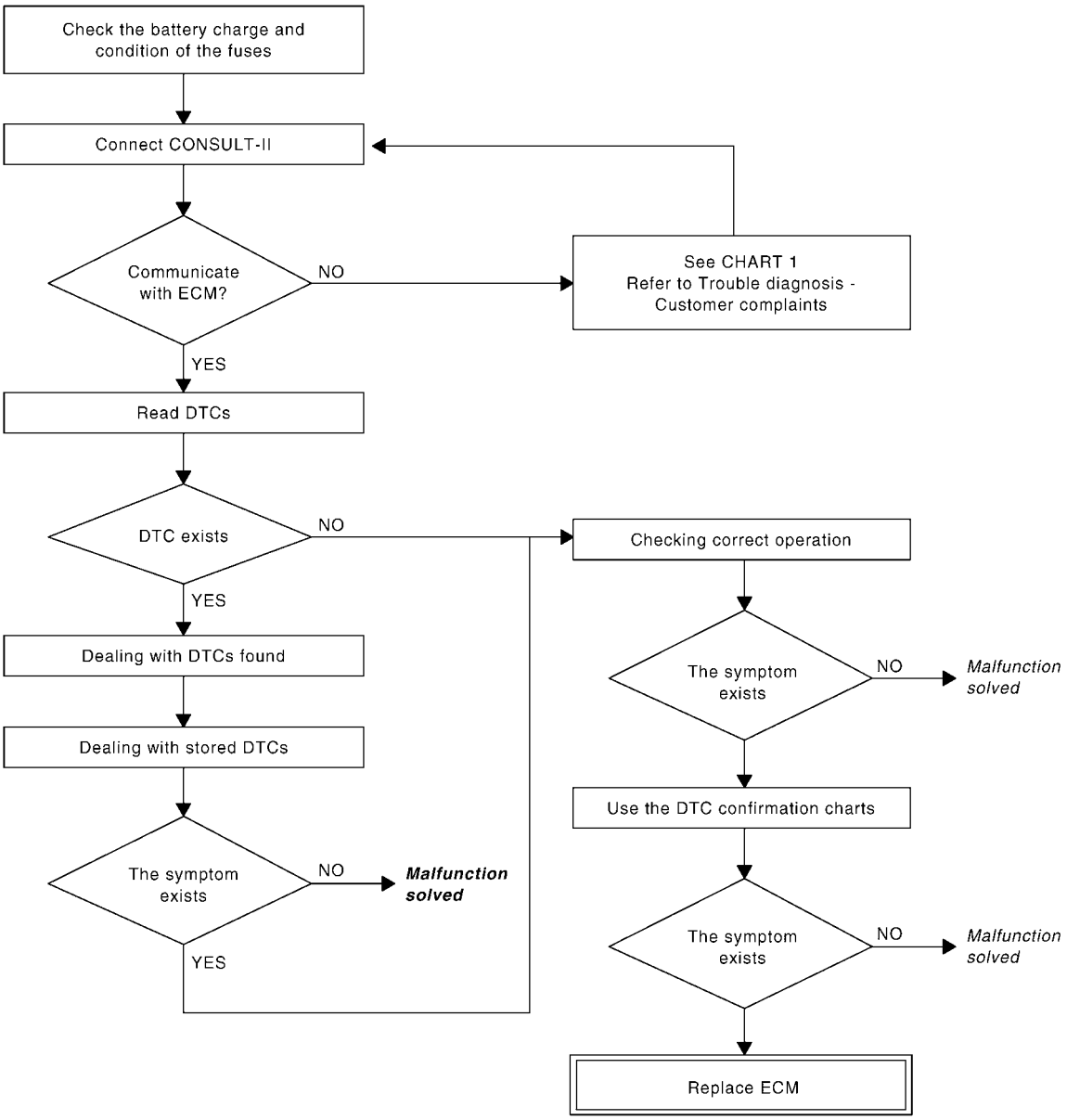
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000000894501

OVERALL SEQUENCE



MBIB1484E

Diagnostics Malfunctions

cardiagn.com

- Malfunctions are declared as either present or stored (depending on whether they appeared in a certain context and have disappeared since, or whether they remain present but have not been diagnosed within the current context).
- The present or stored status of faults should be taken into consideration when the diagnostic tool is used following the + after ignition supply being switched on (without acting on the system components).
- For a present fault, apply the procedure described in the Interpretation of faults section.
- For a stored fault, note the faults displayed and apply the instructions in the Notes section.
- If the malfunction is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the malfunction
- If the malfunction is not confirmed, check:

- the electrical lines which correspond to the fault,
- the connectors for these lines (for oxidation, bent pins, etc),
- the condition of the wires (insulation has melted or been cut, abrasions).
- the resistance of the component detected as faulty,

Conformity Check

- The aim of the conformity check is to check data that does not produce a fault on the diagnostic tool because the data is inconsistent. Therefore, this phase is used to:

- carry out fault finding on faults that do not have a fault display, and which may correspond to a customer complaint.
- check that the system is operating correctly and that there is no risk of a fault recurring after repairs.

- This section gives the fault finding procedures for statuses and parameters and the conditions for checking them.
- If a status is not behaving normally or a parameter is outside the permitted tolerance values, consult the corresponding malfunction finding page.

Customer Complaints - Malfunction finding chart

If the test with the diagnostic tool is OK but the customer complaint is still present, the fault should be processed by customer complaint.

NOTE:

A synopsis of the general procedure to follow is provided on the preceding page in the form of a flow chart.

Malfunction Finding Procedure (Wiring Check)

Diagnostics malfunctions

Removing the connectors and/or handling the wirings may temporarily remove the origin of a DTC. The measurements of the electrical voltages, resistance and insulation are generally correct, especially when the DTC is not present at the time of the analysis (stored DTC).

Visual Check

Look for impacts under the bonnet and in the passenger compartment.
Perform a careful check of the protections, insulation and correct running of wirings.
Look for traces of oxidation.

Tactile Check

While manipulating the wirings, use the diagnostic tool to detect a change in DTC status from “stored” to “present”.
Ensure that the connectors are correctly engaged.
Apply light stresses to the connectors.
Gently manipulate the wiring harness.
If a change of status occurs, try to isolate the origin of the incident.

Inspection of each component

Disconnect the connectors and check the appearance of the clips and blades and their crimping (no crimping on the insulating part).
Check that the clips and blades are properly engaged in the receptacles.
Ensure that there is no rebounding of clips or blades at the time of connection.
Check the contact pressure of the clips using a suitable model blade.

Resistance Control

Test the continuity of the lines in their entirety, then section by section.
Try to create a short-circuit to earth, on the + 12 V or with another wire.
If a DTC is detected, repair or replace the wiring.

REMINDERS

Trouble Diagnosis:

cardiagn.com

There are present DTCs and stored DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).
The “present” or “stored” status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).
Deal with present DTCs according to the procedure specified in the corresponding DTC trouble diagnosis.
For stored DTCs, note the DTCs displayed and follow the instructions in the Notes section.
If the DTC is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:
- Electrical lines which correspond to the malfunction
- Connectors for these lines (for oxidation, bent pins, etc.)
- Resistance of the malfunction component
- Condition of the wires (melted or cut insulation, wear)

Conformity Check
The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:
- Diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.
- Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.
If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer Complaints - Trouble Diagnosis
If the test with the CONSULT-III is OK, but the customer complaint still present, the malfunction should be treated by customer complaints.

A synopsis of the general procedure to follow is provided on the previous page in the form of a flow chart.

SAFETY ADVICE
- The safety instructions must be followed at all times when working on components, to avoid damage or injury:
- make sure that the battery is properly charged to avoid damaging the computers with a low load,
- use the appropriate tools,
- do not touch the xenon bulbs.

Diagnostic Work Sheet

INFOID:0000000000903764

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:
- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

cardiagn.com

WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

cardiagn.com

INSPECTION AND ADJUSTMENT
BASIC INSPECTION

BASIC INSPECTION : Description

INFOID:0000000000945894

NOTE:
Only consult the tests after following the diagnostic procedure chart.
Some specific checks are grouped under the “tests” heading and are used as required in different diagnostic charts.

Basic test	Trouble diagnosis	Reference page
Low pressure fuel supply system check	TEST 1	EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)"
Internal fuel transfer pump check	TEST 2	EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)"
High pressure supply pump (Pressure control valve) check	TEST 3	EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]"
High pressure supply pump (Volumetric control valve) check	TEST 4	EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]"
Rail high pressure regulation check	TEST 5	EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)"
Major leak in fuel injectors/fuel injectors open	TEST 6	EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)"
Incorrect fuel injection quantity	TEST 7	EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"

BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)

INFOID:0000000001083085

NOTE:
- **CAUSE**
- No fuel can be seen in the transparent supply pipe leading to the pump or large air bubbles can be seen (small air bubbles are permitted).
- engine does not start.

1.CHECK CONFORMITY

Check the conformity and presence of the fuel (gasoline instead of diesel, contaminated fuel).

Is the inspection result normal?

Yes >> GO TO 2.
No >> Bleed the fuel supply system with the manual priming pump.

cardiagn.com

2.CHECK FUEL CIRCUIT

Does the fuel circulate correctly when pumped manually?

Yes or No

Yes >> GO TO 5.
No >> GO TO 3.

3.CHECK FOR LEAK

Look for leaks on the unions.

Are there leaks in the hoses and unions?

Yes >> Carry out the required repairs.
No >> GO TO 4.

4.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 5.
No >> Replace the fuel filter with a genuine part.

5.INSPECTION END

Low pressure circuit OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)

INFOID:0000000001083086

NOTE:
- **CONDITIONS PRIOR TO TEST**
- Test 1 Low pressure fuel supply system check has been carried out previously and results are satisfactory.
- **CAUSE**
- Fuel can be seen in the transparent supply pipe leading to the pump.
- However, fuel does not move during starting.

1.CHECK INTERNAL FUEL TRANSFER PUMP

1. Disconnect high pressure supply pump (volumetric control valve) harness connector
2. Remove fuel return pipe from the pump and block it so that it is sealed. Connect a pipe to the pump to measure the flow of diesel.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure: measure the flow of diesel.

- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM_REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Check the flow rate of the fuel being collected in a graduated measuring cylinder (500 ml minimum).The minimum flow rate must be 25 ml every 15 sec.
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Does the flow measure less than 25ml?

Yes >> Replace high pressure supply pump.
No >> GO TO 2.

2.INSPECTION END

Low pressure system OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]

INFOID:0000000001083087

cardiagn.com

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Rail pressure approximately 5000 kPa(50 bar, 51 kg/cm^2, 725 psi) during starting.

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F107	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	4	F68	49	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-1334, "Component Inspection".

Is the inspection result normal?

Yes >> INSPECTION END
No >> Replace high pressure supply pump.

BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]

INFOID:0000000001083088

cardiagn.com

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Not enough or no rail pressure during starting.
- Rail reference pressure during starting, minimum 15 000 kPa (150 bar, 153 kg/cm^2, 2175 psi).

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Replace high pressure supply pump.

2. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “FUEL_FLOW_S/V_CU” indication when the cranking engine.

Is the excitation current between 0.6 - 1.0A?

YES >> GO TO 6.
NO >> GO TO 3.

3. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

cardiagn.com

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ENGINE CONDITION

Start engine.

Is the engine start?

YES >> GO TO 7.
NO >> GO TO 9.

7.CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature 60°C (140°F)
- Engine running at idle speed.
- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES SET” at ± 5000 kPa(50 bar, 51 kg/cm^2, 725 psi) during the phase of the 4 acceleration cycles?

NOTE:
If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 8.

8.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Carry out TEST 5.

>> GO TO 11.

9.CHECK ENGINE CONDITION

- Check that the oil level is correct.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES_SET” when the cranking engine.

NOTE:
If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> GO TO 11.

11.INSPECTION END

High pressure supply pump (volumetric control valve) OK.

cardiagn.com

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)

INFOID:0000000001083090

NOTE:
- If contaminants (swarf) can be seen in the transparent return pipe, the entire fuel injection system (fuel injectors, pump, rail, high pressure pipes and all return pipes) must be replaced.
- **CONDITIONS PRIOR TO TEST**
- Engine coolant temperature between 80 - 90°C (176 - 194°F).
- All the electrical load are switched off.
- Air conditioning is switched off.
- The tank is at least half-full.
- The pipe connections and unions have been checked.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Rail pressure variations around the setpoint.
- The rail reference pressure is not reached.
- Rough idle.
- Possibly noisy combustion.

1.CHECK AIR BUBBLES

1. Start engine
2. Are there large air bubbles in the transparent supply pipe going to the pump?

Is the inspection result normal?

YES >> Check low pressure system.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Disconnect high pressure supply pump (volumetric control valve) harness connector.

Does the engine stop?

YES >> GO TO 3.
NO >> Replace high pressure supply pump (the high pressure supply pump [volumetric control valve] remains open mechanically).

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-I

1. Reconnect high pressure supply pump (volumetric control valve) harness connector.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start engine.
4. Disconnect high pressure supply pump (pressure control valve) harness connector.

Does the engine stop?

YES >> GO TO 4.
NO >> Replace high pressure supply pump (the high pressure supply pump [pressure control valve] remains open mechanically).

4.CHECK FUEL INJECTOR

1. Reconnect high pressure supply pump (pressure control valve) harness connector.
2. Wait at least 30 seconds.
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “F/FLOW_CORR_CYL1”, “F/FLOW_CORR_CYL2”, “F/FLOW_CORR_CYL3”, “F/FLOW_CORR_CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

cardiagn.com

>> INSPECTION END

6. CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature.60°C (140°F)
- Engine running at idle speed.
- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select DATA MONITOR mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURE” follow “RAIL PRES SET” at during the phase of 4 acceleration cycles?

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 7.

7. CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Check that the “FUEL TEMP” indication when operating at idle speed is between 60 - 80°C (140 - 176°F)
3. Check that the “WATER TEM” indication is between 80 - 90°C (176 - 194°F)

NOTE:

- When the fuel temperature is above 136°C (277°F), the maximum rail pressure is reduced to protect the plastic pipes.
- When the coolant temperature is above 100°C (212°F), the maximum rail pressure is reduced to protect the engine.

Are the “FUEL TEMP” and “WATER TEMP” within the reference value range?

YES >> GO TO 8.
NO >> Check the fuel pump temperature sensor (Refer to EC-1348, "Component Inspection") or engine coolant temperature sensor (Refer to EC-1344, "Component Inspection").

8. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

cardiagn.com

3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure supply pump.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F107	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	4	F68	49	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 15.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-II

Refer to EC-1334, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace high pressure supply pump.

16. CHECK FUEL RAIL PRESSURE SENSOR POWER SUUPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel rail pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel rail pressure sensor harness connector and ground.

Fuel rail pressure sensor		Ground	Voltage (V)
Connector	Terminal		
F102	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F102	2	F85	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F102	1	F85	19	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

19. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Replace fuel rail.

20. CHECK FUEL RAIL PRESSURE-I

1. Reconnect all harness connectors disconnected.

cardiagn.com

2. Start engine and let it idle speed.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “RAIL PRESSURE” indication under the following conditions.
   NOTE:
   An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 21.

21. CHECK FUEL RAIL PRESSURE-II

1. Turn ignition switch OFF.
2. Replace fuel rail. Refer to EM-277, "Removal and Installation"
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication under the following conditions.
   NOTE:
   An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace high pressure supply pump.

22. INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)

INFOID:0000000001083091

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.
- **CAUSE**
- Not enough or no rail pressure during starting.
- The engine does not start.

1. CHECK FUEL INJECTOR-I

Refer to EC-1352, "Component Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure:

- Disconnect high pressure supply pump (volumetric control valve) harness connector
- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM_REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Is the return volume at the fuel injectors more than 20 ml per fuel injector for the starting phase?

NOTE:

- Do not repeat this procedure more than 3 times and wait 30 seconds between each 15 second cranking engine.
- Then wait 30 minutes before cranking the engine for 3 15 second cycles.
- Follow this instruction so that the starter does not get damaged.

Does the flow measure more than 20ml?

Yes >> Replace malfunctioning fuel injector.
No >> GO TO 3.

3.CHECK FUEL INJECTOR-II

1. Turn ignition switch OFF.
2. Reconnect return pipes.
3. Start Engine.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “RAIL PRESSURE” and “RAIL PRES SET” indication.
6. Does “RAIL PRESSURE” follow “RAIL PRES SET” during the 3 second cranking engine?

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Remove the glow plugs and check for moisture.
3. If the glow plugs are wet with fuel, it is possible that the fuel injector is leaking.

Are the glow plugs wet with fuel?

Yes >> Replace malfunction fuel injector.
No >> Replace high pressure supply pump.

5.INSPECTION END

Fuel injector system OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)

INFOID:0000000001083092

NOTE:

- **CONDITIONS PRIOR TO TEST**

- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.

cardiagn.com

- All the electrical loads are switched off.
- Air conditioning is switched off.

• **CAUSE**

- The engine runs poorly at idle speed, possibly emits white smoke.

1.CHECK FUEL INJECTOR

Refer to EC-1352, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Start engine let it idle speed.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check “FUEL TEMP” indication is above 60°C (140°F)
4. Check “F/FLOW CORR CYL1“, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight. While the engine is idling, check the return flow rate at the fuel injector. After 5 minutes the return volume must be between 16 - 24 ml per fuel injector.

Is there more than 24 ml or less than 16 ml of return for each fuel injector?

Yes >> Replace malfunctioning fuel injector.
No >> INSPECTION END

4.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-263, "Inspection".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000000894656

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000000903972

1.PRECONDITIONING

- Connect a CONSULT-III
- Connect a battery charger
- Electric load switch is OFF
- Wait for the engine to cool [engine coolant temperature < 60°C (140°F and air temperature < 50°C (122°F)].

NOTE:
While the ECM is being programmed the cooling fan motors are triggered automatically.

>> GO TO 2.

2.SAVE ECM DATA

Turn ignition switch ON.
Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.

cardiagn.com

>> GO TO 3.

3.REPLACE ECM

Replace ECM.

>> GO TO 4.

4.WRITE ECM DATA

1. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
2. Perform “PRGRM_REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
3. Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.
4. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".
5. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
6. Select “DATA MONITOR” mode in ECM with CONSULT-III.
7. Check that the “CODE_PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> GO TO 5.

5.WRITE ECM DATA

1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Description".
2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Select “DATA MONITOR” mode in ECM with CONSULT-III.
4. Check that the “CODE_PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> Repeat above steps.

6.PERFORM VIN REGISTRATION

1. Start engine and warm it up to normal operating temperature.
   NOTE:
   The start-up phase may last up to 30 seconds.
2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Perform “WRITE VIN” in WORK SUPPORT mode with CONSULT-III.
4. Follow the instruction of CONSULT-III display.
   NOTE:
   After replace ECM, stored DTC may appear on other control unit. Clear the malfunction memory of these control unit.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001082271

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal.

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001082272

1.START

1. Turn ignition switch ON.
2. Perform “EGR ADAPTIVES” in WORK SUPPORT mode with CONSULT-III.
3. Turn ignition switch OFF.and wait at least 30 seconds.
4. Start engine and let it idle.

cardiagn.com

5. Select “DATA MONITOR” mode with CONSULT-III.
6. Check that the “NEW EGR/V OFFSET” and “LAST EGR/V OFSET” indication.

0.75V < NEW EGR/V OFFSET = LAST EGR/V OFSET < 1.5V

>> END

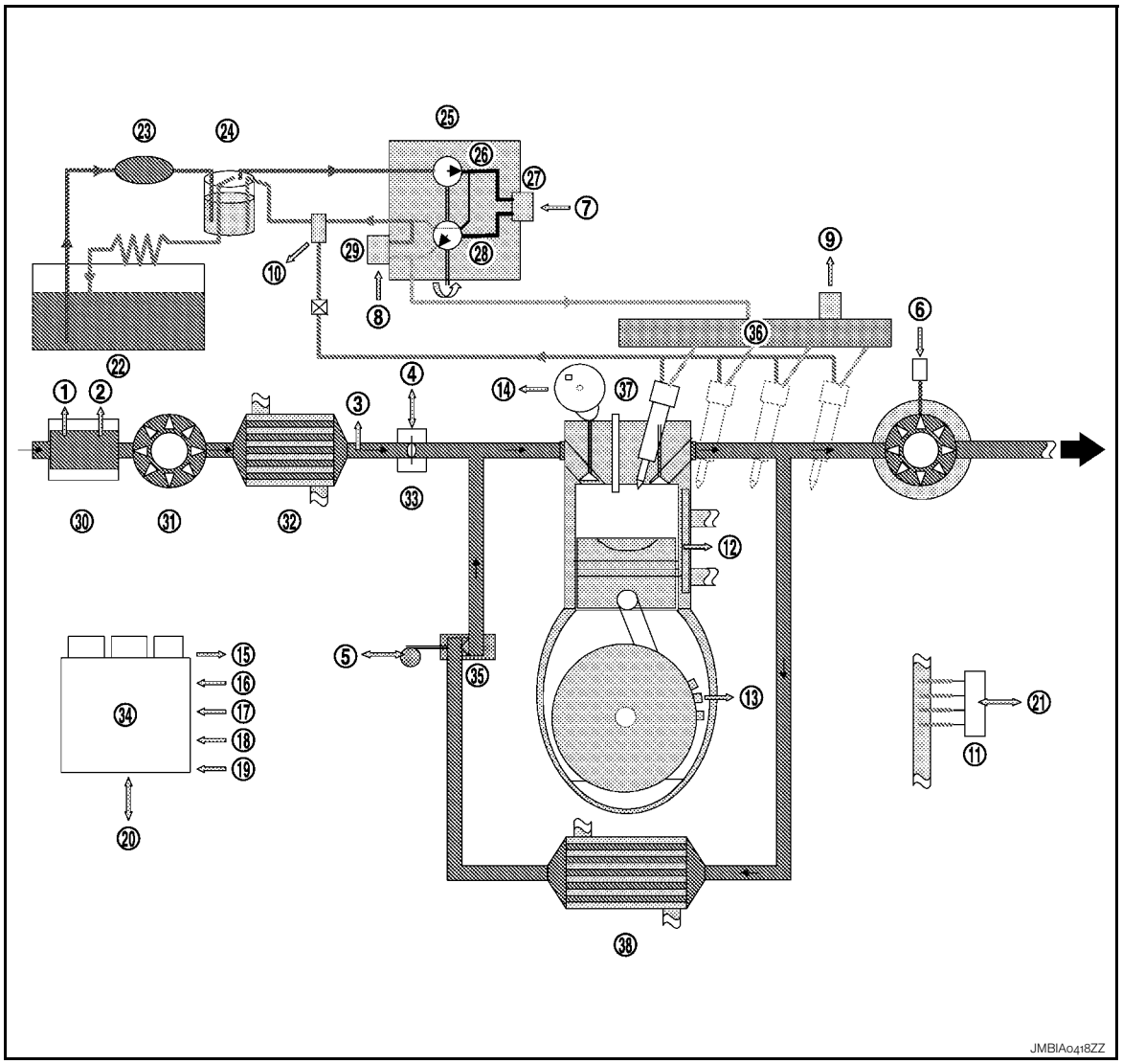
cardiagn.com

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000000894699



1. Mass air flow sensor signal
2. Intake air temperature sensor signal
3. Turbocharger boost sensor signal
4. Throttle position sensor signal
5. EGR Volume Control Valve Control Position Sensor signal
6. Turbocharger boost control solenoid valve signal
7. High Pressure Supply Pump (volumetric Control Valve) signal
8. High Pressure Supply Pump (pressure Control Valve) signal
9. Fuel rail pressure sensor signal
10. Fuel Pump Temperature Sensor
11. Glow plug
12. Engine coolant temperature sensor signal
13. Crankshaft Position Sensor signal
14. Camshaft Position Sensor signal
15. Barometric pressure sensor signal
16. Refrigerant pressure sensor signal
17. Accelerator pedal position sensor signal
18. Clutch switch signal
19. Brake switch signal
20. CAN communication
21. Glow plug signal
22. Fuel tank
23. Fuel pump
24. Fuel filter
25. High Pressure Supply Pump
26. High Pressure Supply Pump (internal transfer pump)
27. High Pressure Supply Pump (volumetric Control Valve)
28. High Pressure Supply Pump (high pressure pump)
29. High Pressure Supply Pump (pressure Control Valve)
30. Mass air flow sensor (with intake air temperature sensor)

cardiagn.com

31. Compressor
32. Charge air cooler
33. Electric throttle control actuator
34. ECM
35. EGR volume control valve
36. Fuel rail
37. Fuel injector
38. EGR cooler

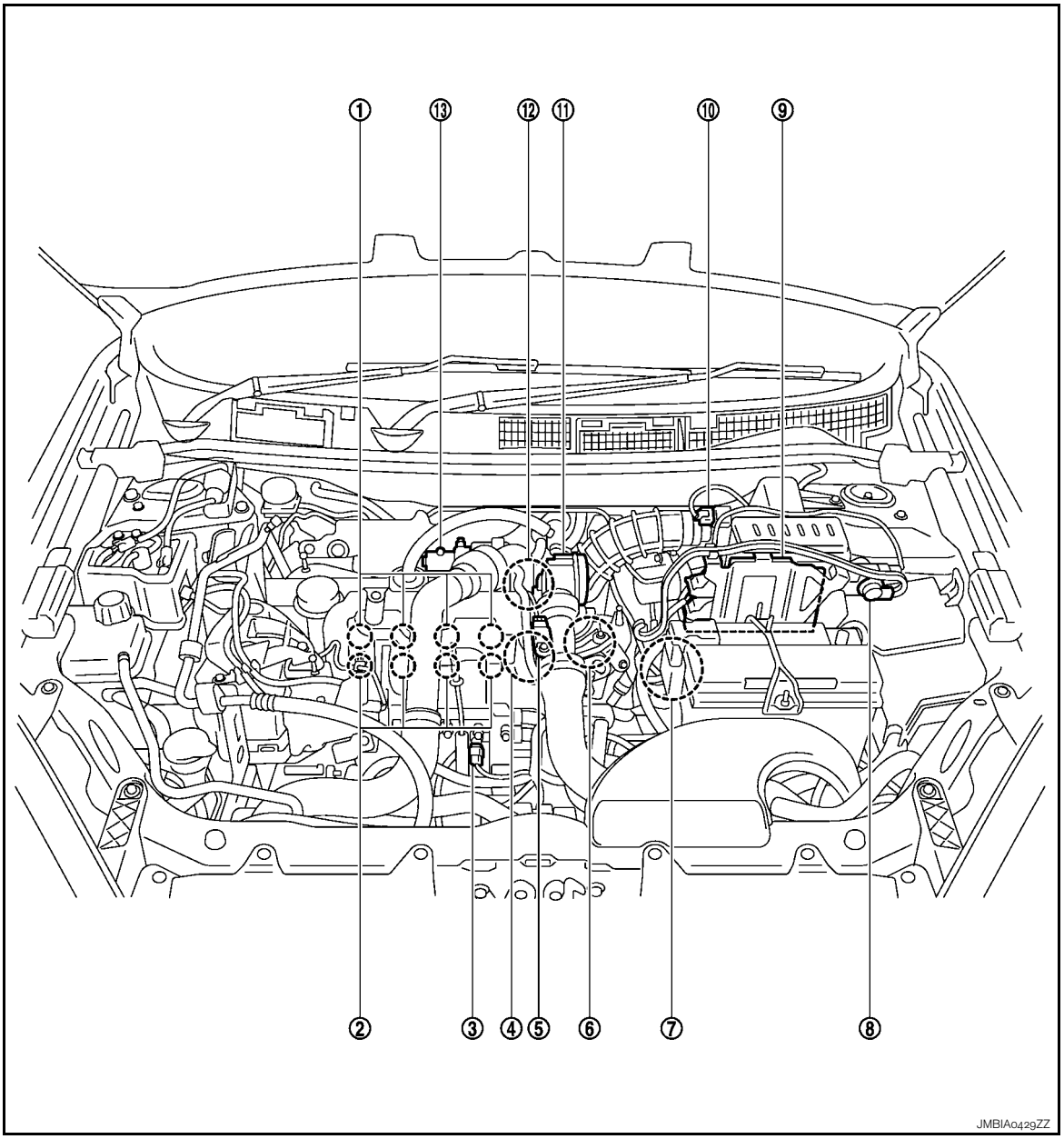
System Description

INFOID:0000000000897207

ECM performs various controls such as fuel injection control and furl pressure control.

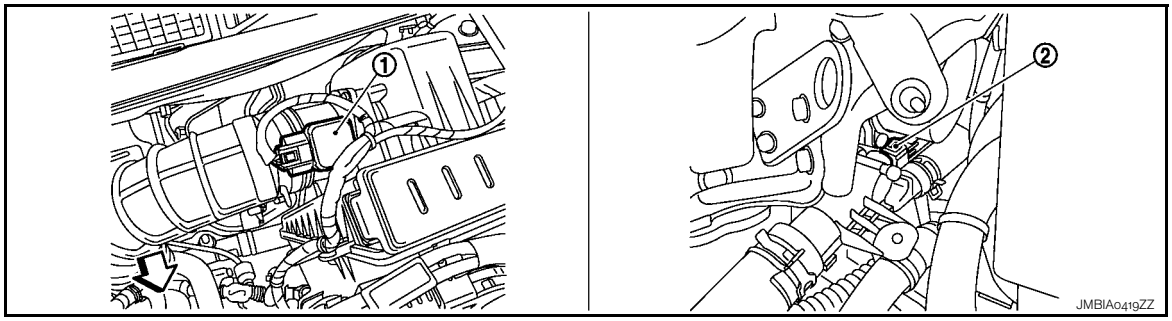
Component Parts Location

INFOID:0000000001078627



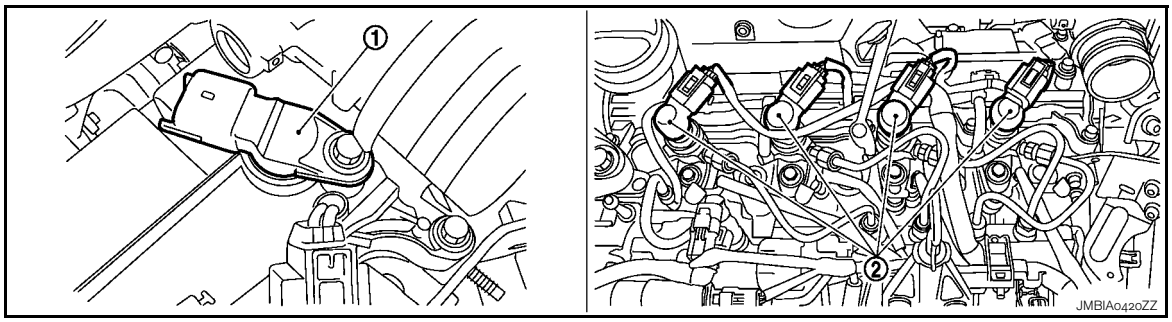
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

cardiagn.com

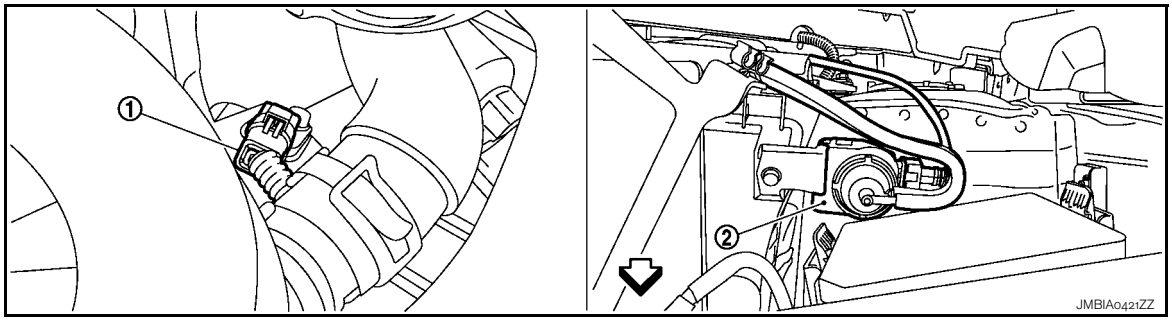


⇦ : Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

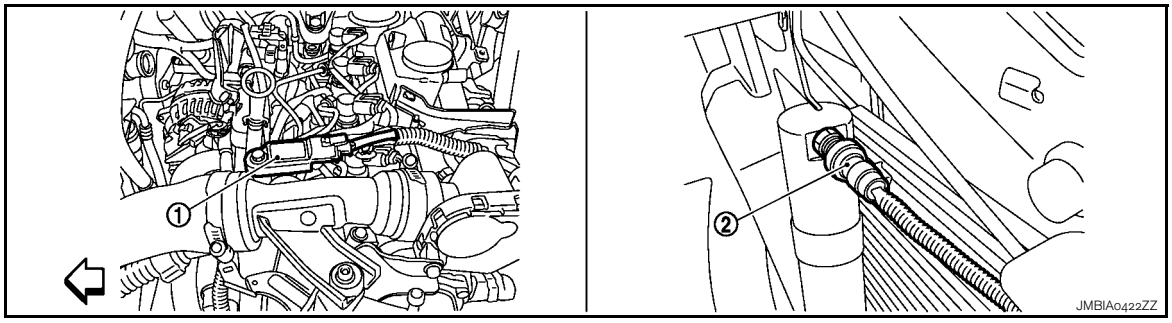


1. Camshaft Position Sensor
2. Fuel injector



⇦ : Vehicle front

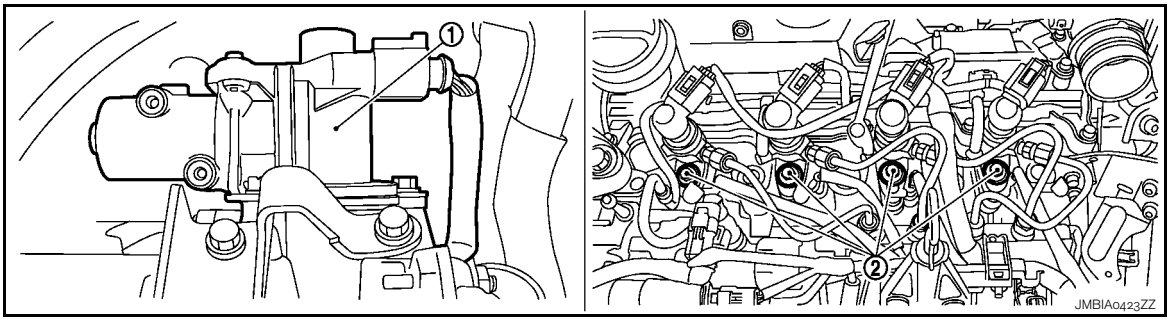
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve



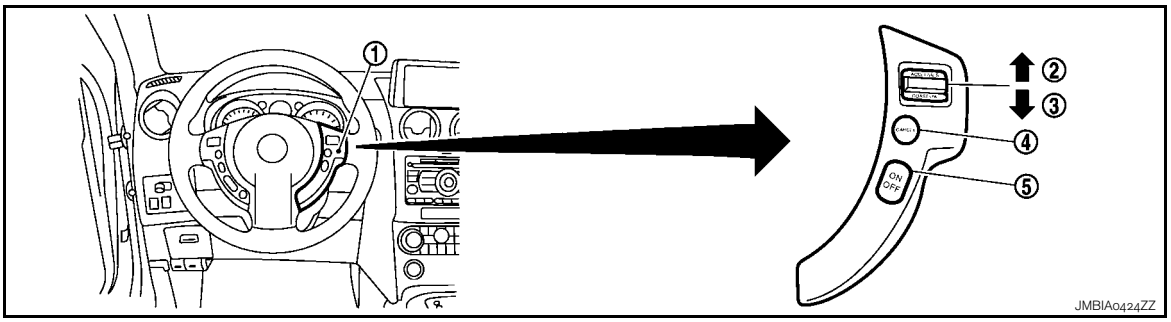
⇦ : Vehicle front

1. Turbocharger boost sensor
2. Refrigerant pressure sensor

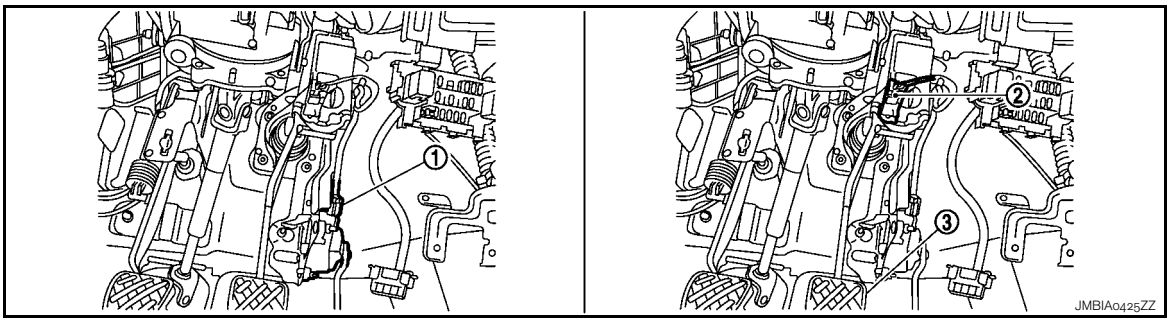
cardiagn.com



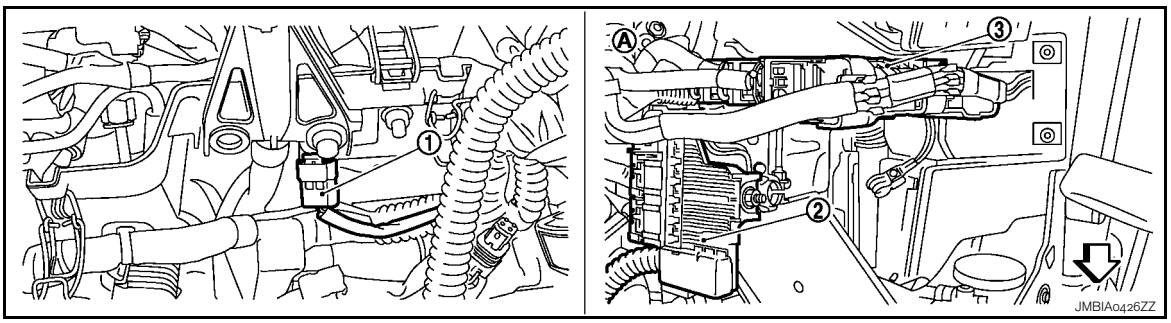
1. EGR volume control valve 2. Glow plug



1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch

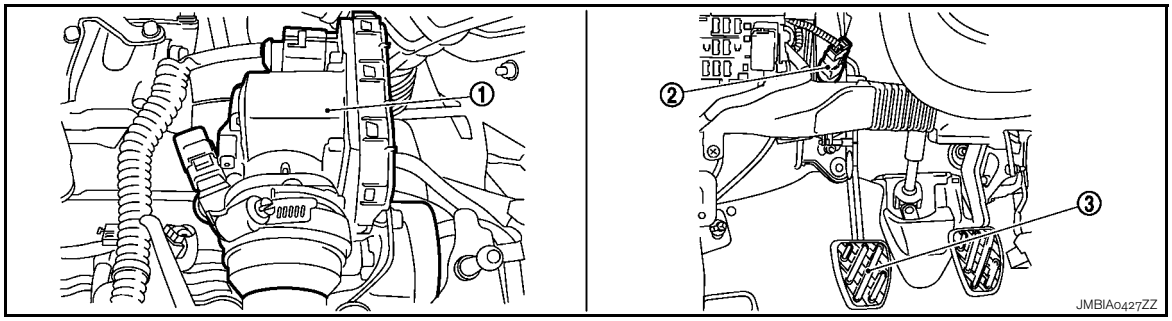


1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal

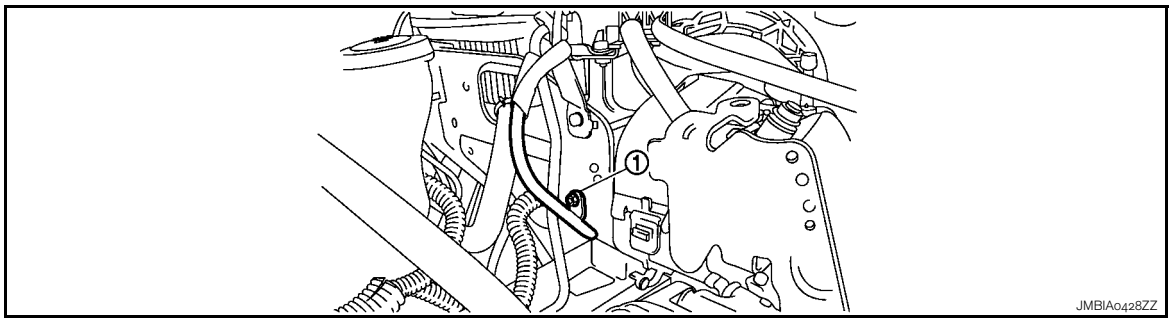


1. Fuel rail pressure sensor 2. Glow relay 3. ECM
A. View with battery removed

cardiagn.com



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

Component Description

INFOID:0000000000897219

Component	Reference
Accelerator pedal position sensor	EC-1407, "Description"
ASCD steering switch	EC-1388, "Description"
Clutch switch	EC-1400, "Description"
Cooling fan motor	EC-1422, "Description"
Electric throttle control actuator	EC-1345, "Description"
Engine coolant temperature sensor	EC-1343, "Description"
Fuel pump temperature sensor	EC-1347, "Description"
Fuel rail pressure sensor	EC-1349, "Description"
Intake air temperature sensor	EC-1341, "Description"
Mass air flow sensor	EC-1338, "Description"
Refrigerant pressure sensor	EC-1380, "Description"
Stop lamp switch	EC-1425, "Description"
Throttle control motor	EC-1345, "Description"
Throttle position sensor	EC-1345, "Description"
Turbocharger boost sensor	EC-1361, "Description"
Vehicle speed sensor	EC-1379, "Description"

cardiagn.com

FUEL INJECTION CONTROL

System Description

INFOID:0000000000897234

SYSTEM DESCRIPTION

The high pressure injection system is designed to deliver a precise quantity of diesel fuel to the engine at a set moment. The Siemens VDO piezo Common Rail system used on the K9K Step 2 engine is a second generation Common Rail injection system. Fuel pressure in the rail can reach a maximum of 1,600 bar. It uses fuel injectors controlled by piezoelectric actuators. The fuel is pressurised by means of a high pressure pump then sent to a rail which supplies the four fuel injectors.

- The circuit comprises two subsystems, which are distinguished by the fuel pressure level:
  - the low pressure circuit comprises the tank, the diesel fuel filter, the transfer pump and the fuel injector return lines,
  - the high-pressure circuit comprises the high-pressure (HP) pump, the rail, the fuel injectors and the high-pressure (HP) pipes.

Finally, there are a number of control sensors and actuators which enable the entire system to be controlled and monitored.

- The system comprises:
  - Priming bulb
  - Fuel filter
  - High pressure supply pump
  - Fuel rail
  - Fuel rail pressure sensor
  - Fuel injector
  - Fuel pump temperature sensor
  - Engine coolant temperature sensor
  - Camshaft position sensor
  - Crankshaft position sensor
  - Turbocharger boost sensor
  - EGR volume control valve control position sensor
  - EGR volume control valve
  - Barometric pressure sensor (built in ECM)
  - Mass air flow sensor
  - Intake air temperature sensor
  - Electric throttle control actuator

High Pressure Supply Pump

The high pressure supply pump consists of the following components:

- Internal fuel transfer pump:
  - This pump is a vane-type rotary pump. It draws in fuel from the fuel tank through a fuel filter and supplies the high pressure pump with fuel.
- Volumetric control valve:
  - This solenoid valve regulates the flow of fuel entering the high pressure pump and enables an optimum quantity of fuel to be pressurised according to operating phase; this improves the output of the high pressure supply pump and thereby the output of the engine as well.
- High pressure pump:
  - This pump is a 3-piston radial pump, it generates the required pressure in the rail.
- Pressure control valve:
  - This solenoid valve regulates the output pressure of the high pressure pump.

Fuel Injector (Piezo Type)

CAUTION:

The fuel injector voltage is very high (much higher than that of conventional fuel injectors). This voltage can be as much as 150 V.

The piezo fuel injectors enable rapid, precise metering of the quantity of fuel injected, with excellent injection process repetitivity.

The piezo actuator operates like a capacitor. To control the fuel injector, the computer sends, at the correct time, a quantity of energy which is sufficient to enable the actuator to deform and the fuel injector to open.

During the injection period, the piezo actuator stores this energy.

At the end of the injection period, the computer recovers the energy sent at the start of the control operation. The piezo actuator discharges and returns to its original shape. The fuel injector closes. To improve output, the

cardiagn.com

energy returned by the piezo actuator is reused, which keeps down the amount of energy that has to be supplied for the next injection process.

Engine Synchronisation

One of the determining factors for fuel injection control is knowing the position of each of the pistons in their respective cylinders at all times.
The angular position is measured by means of a magneto-inductive sensor which is excited by the teeth machined onto the flywheel; this is known as the crankshaft position sensor. The flywheel has 60 teeth, each 6 degrees apart; 2 of these teeth are missing to form a notch.
A second sensor (Hall-effect sensor), stimulated by a tooth machined onto the camshaft, which turns at half the engine speed, provides a signal relating to the progress of the injection cycle. Indeed, when the piston of cylinder 1 is at top dead centre (TDC), either at the end of the compression stroke or at the end of the exhaust stroke, the camshaft position sensor enables a distinction to be made between these two states.
By comparing the signals from these two sensors, the computer is able to provide all its systems with synchronisation parameters, namely: the angular position of the flywheel, engine speed, the number of the active fuel injector and the progress of the injection cycle.
This module also supplies the system with the rotation speed signal.
The camshaft position sensor is only used when starting the engine. As soon as the engine is running by itself (not being cranked by the starter), the signal provided by the crankshaft position sensor is sufficient. If the camshaft position sensor should fail while the engine is running, this will not affect the operation of the engine.

Quantity of Fuel Injected and Control of Start of Injection

- The parameters for controlling injection are, for each cylinder, the quantity to be injected and the start of injection. These are calculated by the ECM from the following information:

- Engine speed.
- Accelerator pedal position.
- Turbocharge air pressure.
- Engine coolant temperature.
- Intake air temperature.
- Fuel pump temperature.
- Mass air flow.
- Pressure of fuel in the rail.

Station to Station Flow Regulation

The aim of this regulation process is to facilitate smooth engine operation by compensating for the system variations (fuel injectors, compression rate, etc.) which affect the torque generated by each cylinder during combustion.
The regulation process is only active at idle speed, with a warm engine and on condition that the engine speed is sufficiently stable. An injection timing correction coefficient is assigned to each cylinder; this is "learning" all the time the regulation process is active and remains fixed at the last value that was learned when the regulation is inactive.
At each new cycle, the coefficients are initialised to 1.

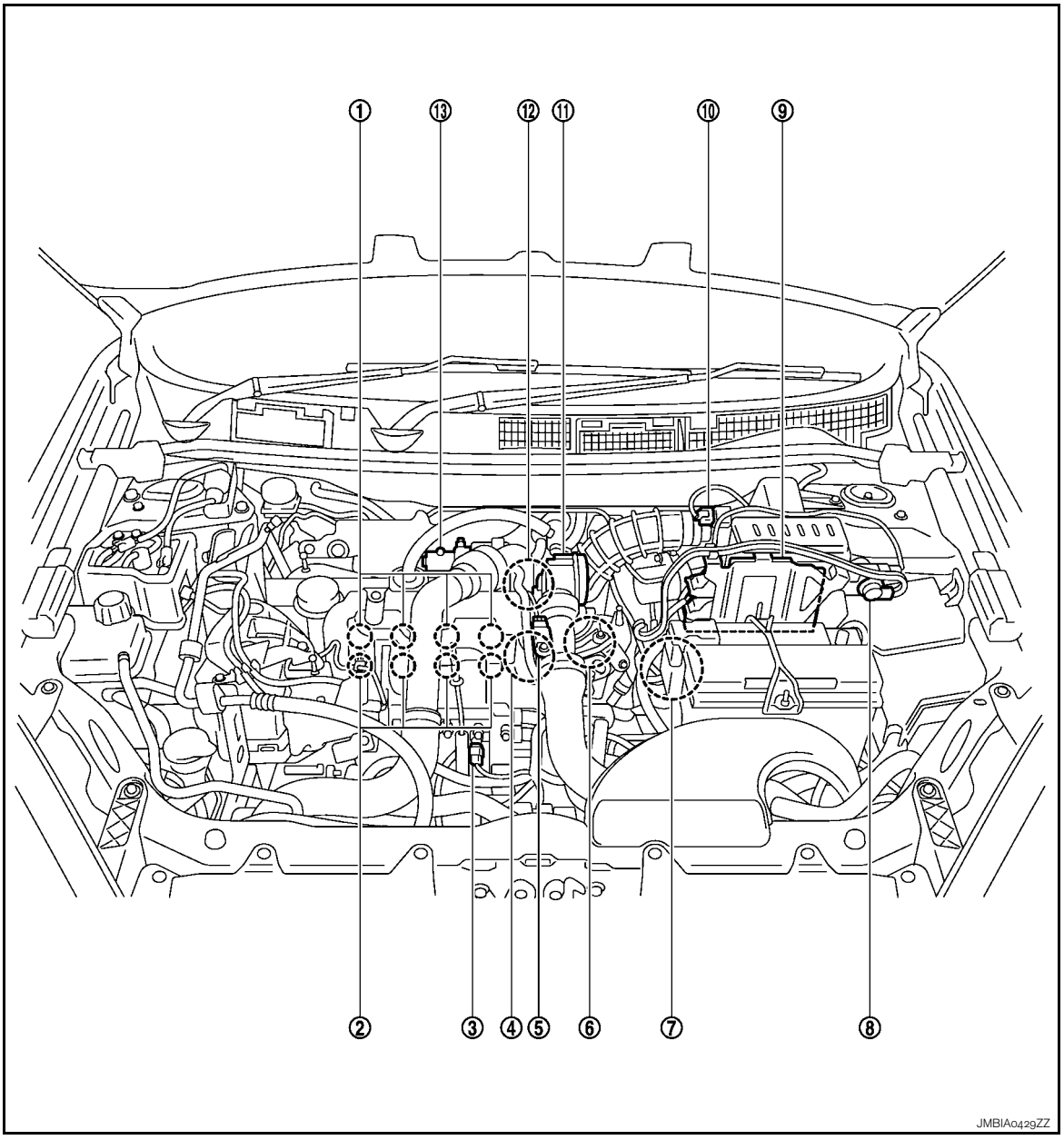
Cylinder Balancing Control

This controller allows smooth behavior of running engine, reduction of noise and oscillations in the drivetrain by compensating for system dispersions (fuel injectors, compression ratio, manufacturing tolerances of cylinders or valves...) having an influence on the torque generated by each cylinder during combustion.
The controller is only activated if engine is in idle, warm and not too rough. Corrective coefficient on the injection time is associated with each cylinder that is learnt as soon as the regulation is active. Otherwise it remains with its last memorized value.
At each new driving cycle, coefficients are initialized to 1.

Component Parts Location

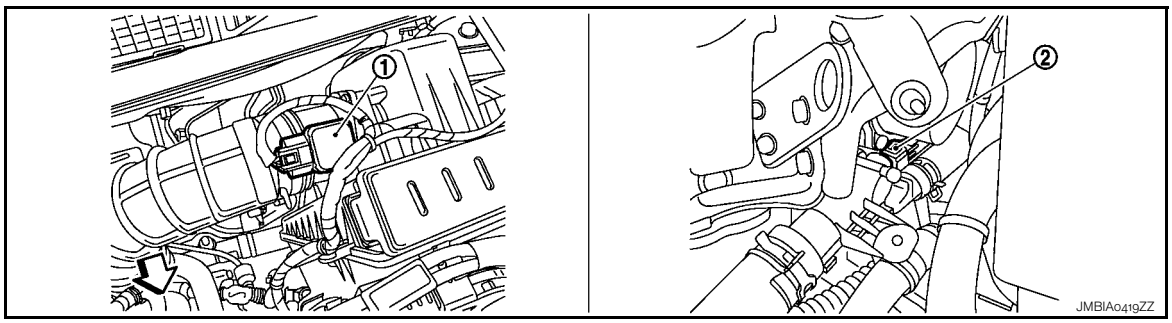
INFOID:0000000001078673

cardiagn.com



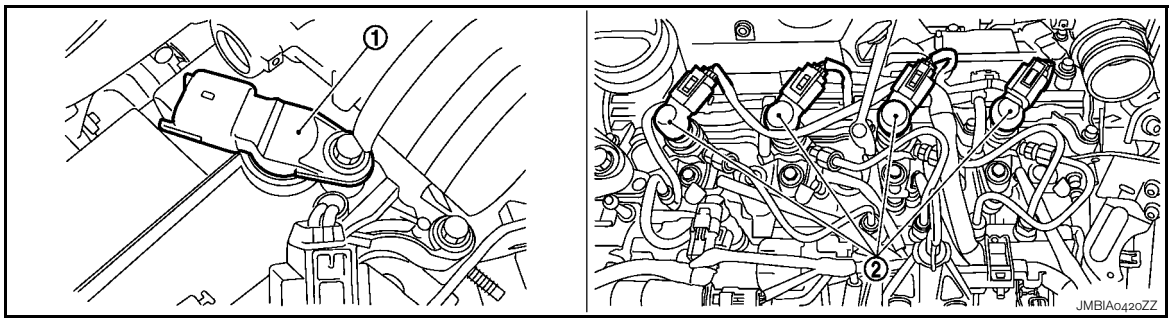
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

cardiagn.com

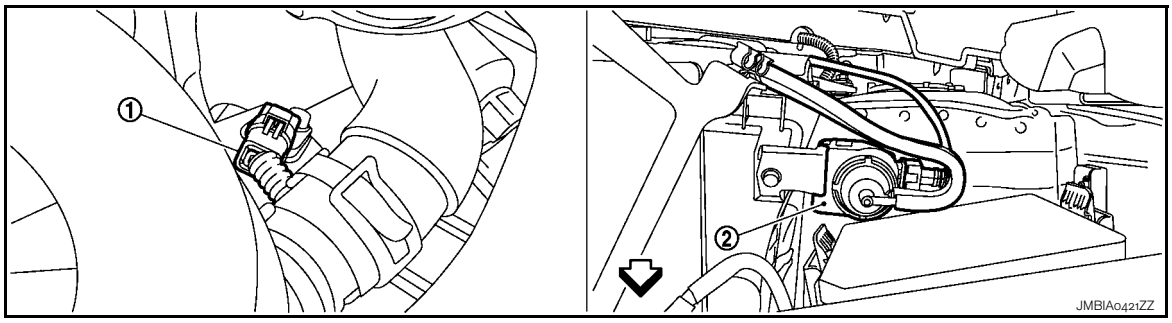


⇦ : Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

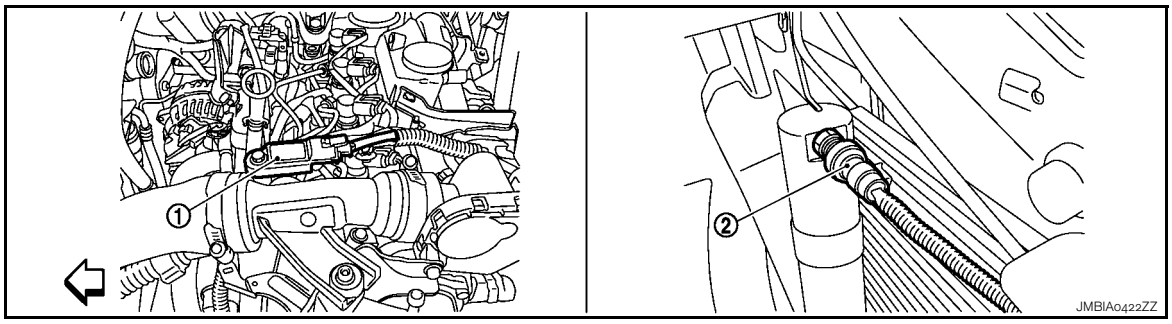


1. Camshaft Position Sensor
2. Fuel injector



⇦ : Vehicle front

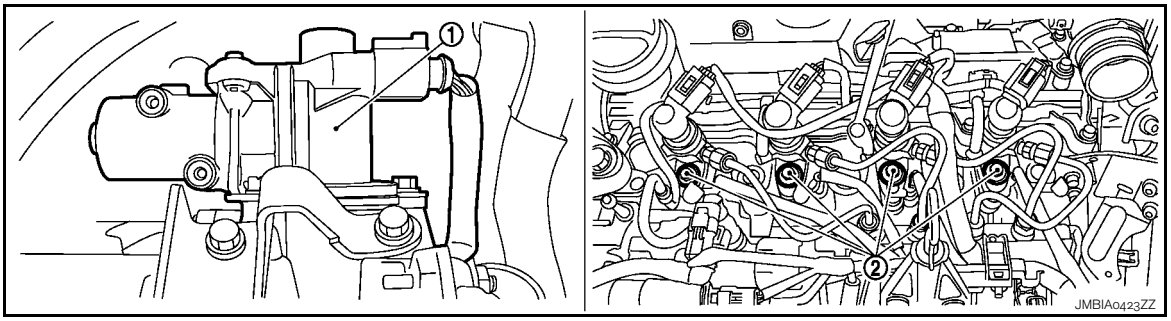
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve



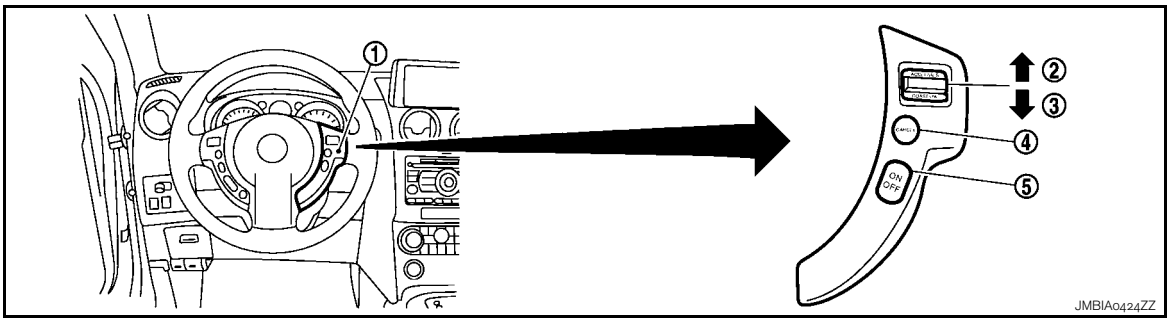
⇦ : Vehicle front

1. Turbocharger boost sensor
2. Refrigerant pressure sensor

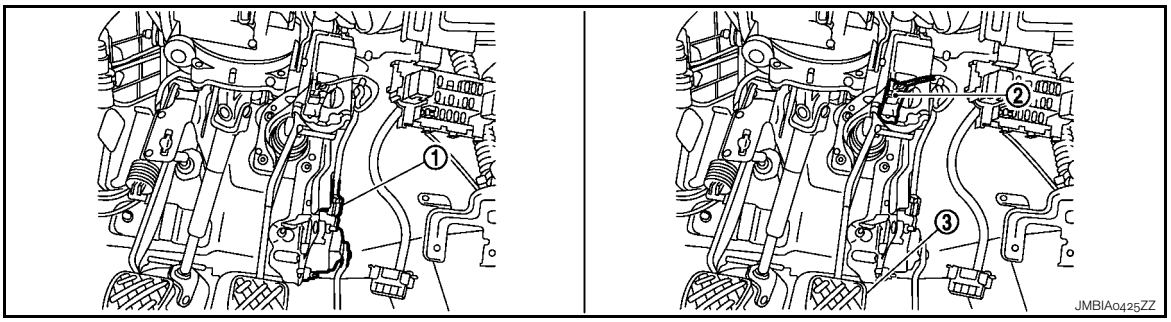
cardiagn.com



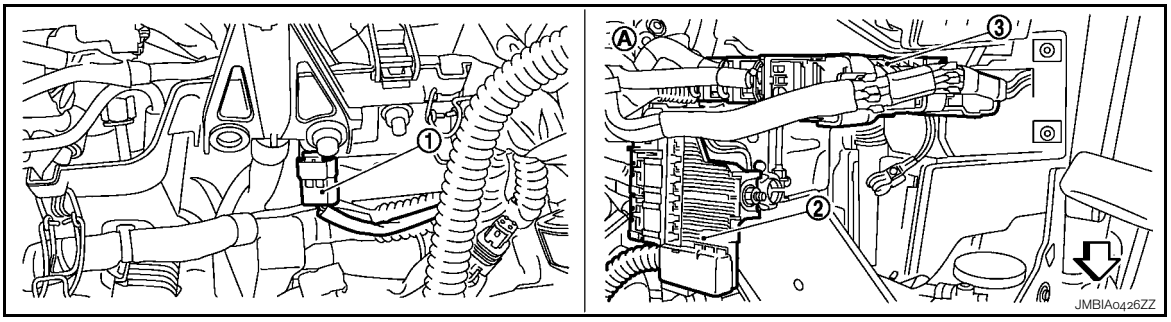
1. EGR volume control valve 2. Glow plug



1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch

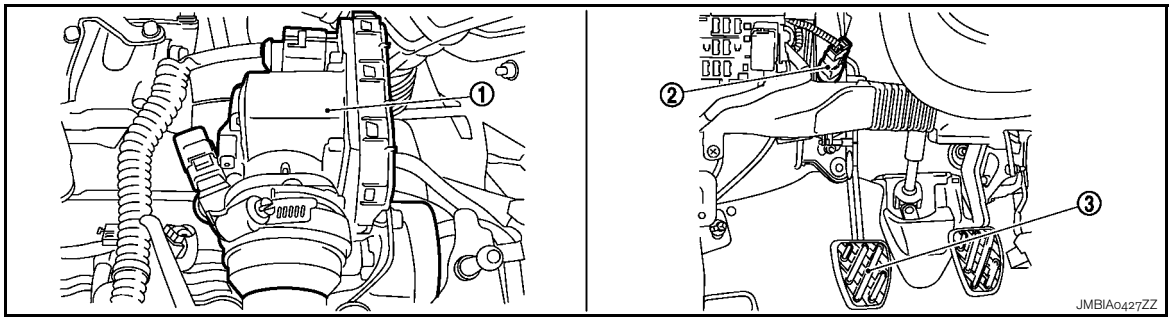


1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal

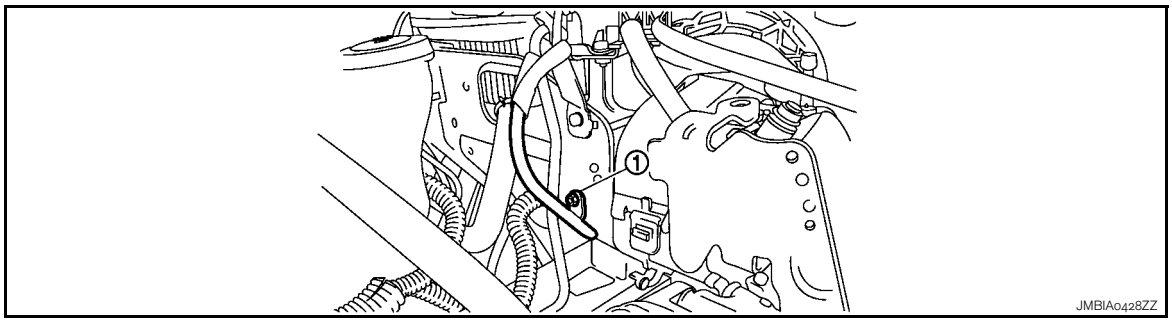


1. Fuel rail pressure sensor 2. Glow relay 3. ECM
A. View with battery removed

cardiagn.com



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



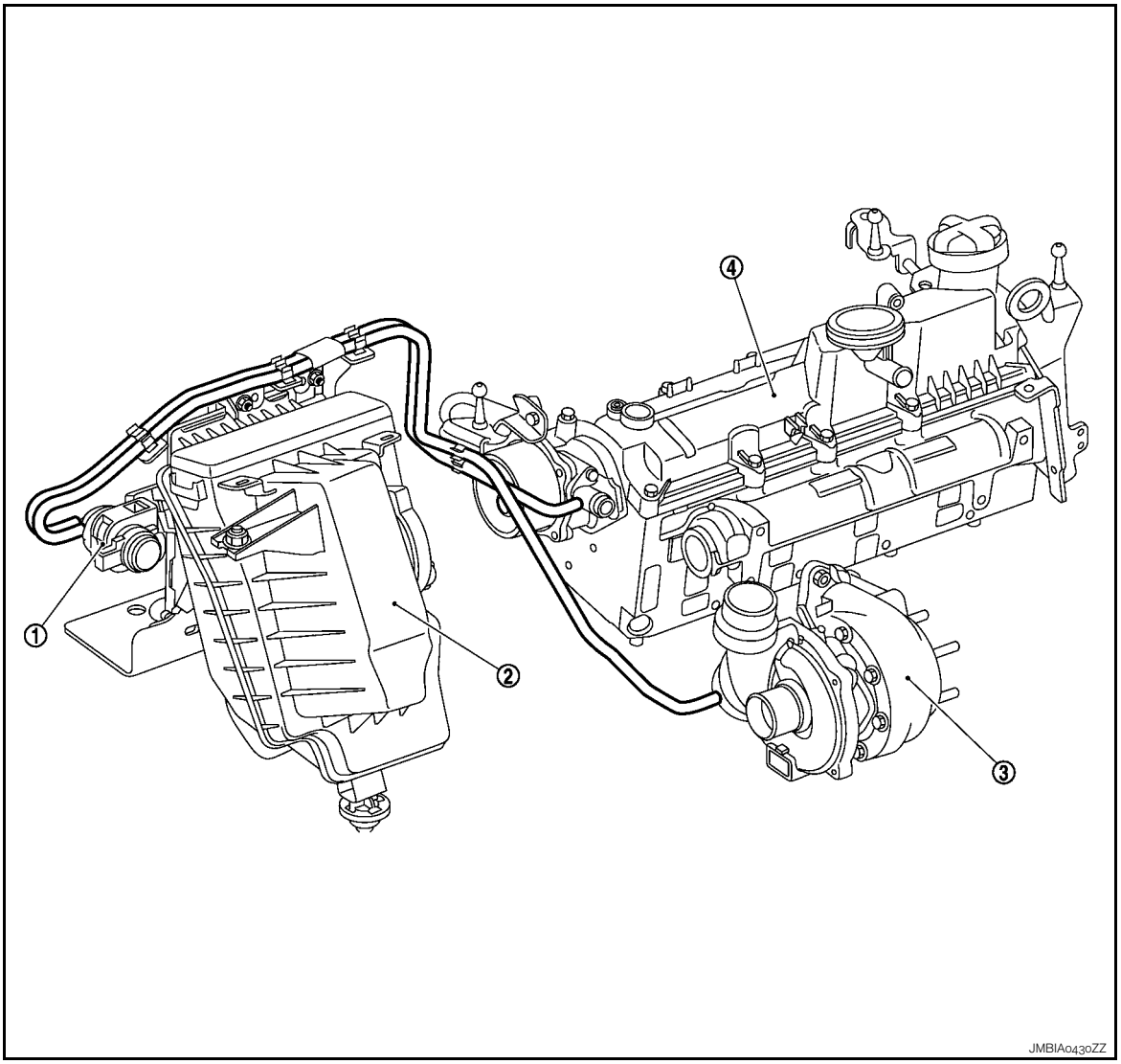
1. Body ground E17

cardiagn.com

TURBOCHARGER BOOST CONTROL

Vacuum Hose Drawing

INFOID:0000000001078841



1. Turbocharger boost control solenoid valve
2. Air cleaner
3. Turbocharger
4. Rocker cover
5. Vacuum pump

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

System Description

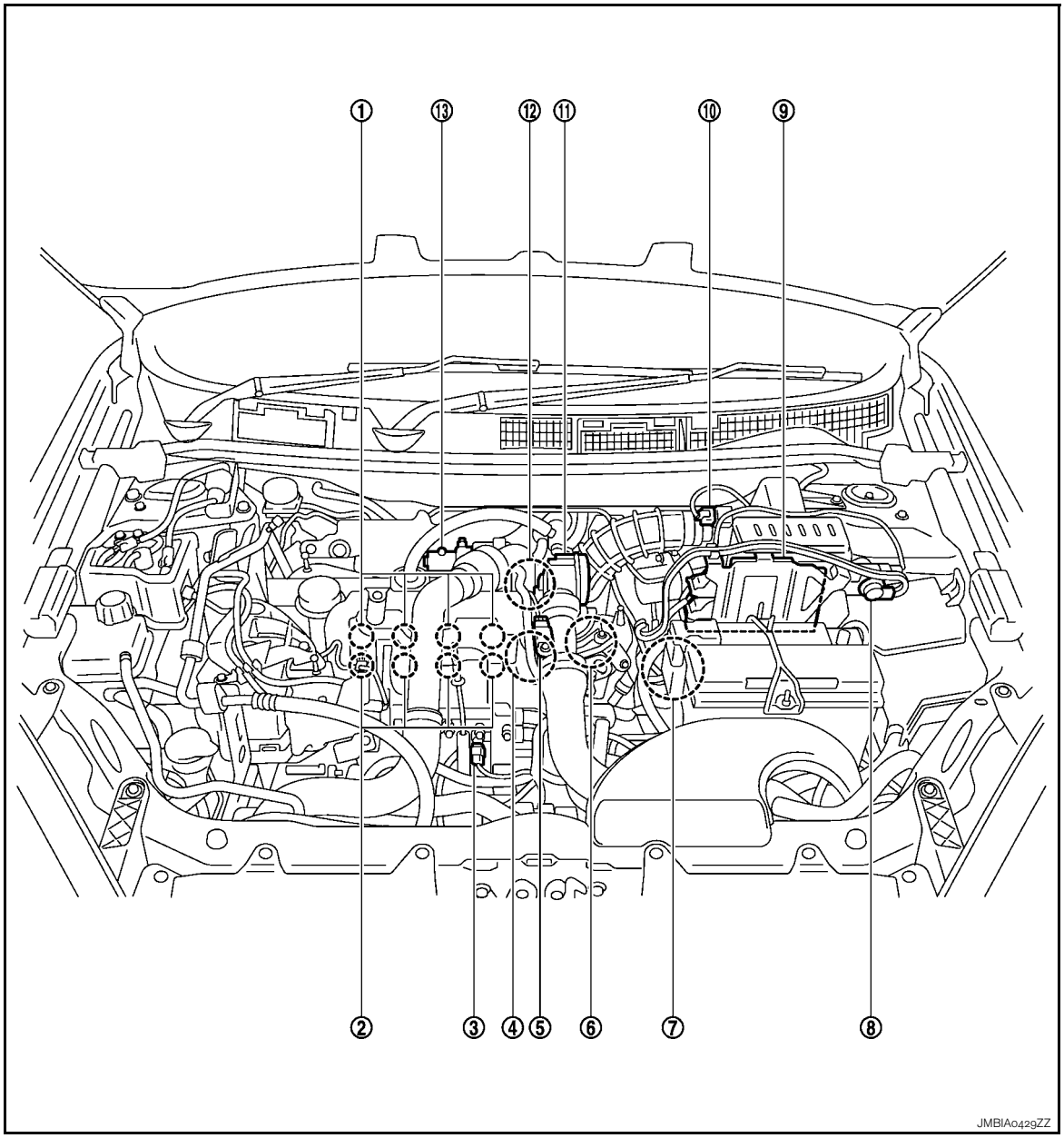
INFOID:0000000001078839

The turbocharger system consists of a solenoid valve connected to the vacuum pump circuit; this enables the vanes to be controlled by means of a diaphragm so as to create either an overpressure or a vacuum in the fresh air inlet circuit.

Component Parts Location

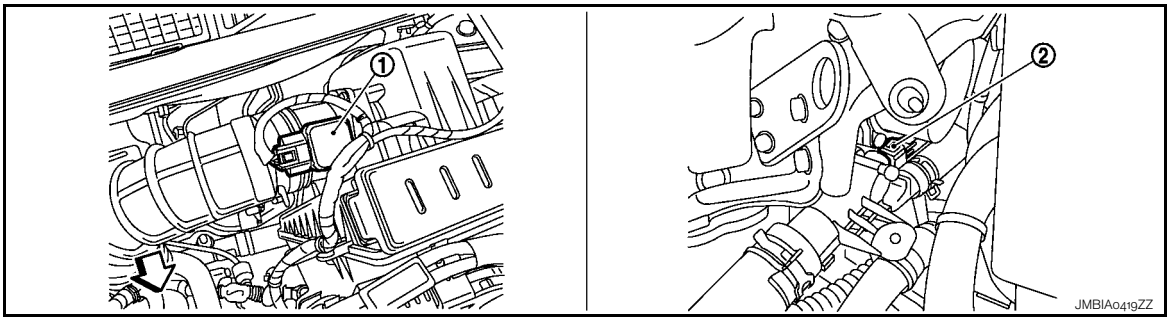
INFOID:0000000001078840

cardiagn.com



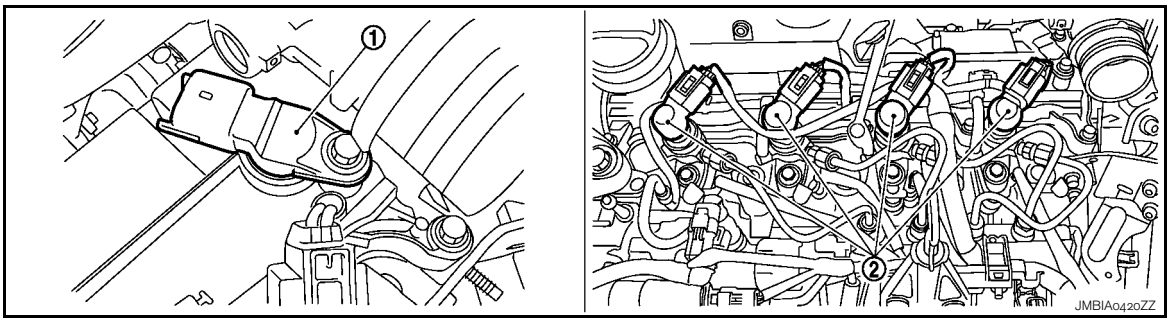
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

cardiagn.com

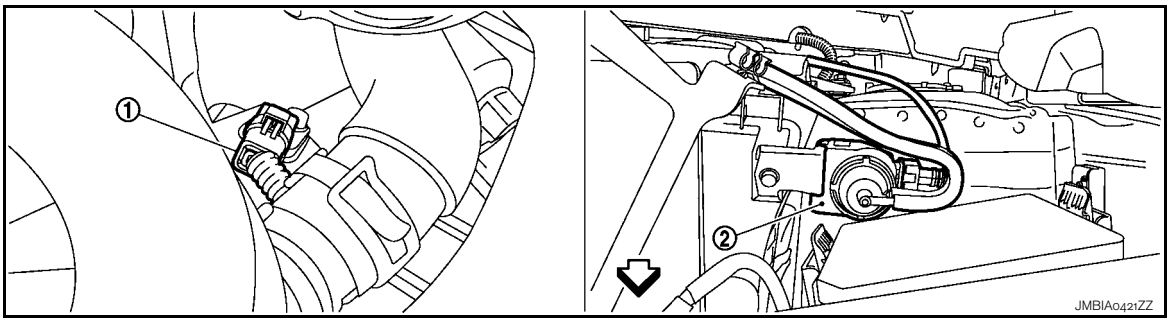


⇦: Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

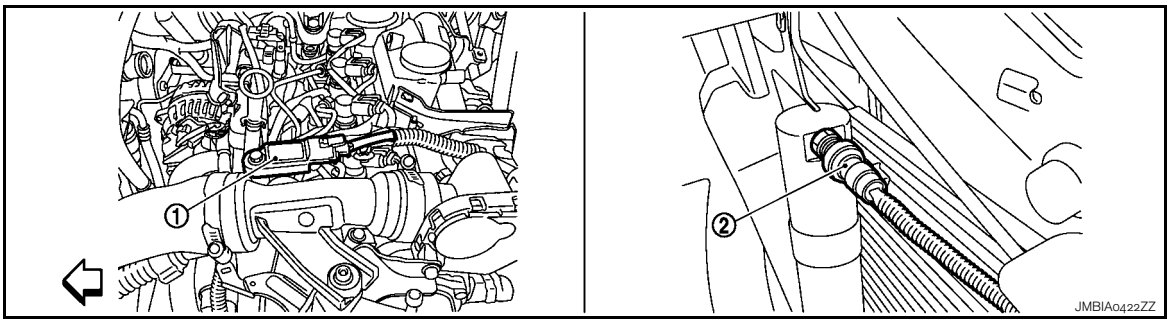


1. Camshaft Position Sensor
2. Fuel injector



⇦: Vehicle front

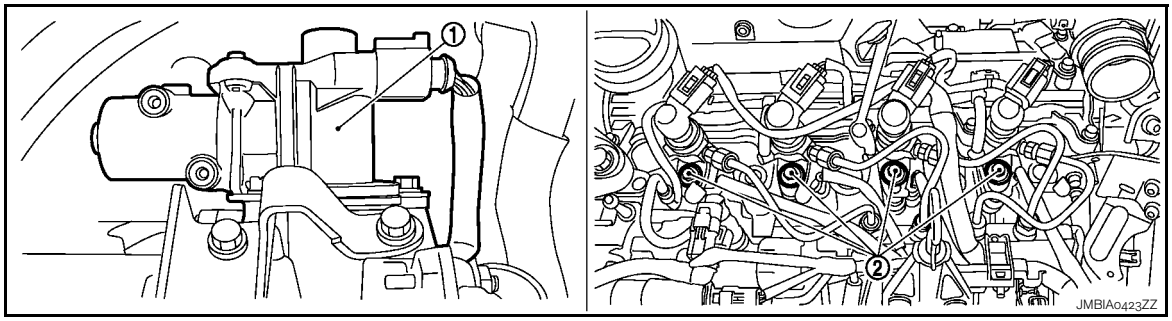
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve



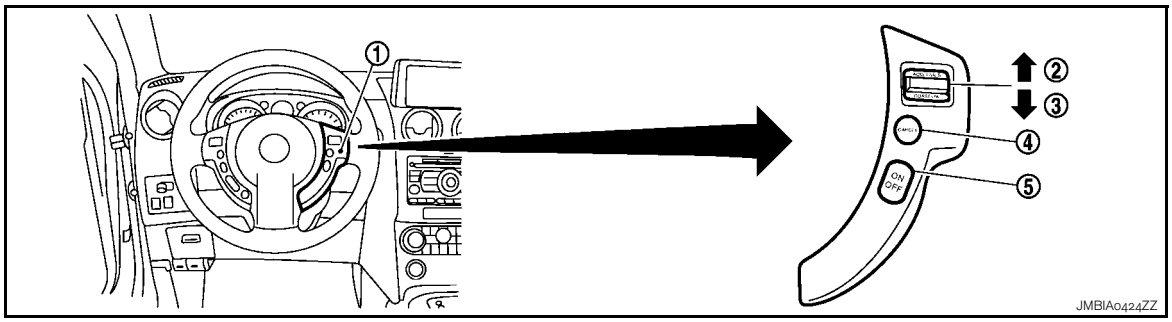
⇦: Vehicle front

1. Turbocharger boost sensor
2. Refrigerant pressure sensor

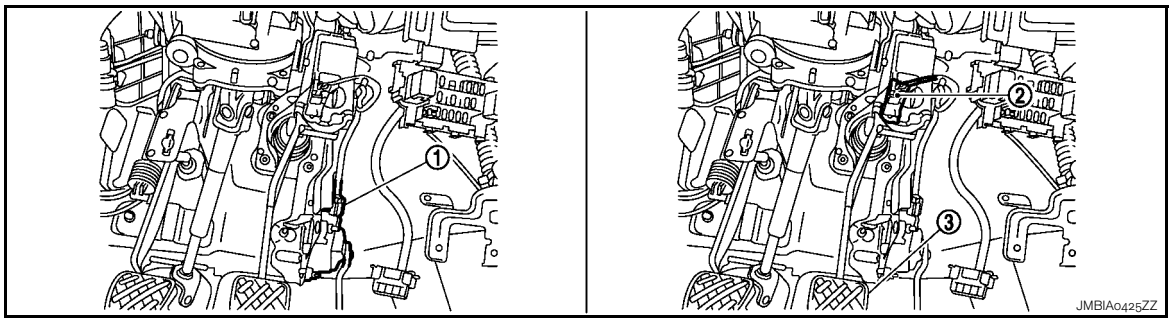
cardiagn.com



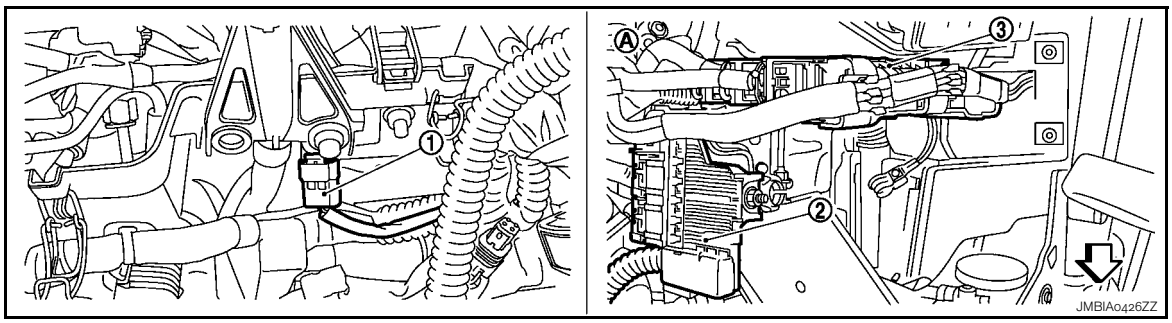
1. EGR volume control valve
2. Glow plug



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



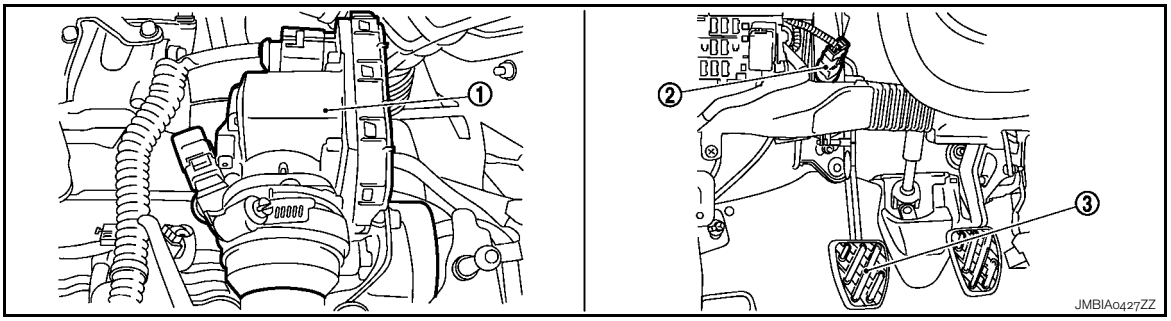
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal



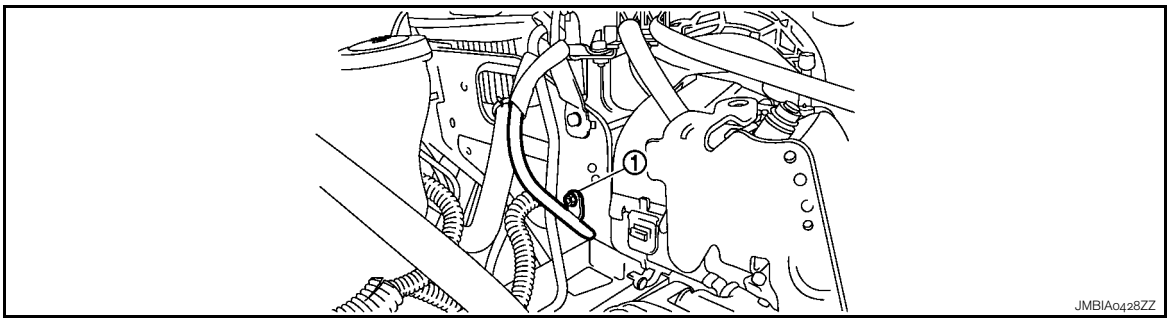
1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed

cardiagn.com



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

cardiagn.com

EGR SYSTEM

System Description

INFOID:0000000000897371

EGR SYSTEM

EGR Valve Control

The EGR (exhaust gas recirculation) system consists of a direct current EGR volume control valve fitted with a EGR volume control valve control position sensor. The EGR volume control valve is controlled in a closed-loop via the EGR volume control valve control position sensor. Up to a certain rate, exhaust gas recirculation enables nitrogen oxide (NOx) emissions to be reduced significantly.

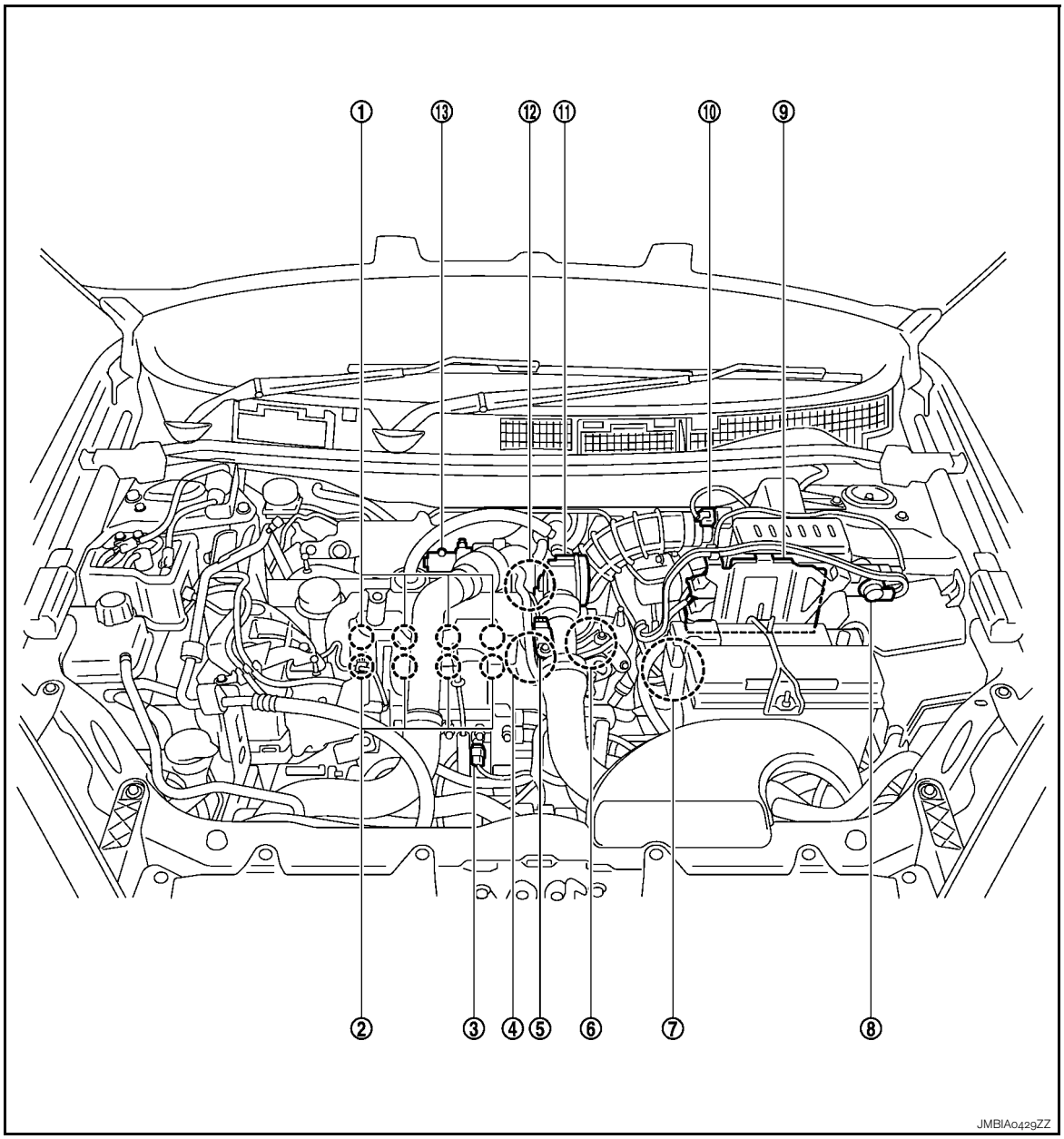
Measurement of the Fresh Air Flow

The flow of fresh air entering the engine is calculated by a mass air flow sensor (ratiometric hot-wire sensor). An intake air temperature sensor is integrated into the mass air flow sensor.

The mass air flow sensor facilitates control of the quantity of exhaust gas sent for recirculation, thus ensuring the best possible recirculation rates. Air flow measurement allows closed-loop control via the EGR valve.

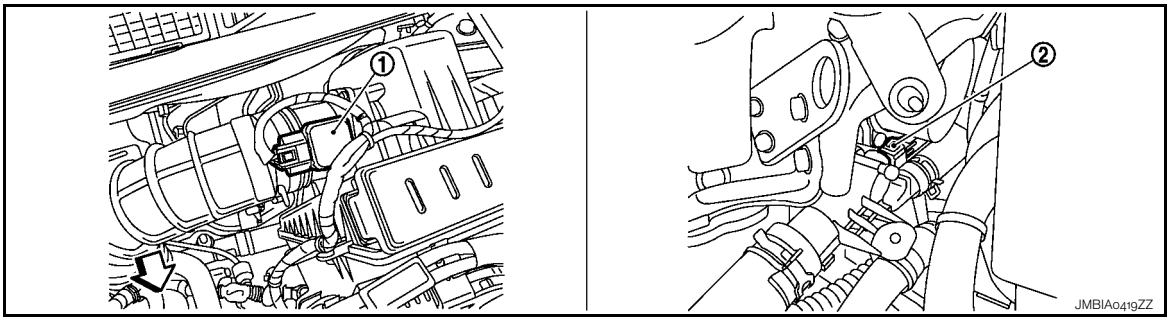
Component Parts Location

INFOID:0000000001078869



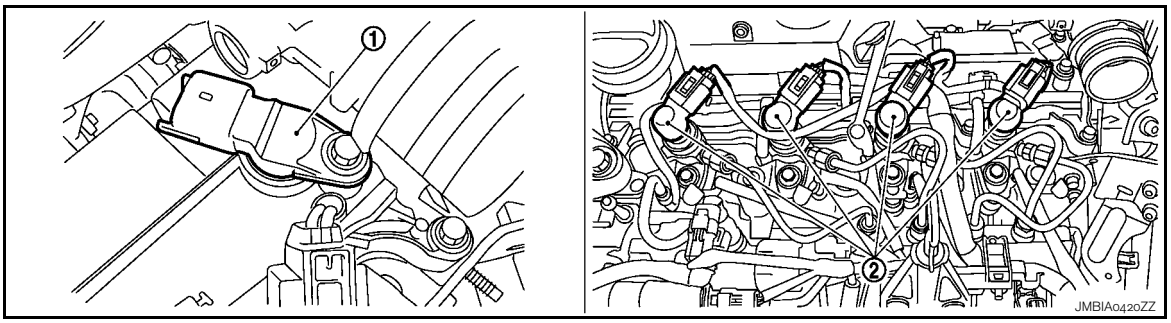
cardiagn.com

1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

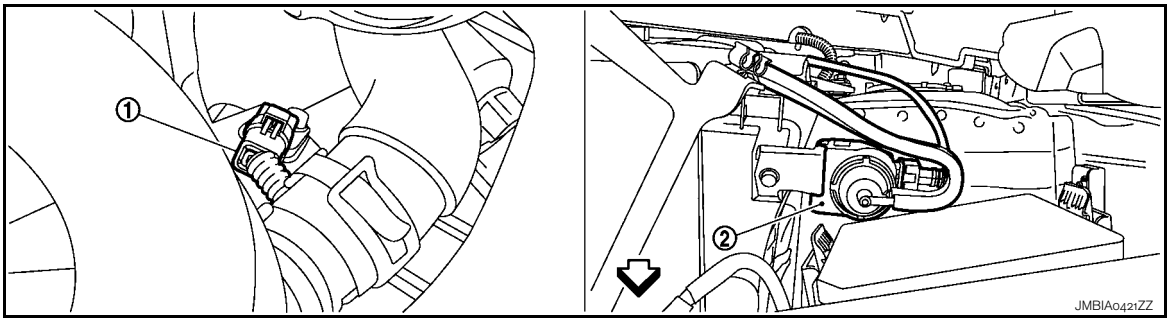


⇦: Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor



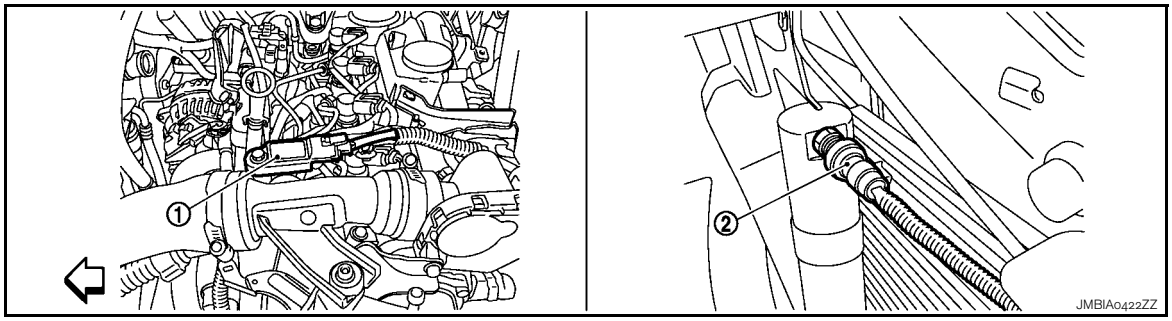
1. Camshaft Position Sensor
2. Fuel injector



⇦: Vehicle front

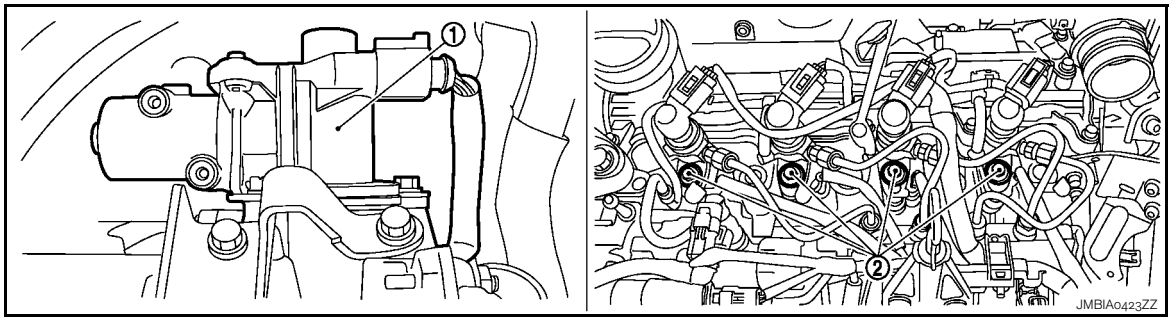
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve

cardiagn.com

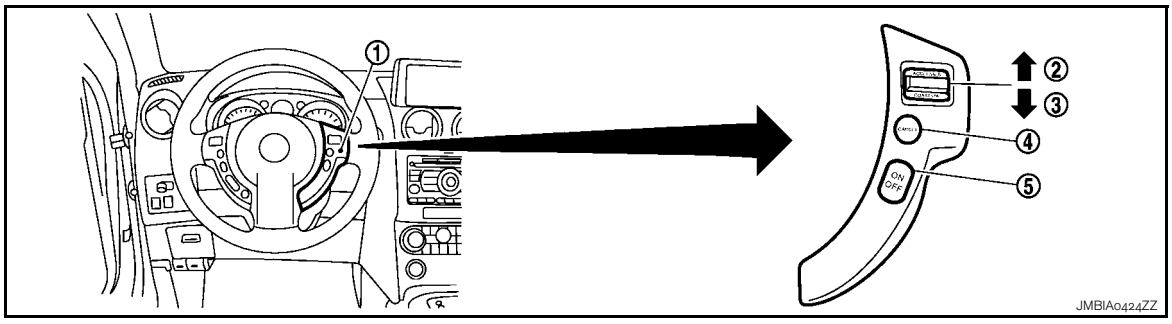


⇦ : Vehicle front

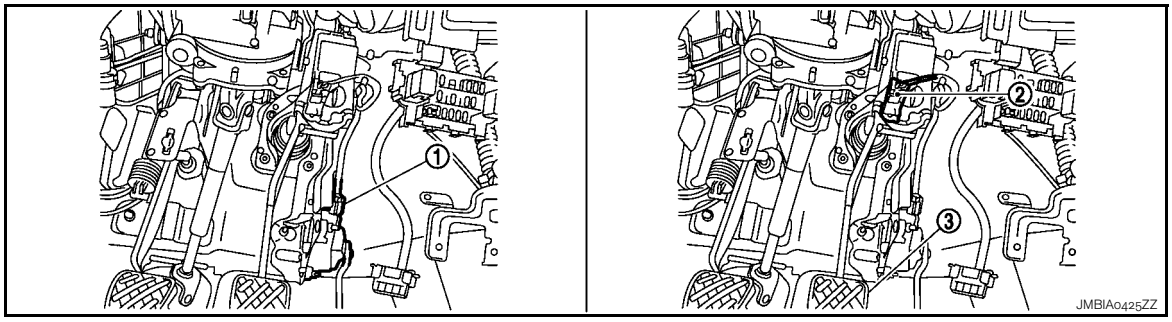
1. Turbocharger boost sensor 2. Refrigerant pressure sensor



1. EGR volume control valve 2. Glow plug

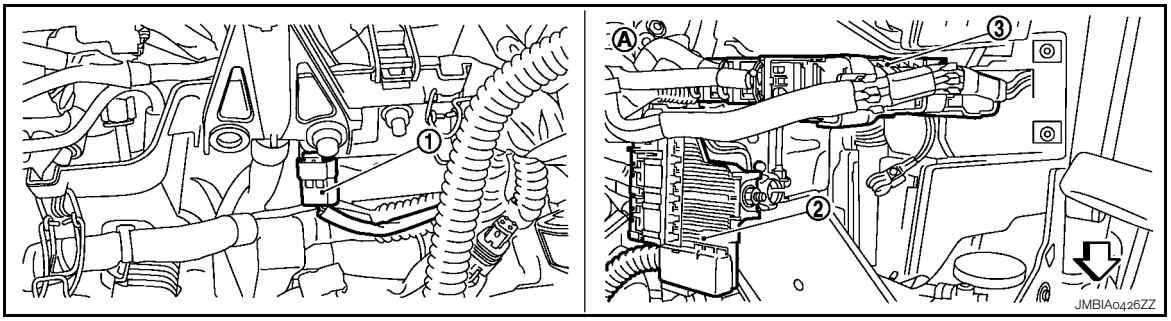


1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch

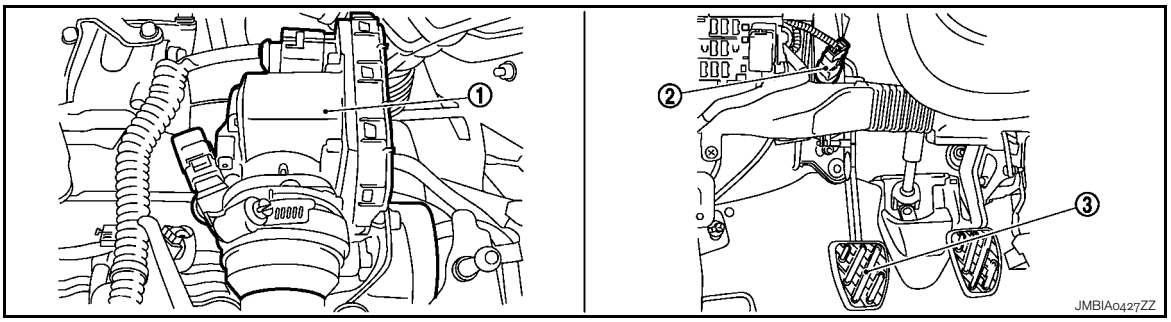


1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal

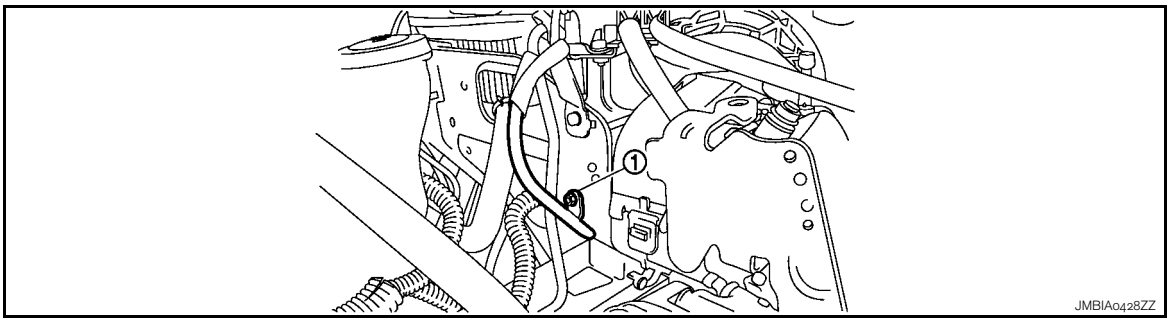
cardiagn.com



1. Fuel rail pressure sensor 2. Glow relay 3. ECM
A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



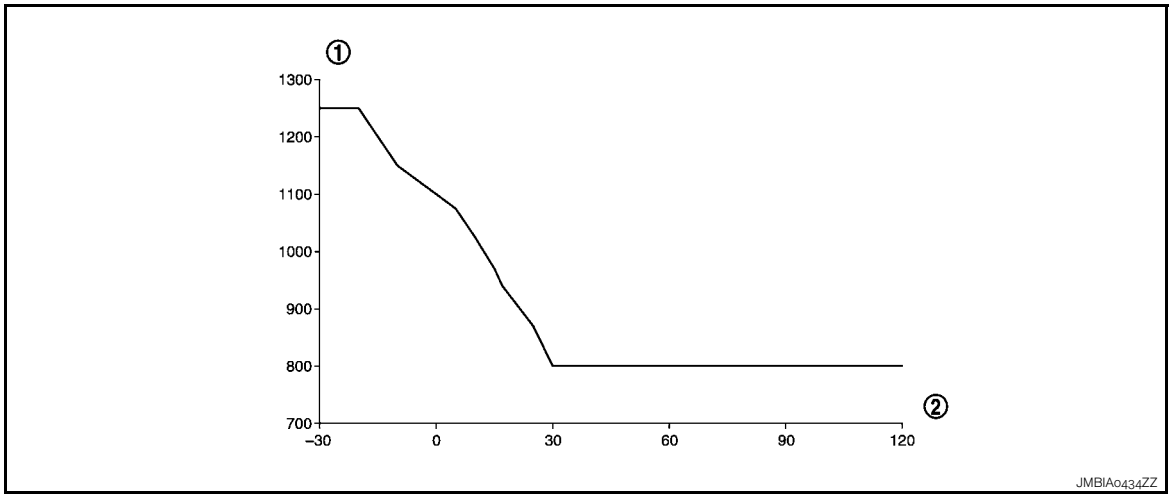
1. Body ground E17

cardiagn.com

IDLE SPEED CONTROL

System Diagram

INFOID:0000000001102318



1. Engine speed in rpm
2. Engine coolant temperature °C

System Description

INFOID:0000000001080389

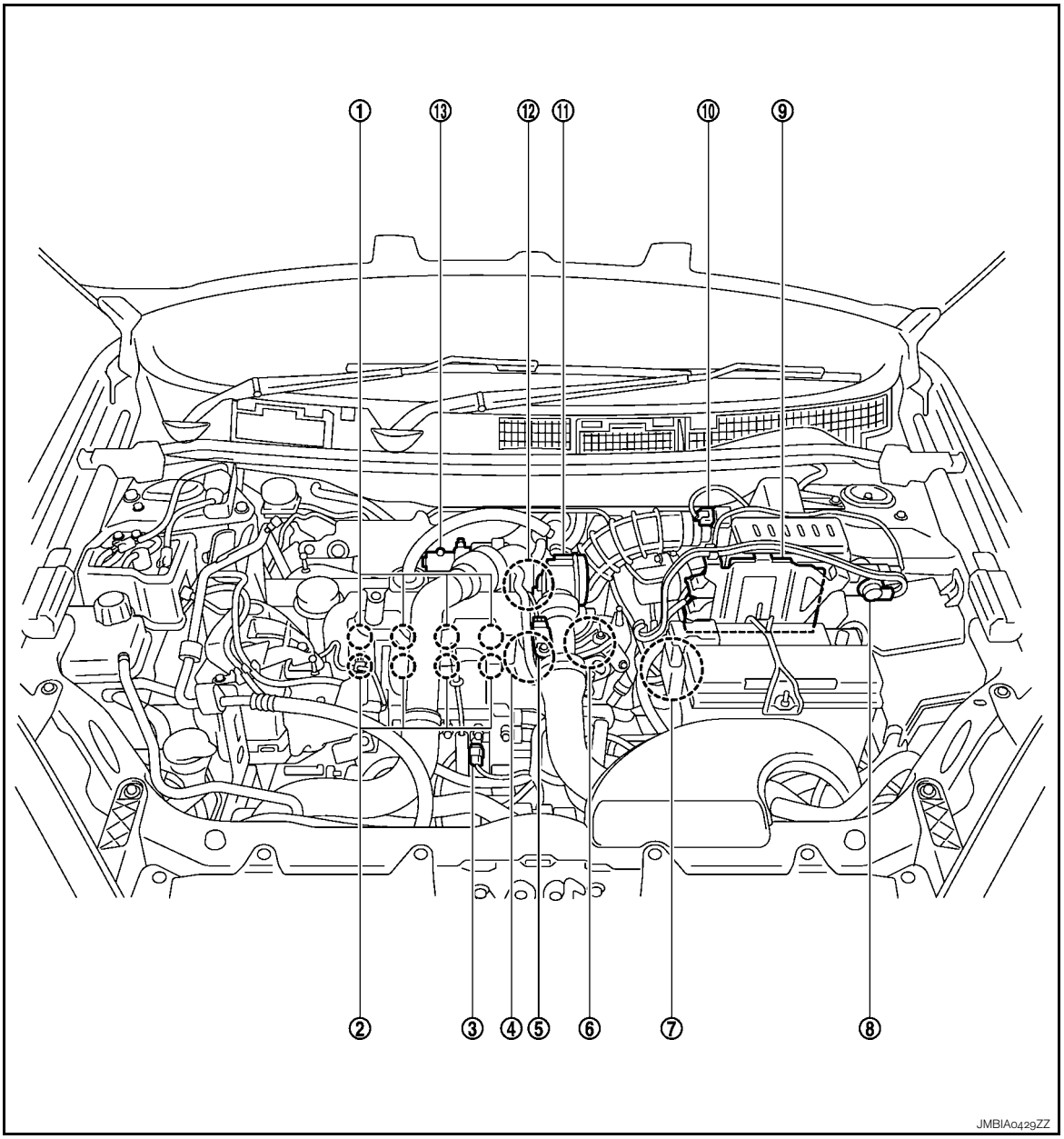
The ECM is responsible for regulating the idle speed as a function of the idle speed setpoint which it calculates.

- The idle speed setpoint is dependent on:
- Engine coolant temperature
- Emission control program
- Air conditioning requirement
- Gear engaged
- Electrical load
- Battery voltage

Component Parts Location

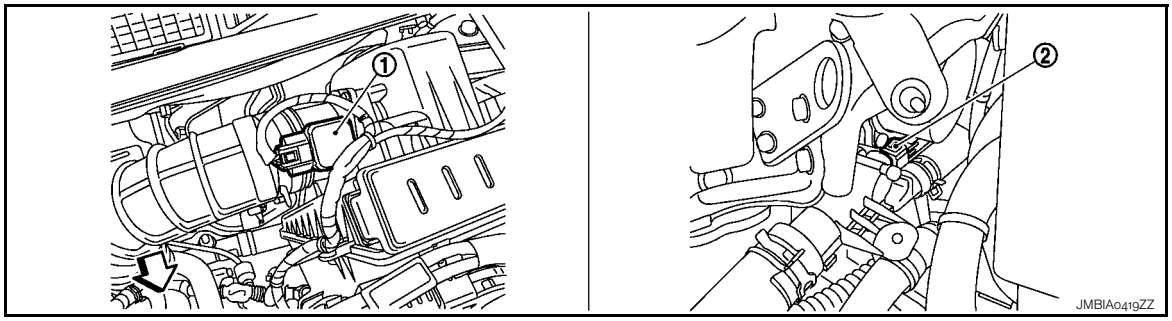
INFOID:0000000001080391

cardiagn.com



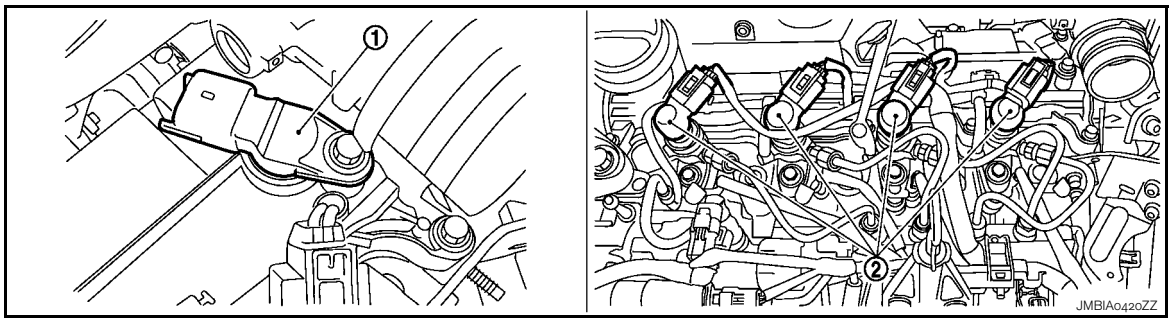
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

cardiagn.com

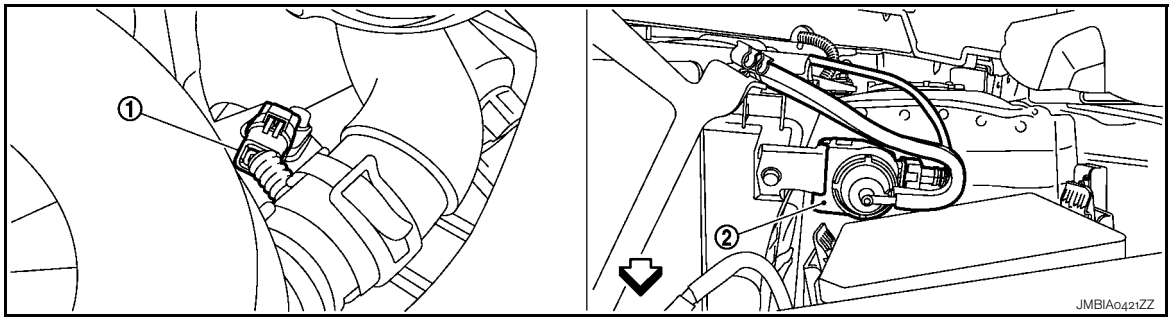


⇦ : Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

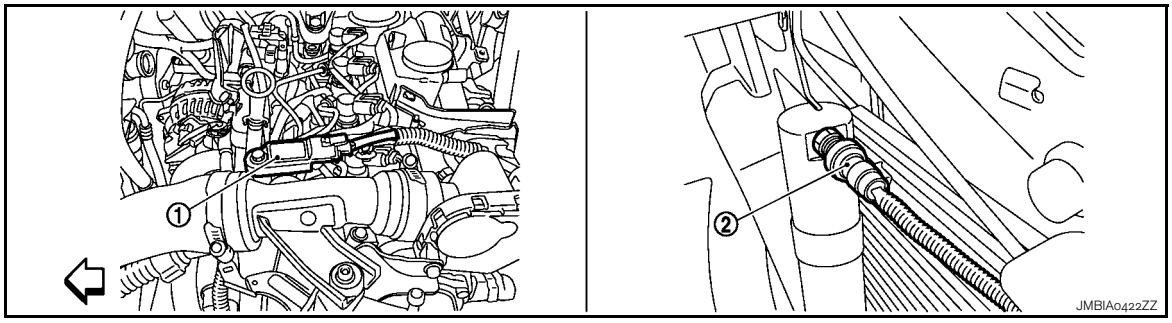


1. Camshaft Position Sensor
2. Fuel injector



⇦ : Vehicle front

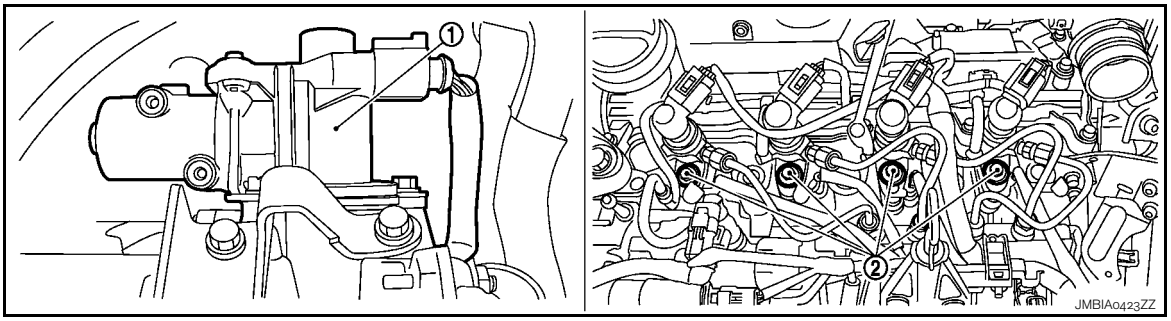
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve



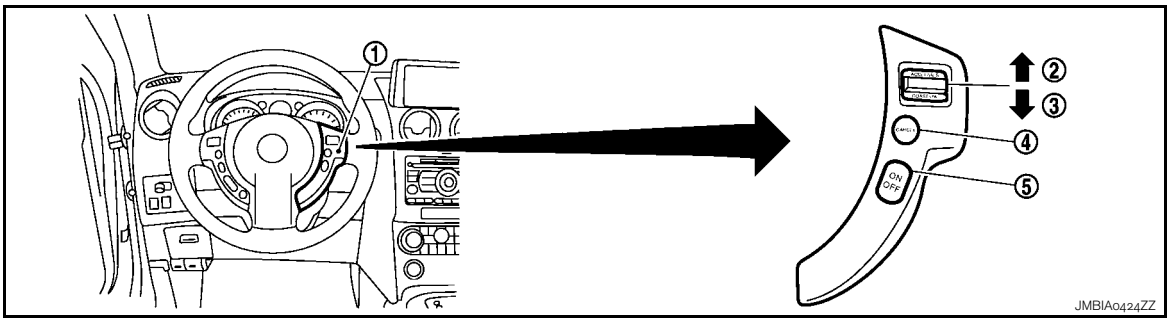
⇦ : Vehicle front

1. Turbocharger boost sensor
2. Refrigerant pressure sensor

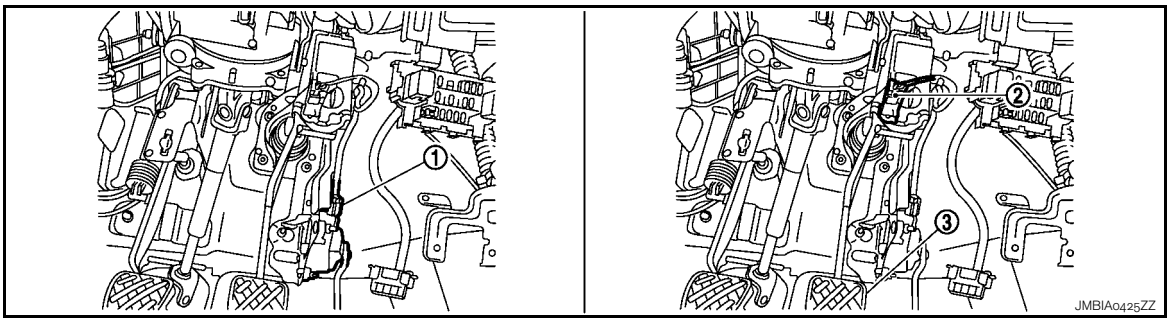
cardiagn.com



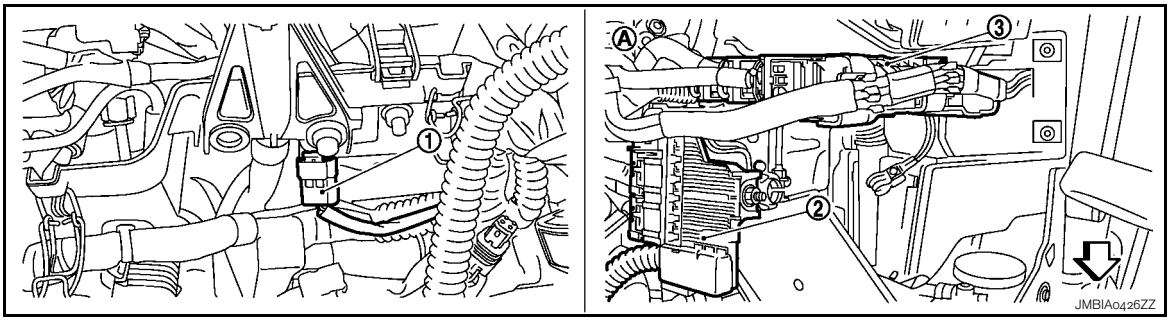
1. EGR volume control valve 2. Glow plug



1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch

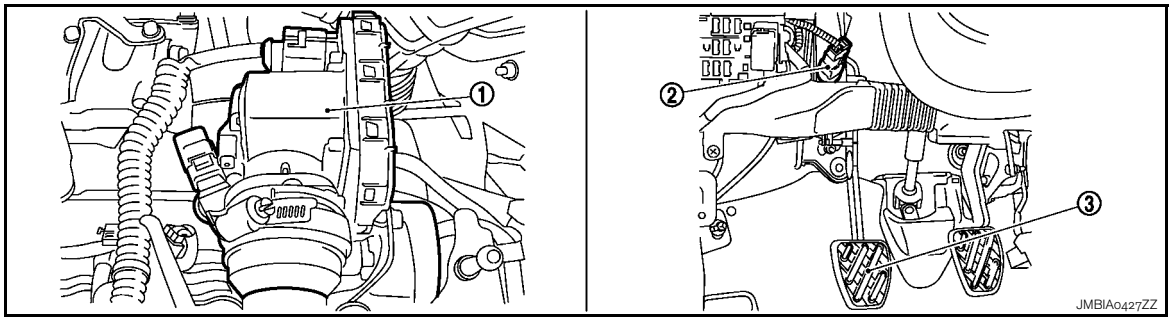


1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal

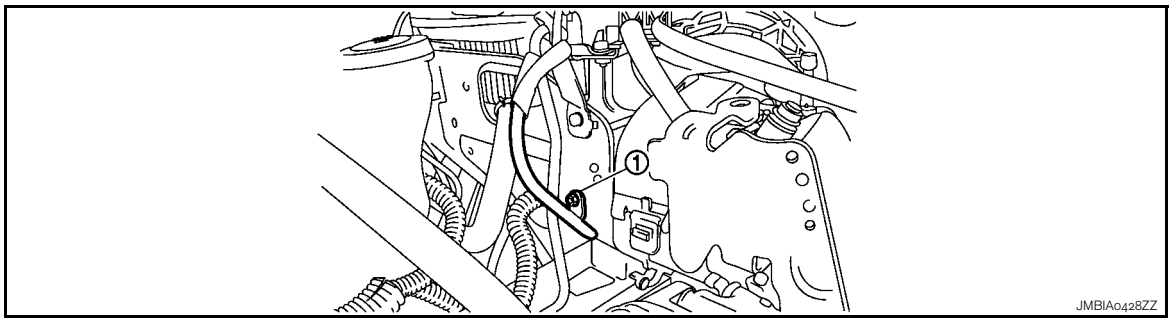


1. Fuel rail pressure sensor 2. Glow relay 3. ECM
A. View with battery removed

cardiagn.com



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

cardiagn.com

ENGINE TORQUE CONTROL

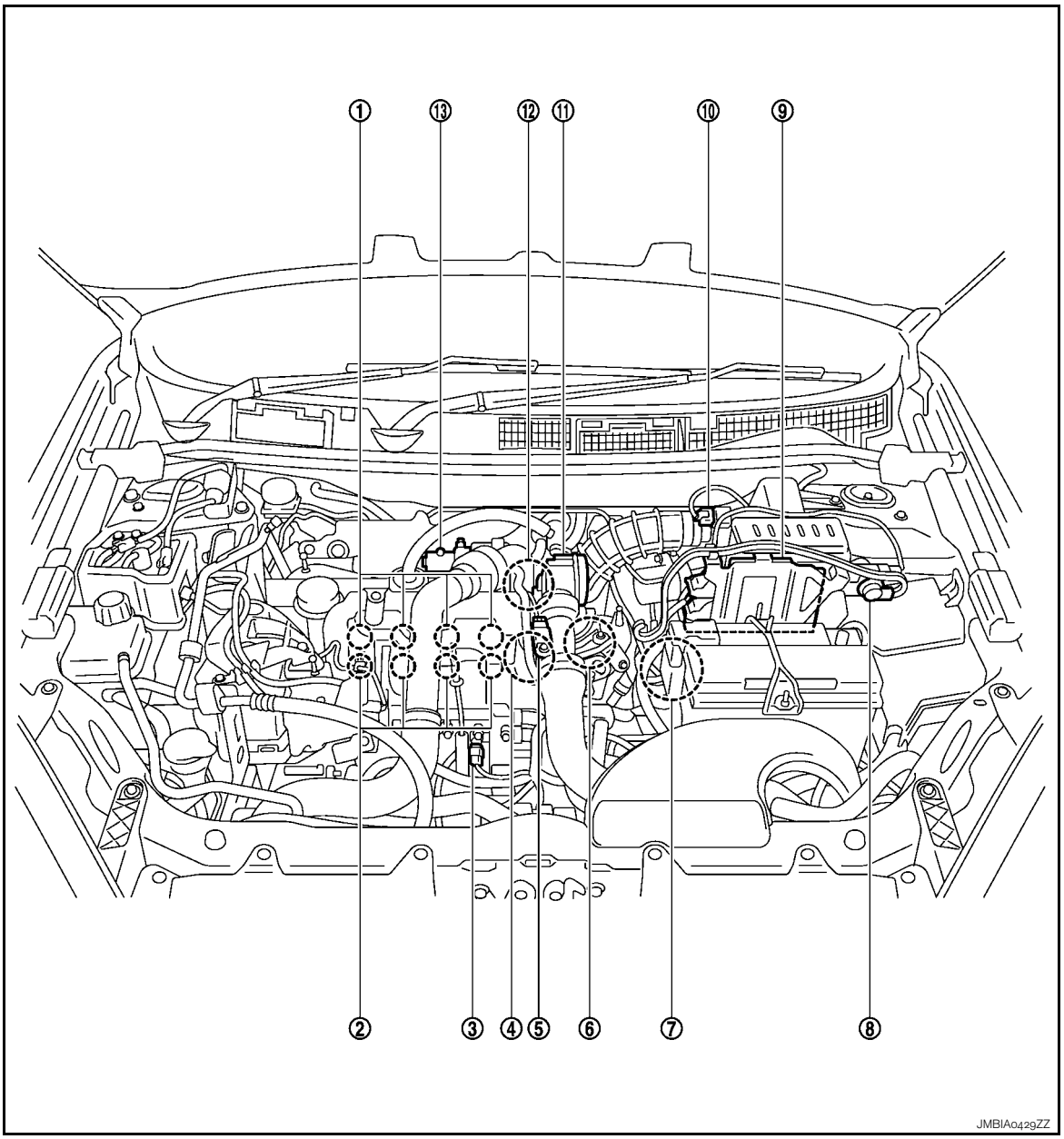
System Description

INFOID:0000000001080654

The torque structure is the system which translates the driver's request into a torque supplied by the engine. It is required for certain functions such as the electronic stability program (ESP), the automatic gearbox or the sequentialgearbox if fitted).
Each inter-system (ESP, automatic gearbox, sequential gearbox) sends the ECM a torque request viathe CAN communication. The computer arbitrates between the inter-system torque requests and the driver's request (comprised of the accelerator pedal or the cruise control/speed limiter function). The result of the arbitration gives thetorque setpoint.
From this torque setpoint, the computer determines the quantity of fuel to be injected (injection duration and numberof injections) and the amount of air required (turbocharging pressure and EGR rate) so that the engine is able toprovide the torque required in the best possible conditions (in terms of smooth running performance, pollutantemissions, etc.).

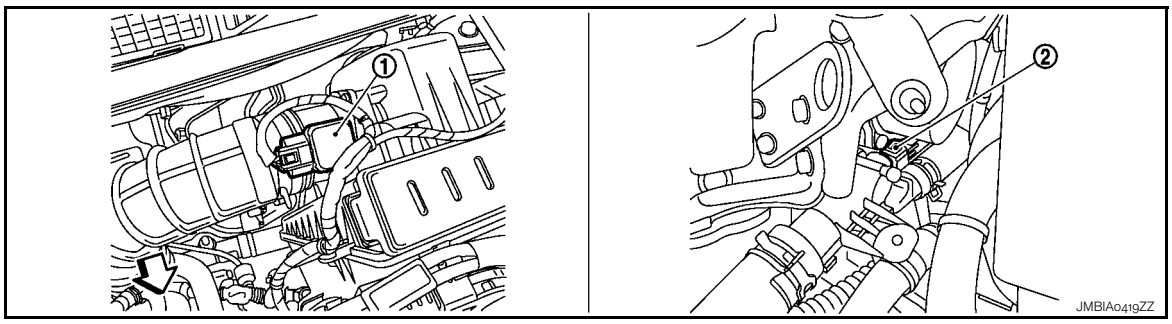
Component Parts Location

INFOID:0000000001080655



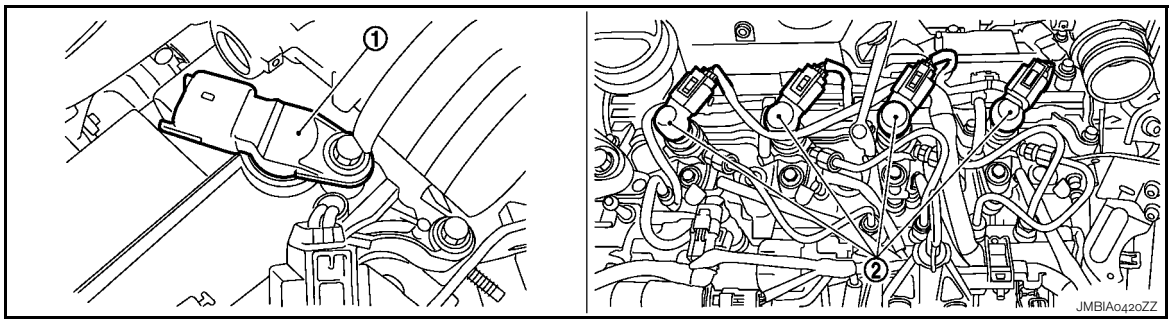
cardiagn.com

1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

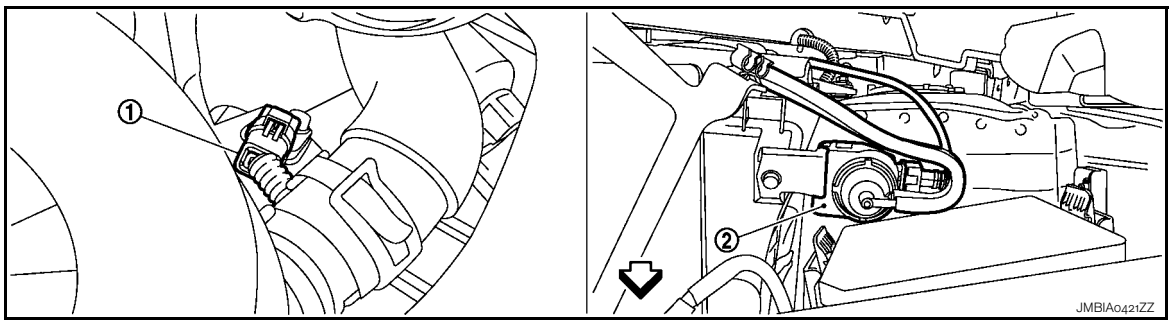


⇦ : Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor



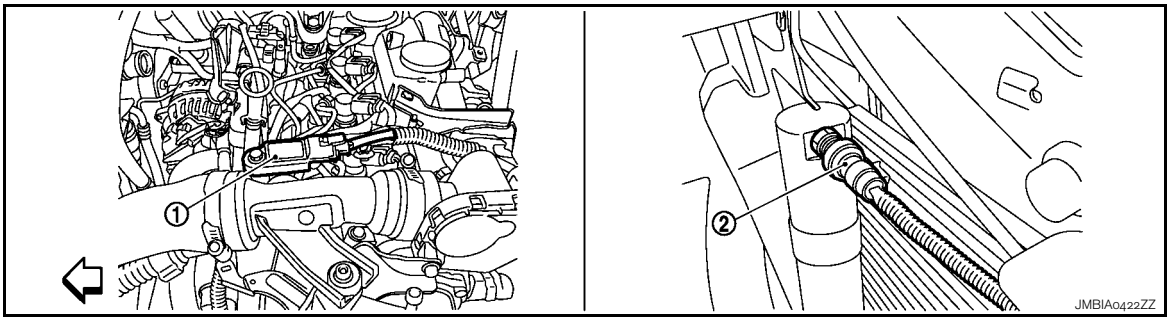
1. Camshaft Position Sensor
2. Fuel injector



⇦ : Vehicle front

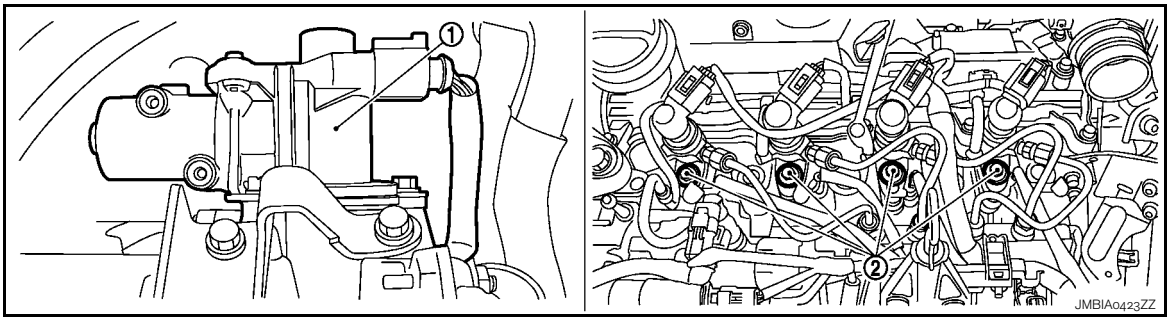
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve

cardiagn.com

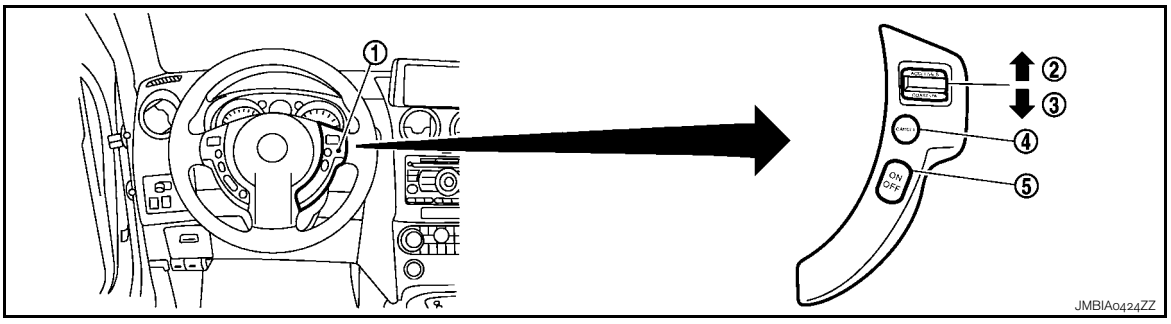


⇦ : Vehicle front

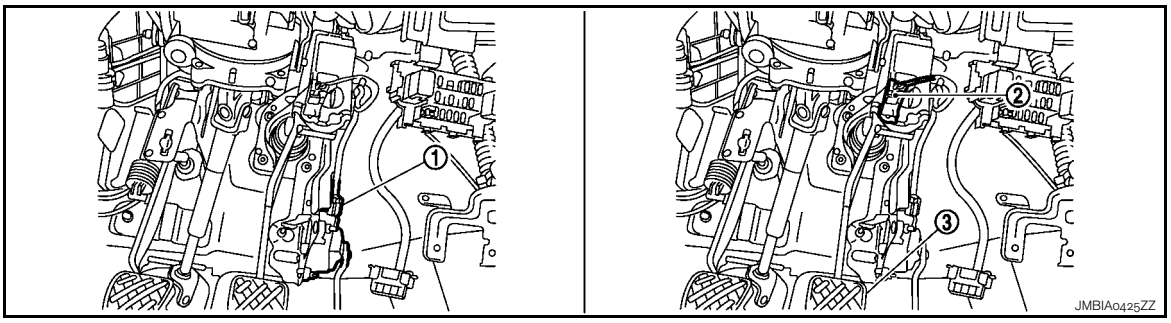
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



1. EGR volume control valve
2. Glow plug

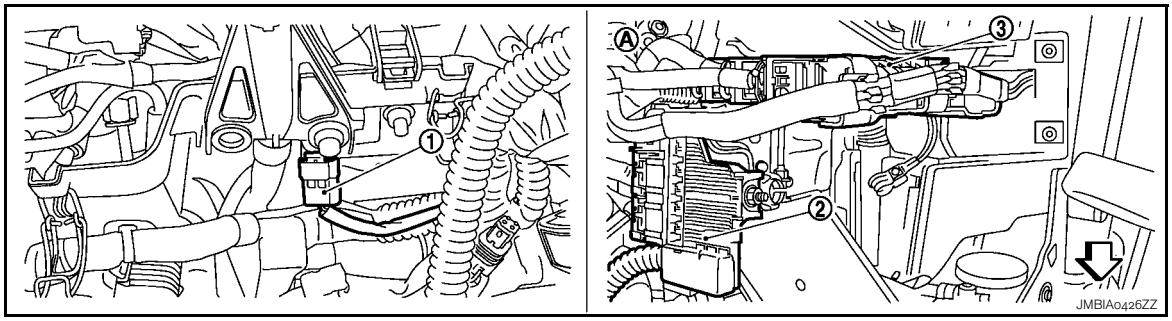


1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



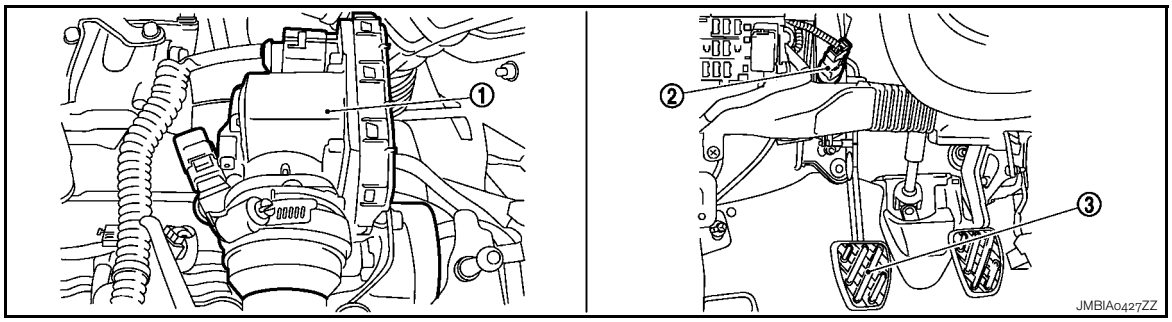
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal

cardiagn.com

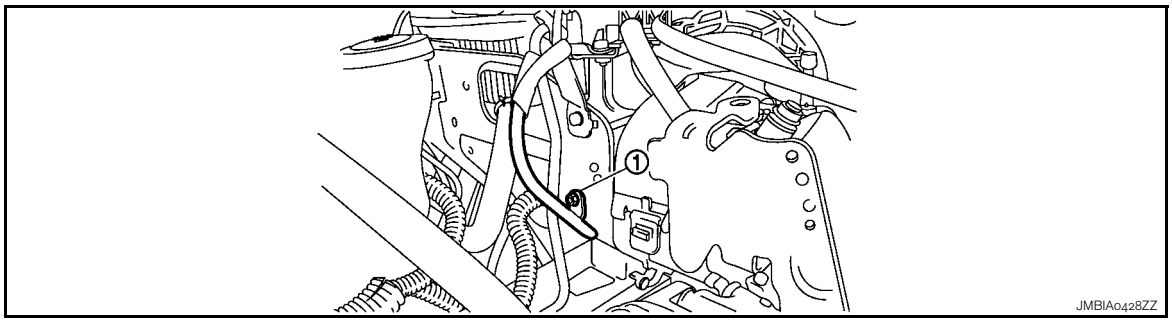


1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed



1. Electric throttle control actuator
2. Clutch switch
3. Clutch pedal



1. Body ground E17

cardiagn.com

GLOW CONTROL

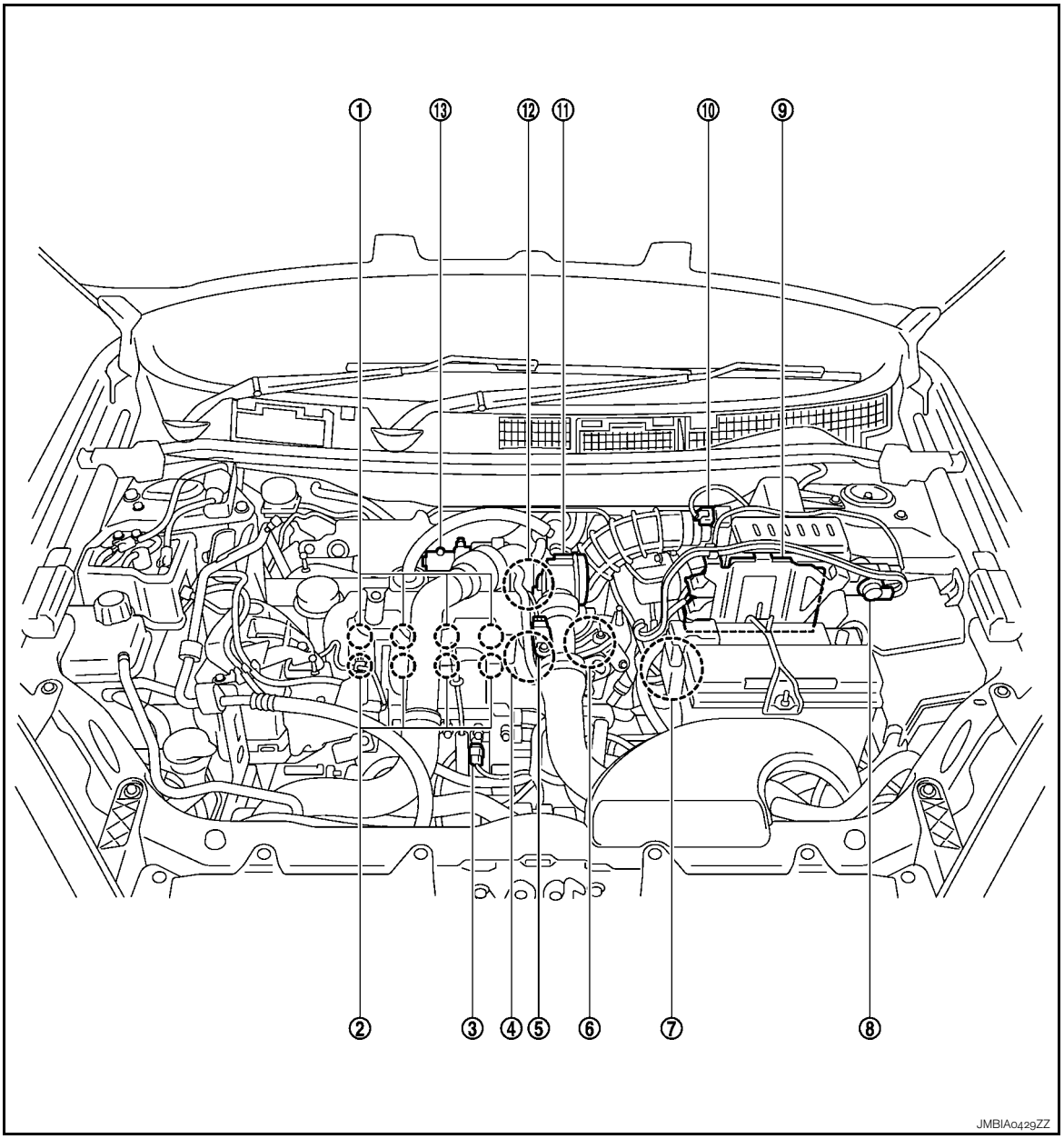
System Description

INFOID:0000000000897322

Glow control involves controlling the glow plugs and the glow plugs "on" indicator light on the instrument panel (via the can communication). The glow plugs are activated by a relay box and the power is provided by the battery.
After the ignition is switched on. Preheating is activated for a period of time. The indicator light comes on for the activation period which is dependent on the battery voltage, barometric pressure and engine coolant temperature. When the engine coolant temperature is below a certain threshold, a postheating function enables combustion stability, and thereby engine operation, to be improved (reduction in unburnt fuel and pollutant emissions).

Component Parts Location

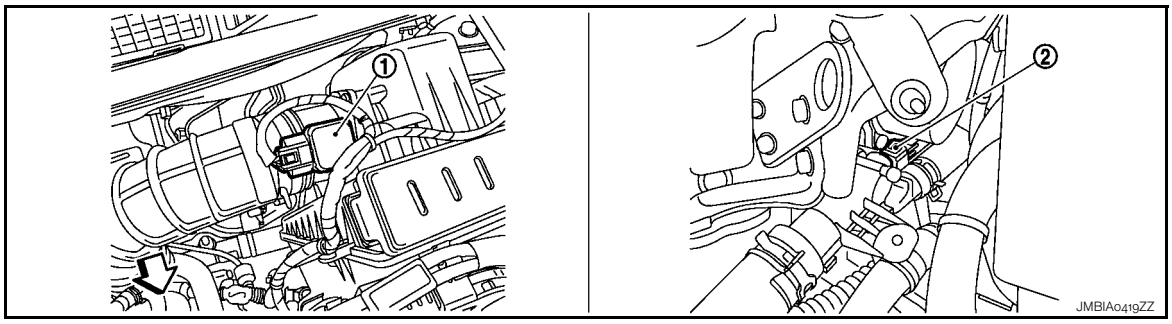
INFOID:0000000001109424



1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor

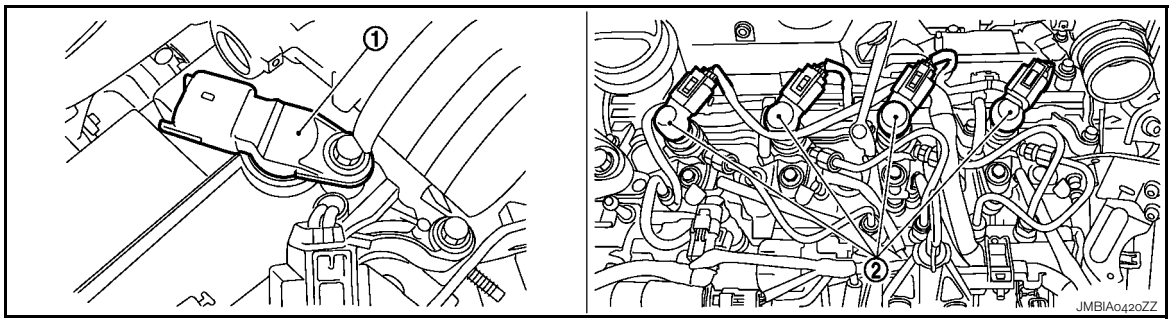
cardiagn.com

7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

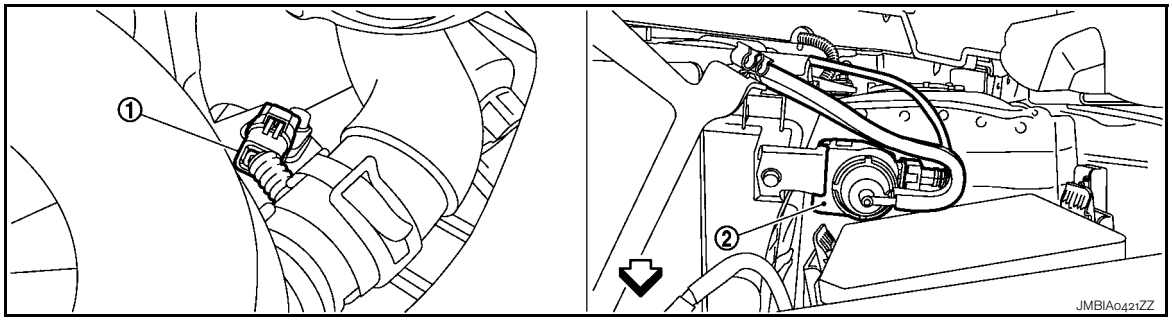


⇦ : Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor



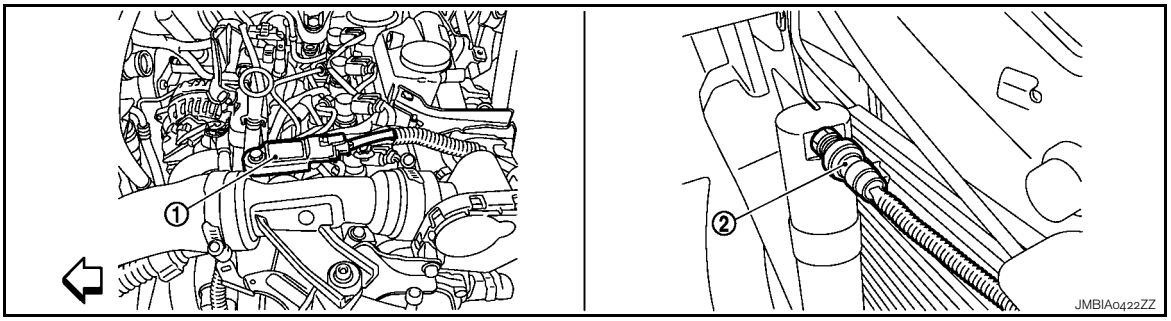
1. Camshaft Position Sensor
2. Fuel injector



⇦ : Vehicle front

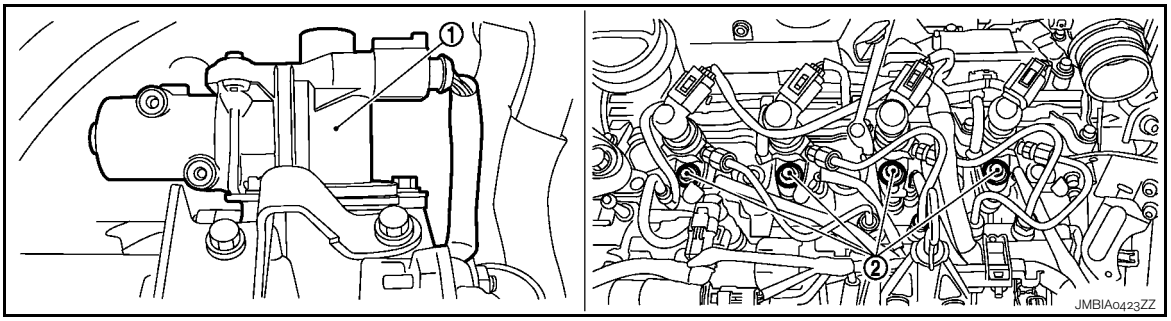
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve

cardiagn.com

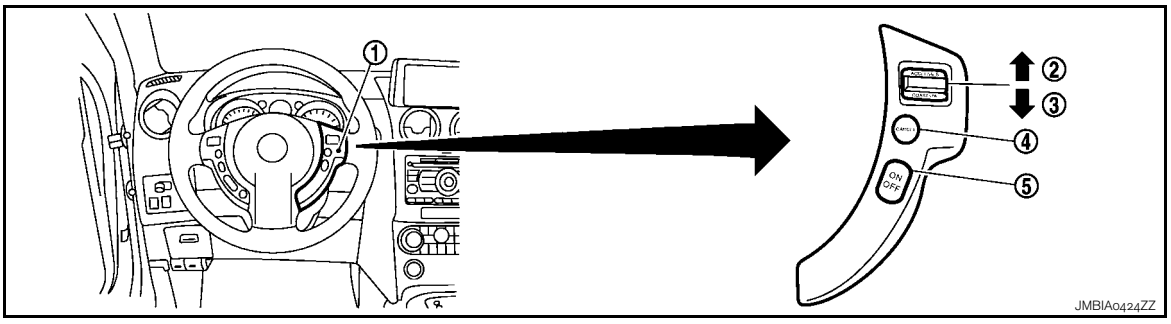


⇦ : Vehicle front

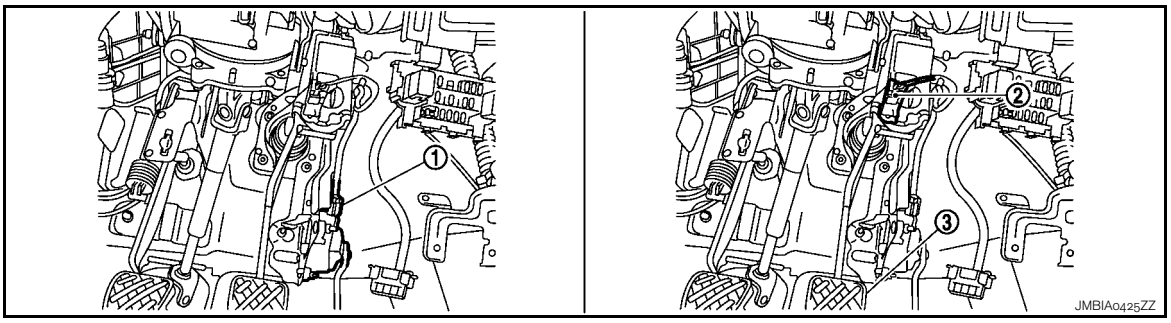
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



1. EGR volume control valve
2. Glow plug

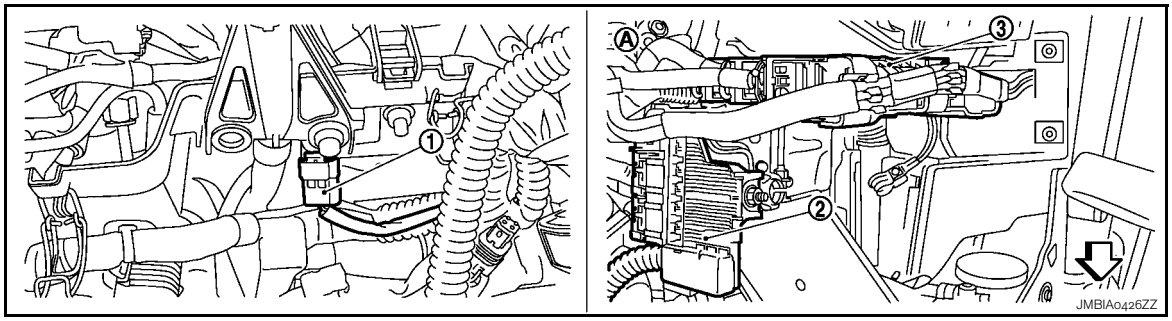


1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



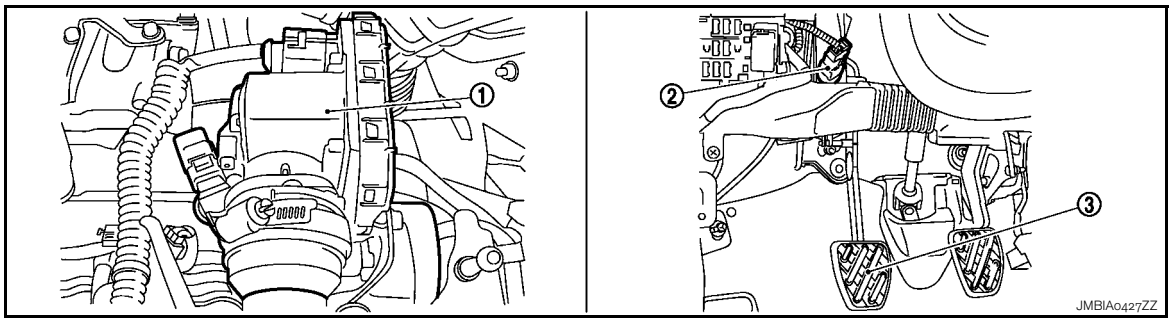
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal

cardiagn.com

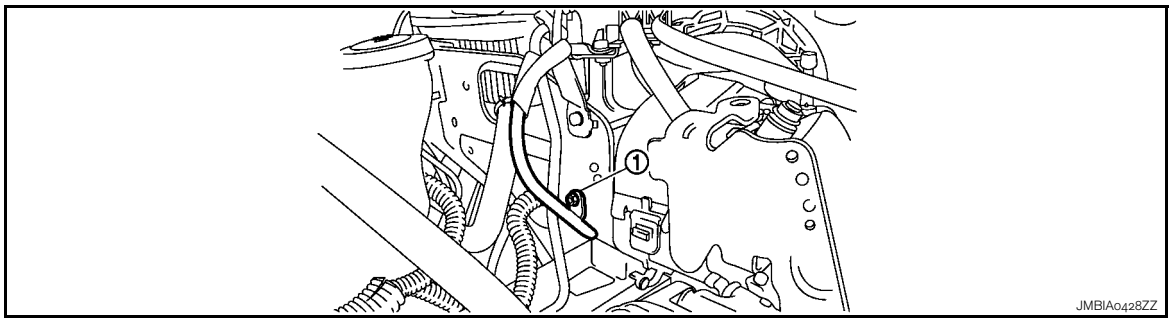


1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed



1. Electric throttle control actuator
2. Clutch switch
3. Clutch pedal



1. Body ground E17

cardiagn.com

COOLING FAN CONTROL

System Description

INFOID:0000000000911871

The cooling fan motor is controlled by the ECM.

COOLING FAN OPERATION WITH THE ENGINE RUNNING

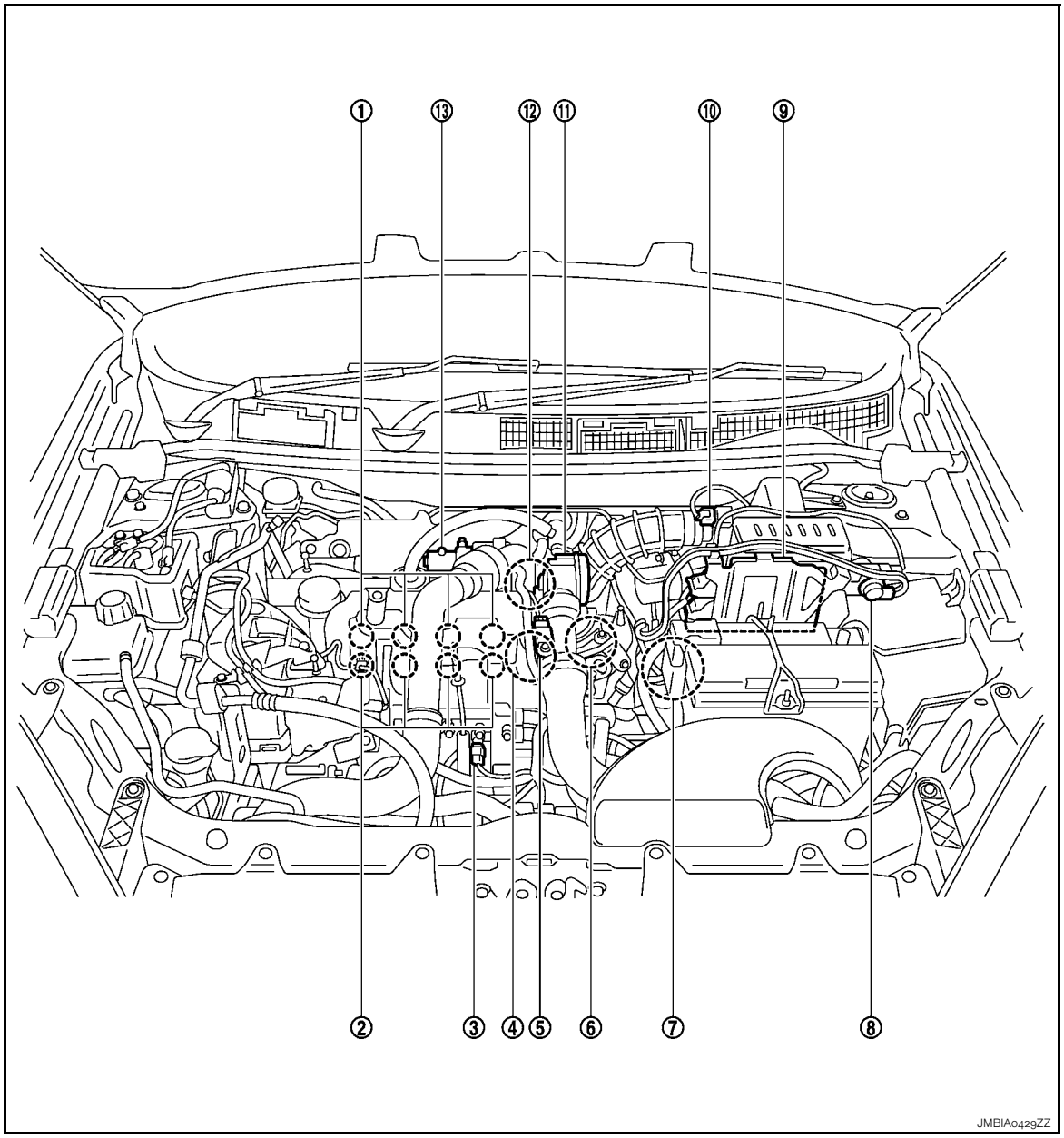
Cooling fan operate is guaranteed by a 2-speed fan assembly (LOW speed and HIGH speed).The ECM requests the IPDM E/R to actuate them via the can communication. To provide cooling:

- Engine running
  - LOW speed is actuated when the engine coolant temperature exceeds 96 °C (205°F) and is deactivated when it drops below 94 °C (201°F).
  - HIGH speed is actuated when the engine coolant temperature exceeds 104 °C (219°F) and is deactivated when it drops below 102 °C (216°F).
- If the engine coolant temperature exceeds the threshold of 115°C (239°F), the ECM requests the IPDM E/R, via the CAN communication, to switch off the air conditioning compressor so as to reduce the load on the engine and attempt to limit the rise in temperature. The cut-off request is cancelled if the engine coolant temperature drops below 110°C (230°F).
- If a malfunction in the engine coolant temperature sensor circuit is detected, the ECM requests that HIGH speed operation.
- In addition to engine management, the ECM centralises the cooling requirements for the climate control and automatic transmission/sequential gearbox functions (where fitted).

Component Parts Location

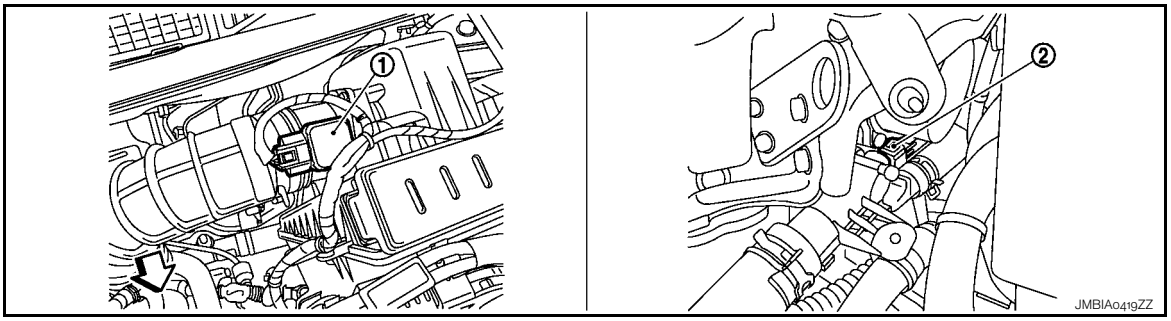
INFOID:0000000001109423

cardiagn.com



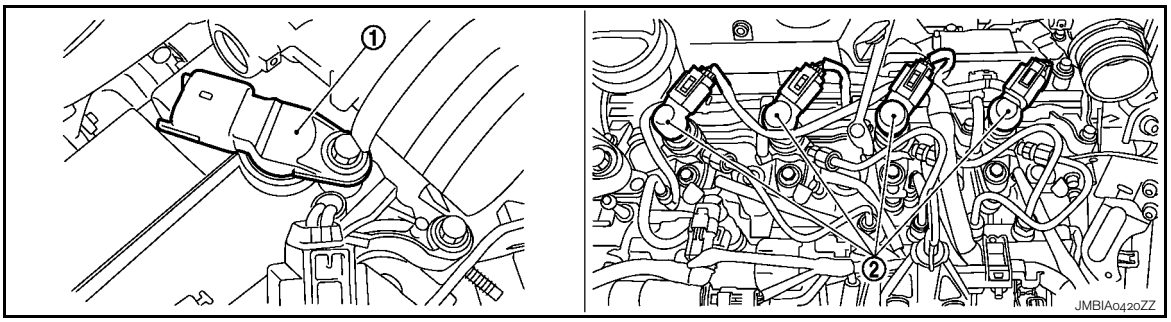
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle control actuator
12. Camshaft position sensor
13. EGR volume control valve

cardiagn.com

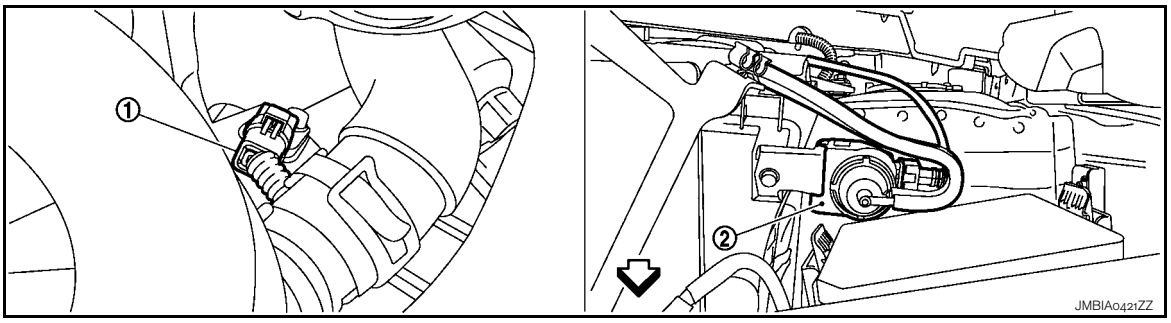


⇦: Vehicle front

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

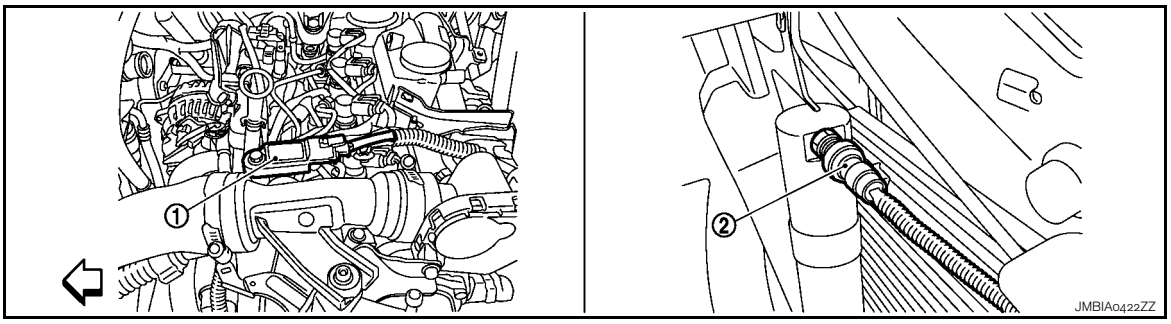


1. Camshaft Position Sensor
2. Fuel injector



⇦: Vehicle front

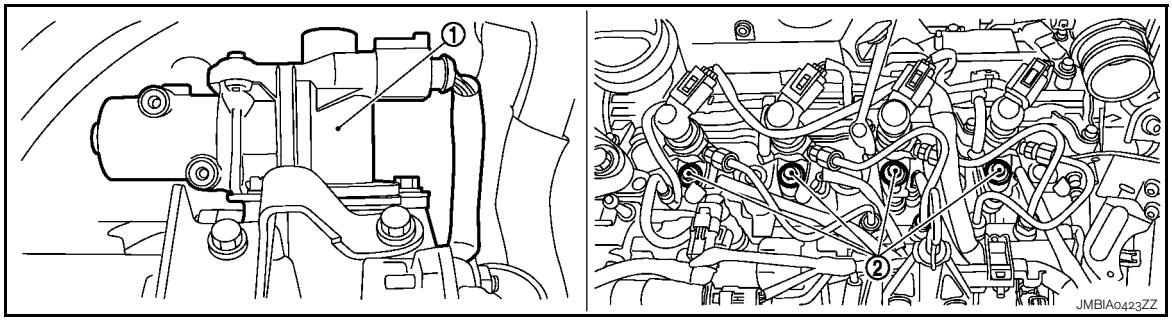
1. Crankshaft position sensor
2. Turbocharger boost control solenoid valve



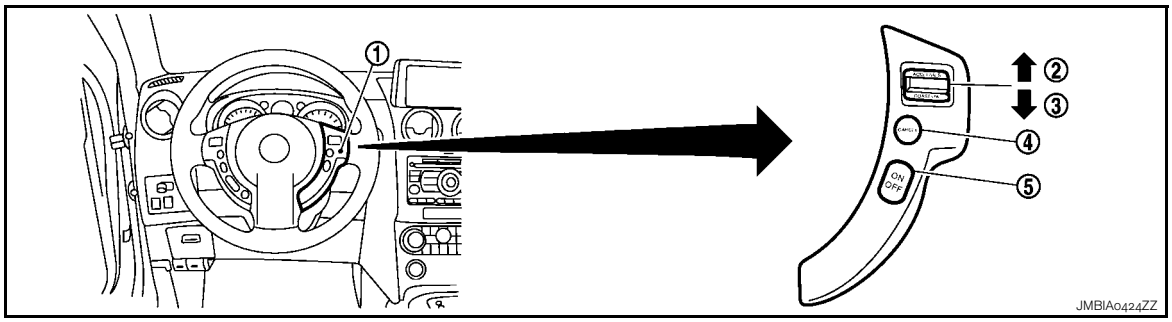
⇦: Vehicle front

1. Turbocharger boost sensor
2. Refrigerant pressure sensor

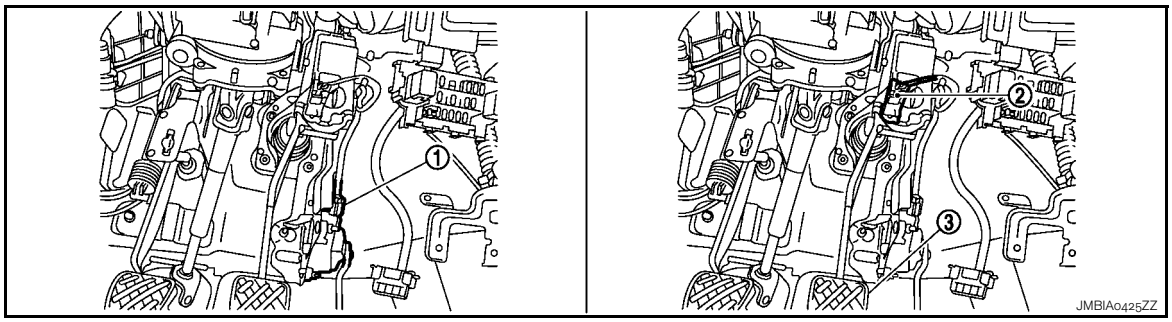
cardiagn.com



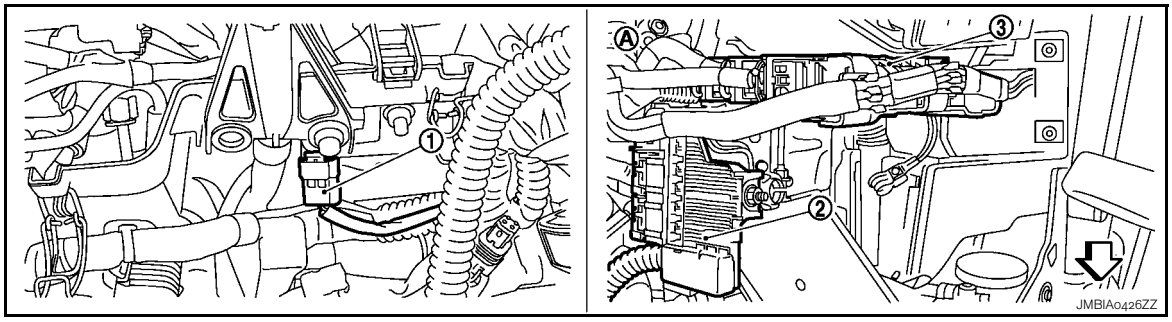
1. EGR volume control valve
2. Glow plug



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



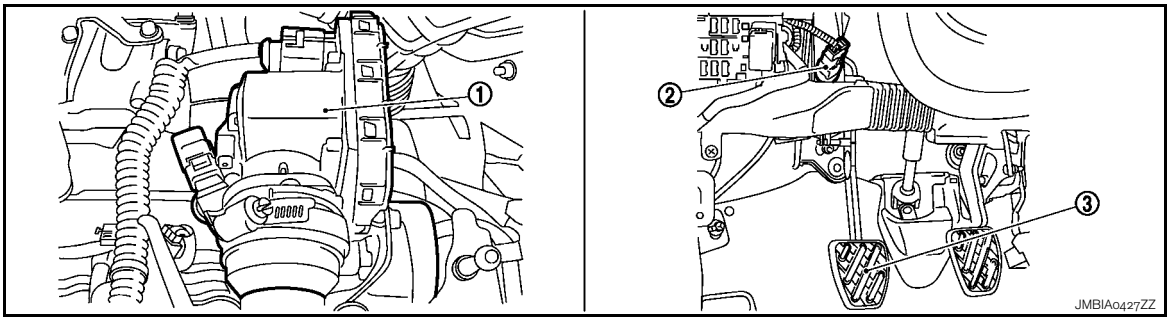
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal



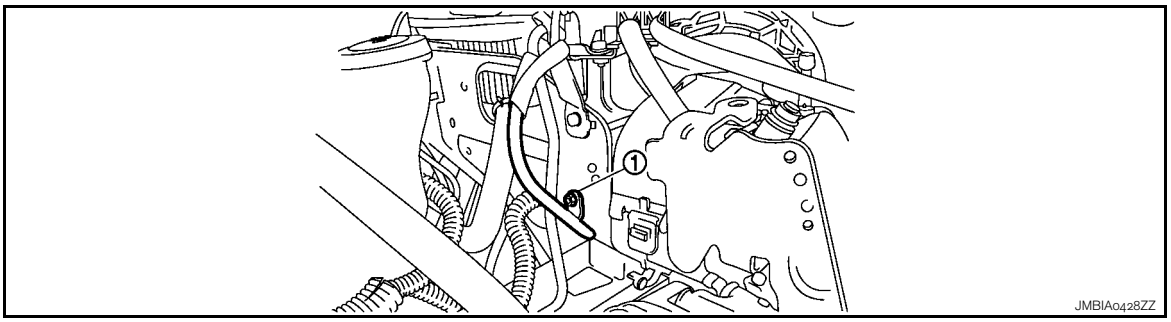
1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed

cardiagn.com



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

cardiagn.com

CAN COMMUNICATION

System Description

INFOID:0000000000902333

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-59, "CAN Communication Signal Chart", about CAN communication for detail.

cardiagn.com

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000000902323

The ECM controls the display on the instrument panel of certain information relating to the operation of the engine.
Four functions are involved here: The OBD malfunction indicator [MI (Yellow)] for the EOBD (European On Board Diagnostics), the pre/post heating, the engine coolant temperature and engine malfunction [MI (Red)]. These four functions are represented by four lights given out by the ECM

GLOW LAMP

This lamp indicates that the glow control system has been activated.

ENGINE COOLANT TEMPERATURE LIGHT

This light is used as an indicator of engine overheating.
- In the event of overheating, it is up to the driver whether to stop the vehicle or not.

MALFUNCTION INDICATOR

The OBD malfunction indicator [MI (Yellow)] is used to alert the driver to the existence of engine control system malfunctions involving excessive pollution or if the EOBD system is deactivated.
The ECM makes a request for lighting of the MI (Yellow) only where there is a malfunction present at the end of three consecutive cycles.
The 3-second visual check upon powering up (automatic test procedure controlled by the IPDM E/R) is performed by the ECM.
In the event of a confirmed OBD malfunction by lighting of the MI, no flashing of the light must be observed following the lighting test.

DTCs Causing MI to Light

DTC	Description	Reference page
P0201	Cylinder 1 fuel injector control circuit	EC-1353
P0202	Cylinder 2 fuel injector control circuit	EC-1353
P0203	Cylinder 3 fuel injector control circuit	EC-1353
P0204	Cylinder 4 fuel injector control circuit	EC-1353
P0409	EGR Volume control valve control position sensor circuit	EC-1372
P0606	ECM	EC-1391
P2413	EGR volume control valve	EC-1415

ENGINE WARNING LIGHT

In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

HOW TO ERASE DTC, 1ST TRIP DTC AND 2ND TRIP DTC

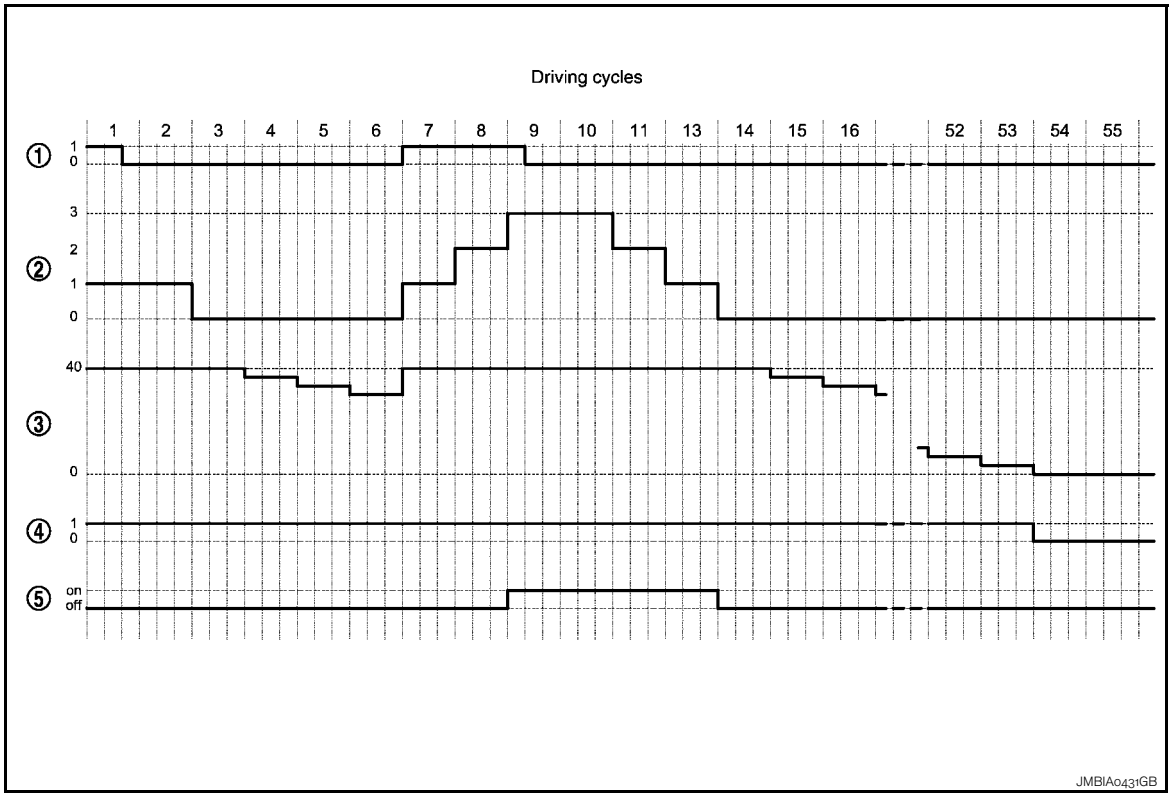
With CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ALL ERASE” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

MI OPERATION CHART

Some malfunction must switch on MI to warn driver, that his engine emissions exceed OBD thresholds (Euro 3 x 2.5).
The rule is to switch on MI after 3 consecutive driving cycles (engine start + engine stop + power latch) with a present OBD malfunction.
To switch off the MI (without CONSULT-III), vehicle has to drive 3 consecutive cycles without present OBD malfunction.
Ignition switch OFF → ON transition, MI remains switched on in pre-drive check mode until engine start.If MI does not switch off whereas engine is running, there is at least one present OBD malfunction.

cardiagn.com



1. Present malfunction
2. Driving cycle counter
3. Warm up cycle counter
4. Memorised malfunction
5. MI state

NOTE: Driving cycle and warm up cycle are both detected in the same cycle.

cardiagn.com

COMPONENT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001070365

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F68	69	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 5)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.

cardiagn.com

2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F68	53	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.
	54		

Is the inspection result normal?

YES >> GO TO 12.
NO-1 >> Battery voltage does not exist: GO TO 7.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 10.

7. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 10.

8. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, E121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F68	60	E11	15	Existed

4. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 52) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace 20A fuse.

12. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace ground connection.

13. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short power in harness or connectors.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

cardiagn.com

P0001 FUEL PUMP

DTC Logic

INFOID:0000000001115046

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0001	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) CIRCUIT • CO: Open circuit • CO.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] • High pressure supply pump (volumetric control valve) • Fuel line

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001034174

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace high pressure supply pump.

5. CHECK FUEL LINE

Check fuel line cleanliness.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Fuel line cleanliness.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001034175

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

cardiagn.com

P0002 FUEL PUMP

DTC Logic

INFOID:0000000001115051

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0002	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) ADAPTIVE • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) • High pressure supply pump (volumetric control valve) • Fuel rail pressure sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when after the engine is started or following a load test.

Diagnosis Procedure

INFOID:0000000001034260

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 9.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Replace or replace. Then GO TO 9.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 9.

6.CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

cardiagn.com

Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/ Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7.CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

Is the inspection result normal?

OK >> GO TO 8.
NG >> Replace or replace. Then GO TO 9.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9.CLEAR PRESSURE REGULATION

Perform “PRESS_REG_ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

Component Inspection

INFOID:0000000001034261

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

cardiagn.com

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:0000000001115053

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION	• Harness or connectors (CMP sensor circuit is open or shorted.) • Camshaft position sensor • Timing belt • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when cranking the engine or at idle speed.
- **If the DTC is present:**
  Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:0000000000952664

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor harness connector and ground.

CMP sensor		Ground	Voltage
Connector	Terminal		
F87	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121
- Harness for open or short between ECM and CMP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F87	1	F68	65	Existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F87	2	F68	75	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CMP SENSOR

Refer to EC-1325, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor.

7. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace sprocket.

8. CHECK TIMING BELT

Refer to EM-287, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace timing belt.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

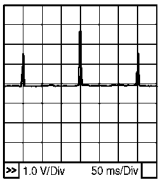
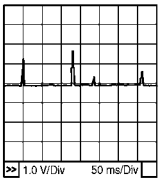
Component Inspection

INFOID:0000000001088003

1. CHECK CMP SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

cardiagn.com

ECM		Condition	Voltage
Connector	Terminal		
F68	75 (CMP sensor signal)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
		[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

cardiagn.com

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000001115054

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0045	TURBOCHARGER BOOST CONTROL SOLENOID VALVE CIRCUIT • CO: Open circuit • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve

NOTE:
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001088004

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

Turbocharger boost control solenoid valve		Ground	Voltage
Connector	Terminal		
E55	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E55	1	F68	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121

cardiagn.com

- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001088005

1. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Check resistance between turbocharger boost control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	18.9 - 23.1Ω [at 23°C (73°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

cardiagn.com

P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION

DTC Logic

INFOID:0000000001115055

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0069	TURBOCHARGER BOOST SENSOR - BAROMETRIC PRESSURE SENSOR CORRELATION • 1.DEF: Signal outside lower level • 2.DED: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor • Barometric pressure sensor

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000953026

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F91	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	2	F85	43	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

cardiagn.com

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	3	F85	44	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK TUBOCHARGER BOOST SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.REPLACE ECM

1. Perform EC-1273, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EGR volume control valve closed position learning. Refer to EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001088007

1.CHECK TURBOCHARGER BOOST SENSOR-I

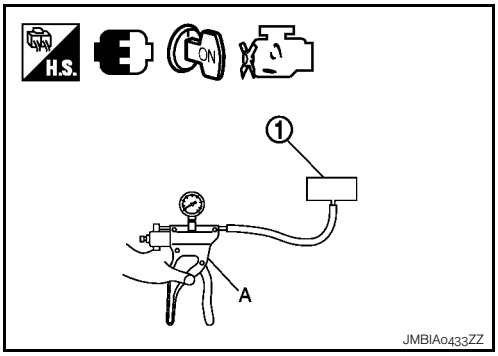
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST_PRESS” and “ATOMOS_PRESS” indication.

If the value is not very close to “ATOMOS_PRESS”, maximum pressure difference between “ATOMOS_PRESS” and “BOOST_PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump to apply turbocharger boost sensor as shown in the figure.
2. Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST_PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

cardiagn.com

P0087 FUEL PUMP

DTC Logic

INFOID:0000000001115058

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0087	RAIL PRESSURE 1.DEF: Rail pressure too low on starting	• High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel injector • Fuel rail pressure sensor • Air mixed with fuel • Lack of fuel • Fuel rail pressure relief valve • Fuel line • Harness or connector

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present during the first 30 seconds after the engine starts.
- In low ambient temperature conditions, diagnostic can.t make difference between a normal long engine start and abnormal long engine start. So, DTC must be take in account only if customer complains about too long or impossible engine start not only in cold conditions but also and especially in warm conditions. If customer complains only in cold conditions, root cause of the problem could elsewhere like low battery level, bad fuel specification (too viscous fuel). This DTC could appear after fuel filter too.
- **Special notes:**
  Starting and engine operation difficult or impossible.

Diagnosis Procedure

INFOID:0000000000952676

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 7.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 7.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 7.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.

cardiagn.com

NG >> Replace or replace. Then GO TO 7.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 7.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 7.

7.CLEAR PRESSURE REGULATION

Perform “PRESS_REG_ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

cardiagn.com

P0090 FUEL PUMP

DTC Logic

INFOID:0000000001115060

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0090	HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CIRCUIT • CO: Open circuit • CO.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (pressure control valve) circuit is open or shorted.] • High pressure supply pump (pressure control valve)

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000953542

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F107	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	4	F68	49	Existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-1334, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Replace high pressure supply pump.

5. INSPECTION END

High pressure supply pump (pressure control valve) OK.

>> **INSPECTION END**

Component Inspection

INFOID:0000000001034422

1. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Check resistance between high pressure supply pump (pressure control valve) terminals as follows.

Terminals	Resistance
3 and 4	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

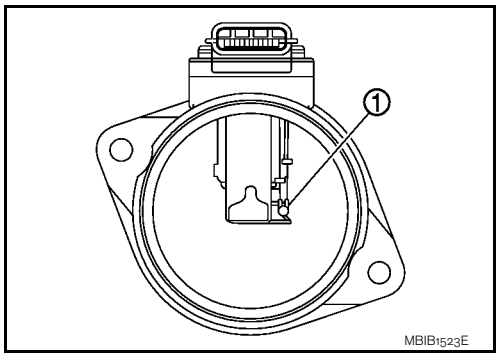
cardiagn.com

P0100 MAF SENSOR

Description

INFOID:0000000001115154

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001115061

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0100	MASS AIR FLOW SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

NOTE:
- **If DTC P0100 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.

Diagnosis Procedure

INFOID:0000000001089002

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and mass air flow sensor

cardiagn.com

• Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
• Harness connector E7, F121
• Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	2	F85	30	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
• Harness connector E6, F123
• Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR NPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	6	F85	35	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
• Harness connector E7, F121
• Harness for open or short between ECM and mass air flow sensor

cardiagn.com

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089000

1. CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	Terminal		
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

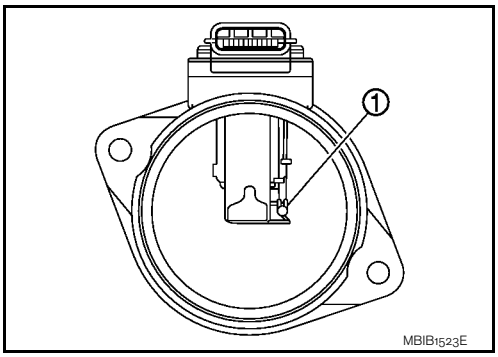
cardiagn.com

P0101 MAF SENSOR

Description

INFOID:0000000001115261

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001115063

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0101	REQUESTED AIR FLOW • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • Intake air leaks • Intake air duct obstructed • Air filter obstructed

NOTE:
- **If DTC P0101 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000000953547

1.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

cardiagn.com

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	2	F85	30	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E6, F123
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

cardiagn.com

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	6	F85	35	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK MASS AIR FLOW SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace mass air flow sensor.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089001

1. CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	Terminal		
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

cardiagn.com

P0110 IAT SENSOR

Description

INFOID:0000000001089055

The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

DTC Logic

INFOID:0000000001115064

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0110	INTAKE AIR TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor

NOTE:
- **If DTC P0110 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001089004

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT-II

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E6, F123
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

cardiagn.com

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	2	F85	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E6, F123
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089003

1.CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
10°C (50°F)	3,714 ± 161
20°C (68°F)	2,448 ± 95
30°C (86°F)	1,671 ± 58

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor (with intake air temperature sensor).

cardiagn.com

P0115 ECT SENSOR

Description

INFOID:0000000001089056

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

DTC Logic

INFOID:0000000001115067

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0115	ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **If the DTC is present:**

- Cooling fan motor is always operate.
- Air conditioner is not operate.

Diagnosis Procedure

INFOID:0000000001089006

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between engine coolant temperature sensor connector and ground.

Engine coolant temperature sensor		Ground	Voltage
Connector	Terminal		
F79	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F79	2	F85	33	Existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089007

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 2 and 3 under the following conditions.

Terminal	Condition	Resistance (Ω)
2 and 3	25°C (77°F)	2,252 ± 112.16
	50°C (112°F)	810 ± 39
	80°C (176°F)	283 ± 8

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace Engine coolant temperature sensor.

cardiagn.com

P0120 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000000970739

By default the valve is open when in the rest position and is actuated only when the engine is stopped; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:0000000001115068

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0120	ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • CO: Open circuit	• Harness or connectors (Electric throttle control actuator circuit is open or shorted.) • Throttle position sensor • Throttle control motor

NOTE:
- The electric throttle control actuator function is no longer ensured when the engine is stopped or the valve is closed, then the engine stalls or starting is impossible.

Diagnosis Procedure

INFOID:0000000000970741

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F81	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and electric throttle control actuator
- Harness for open or short between ECM and electric throttle control actuator

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

cardiagn.com

3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F81	5	F68	72	Existed
	2		94	
	4		90	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace.

cardiagn.com

P0180 FPT SENSOR

Description

INFOID:0000000000955026

Fuel pump temperature sensor is built in the fuel pump. The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.

DTC Logic

INFOID:0000000001115069

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0180	FUEL PUMP TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Fuel pump temperature sensor circuit is open or shorted.) • Fuel pump temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001089060

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL PUMP TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel pump temperature sensor connector and ground.

Fuel pump temperature sensor		Ground	Voltage
Connector	Terminal		
F100	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel pump temperature sensor harness connector and ECM harness connector.

Fuel pump temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F100	2	F85	29	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

4.CHECK FUEL PUMP TEMPERATURE SENSOR

Refer to EC-1348, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pump temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089061

1.CHECK FUEL PUMP TEMPERATURE SENSOR

Check resistance between fuel pump temperature sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
25°C (77°F)	2,051 ± 123
50°C (112°F)	811 ± 47
80°C (176°F)	309 ± 17

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace Engine coolant temperature sensor.

cardiagn.com

P0190 FRP SENSOR

Description

INFOID:0000000001089064

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises.The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

DTC Logic

INFOID:0000000001115070

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0190	FUEL RAIL PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: malfunctioning sensor • 2.DEF: Signal outside upper level • 3.DEF: Micro-breaks	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

NOTE:

- **If DTC P0190 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
- The DTC is declared present after the ignition is switched on when the engine is running outside idle speed.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001089062

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F102	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F102	2	F85	15	Existed

cardiagn.com

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F102	1	F85	19	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel rail pressure sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001041202

1.CHECK FUEL RAIL PRESSURE SENSOR

1. Turn ignition switch OFF and wait at least 1 minutes.
2. Reconnect harness connector disconnected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication.

If the value is lower than 30 bar?

YES >> **INSPECTION END**.
NO >> Replace fuel rail pressure sensor.

cardiagn.com

P0200 FUEL INJECTOR

DTC Logic

INFOID:0000000001115071

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0200	FUEL INJECTOR CONTROL • 1.DEF: Voltage outside permitted range of values • 2.DEF: Configuration/ Initialisation • 3.DEF: Signal incoherence	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000954969

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	1	F85	8	Existed
2	F71	1	F85	7	
3	F72	1	F85	6	
4	F73	1	F85	5	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	2	F85	4	Existed
2	F71	2	F85	3	
3	F72	2	F85	2	
4	F73	2	F85	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR

Refer to EC-1352, "Component Inspection".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 4.
NO >> Replace engine coolant temperature sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001041774

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

cardiagn.com

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000001115072

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0201	NO. 1 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector
P0202	NO. 2 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	
P0203	NO. 3 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	
P0204	NO. 4 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001089320

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	1	F85	8	Existed
2	F71	1	F85	7	
3	F72	1	F85	6	
4	F73	1	F85	5	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

cardiagn.com

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	2	F85	4	Existed
2	F71	2	F85	3	
3	F72	2	F85	2	
4	F73	2	F85	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR

Refer to EC-1354, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine coolant temperature sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089321

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

cardiagn.com

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001102011

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	Possible cause
P0217	Engine over temperature (Overheat)	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relay-1) • Cooling fan relay-3 • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat

Diagnosis Procedure

INFOID:0000000001102013

1.CHECK COOLING FAN LOW SPEED FUNCTION

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to EC-1422, "Diagnosis Procedure".

2.CHECK COOLING FAN HIGH SPEED FUNCTION

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Refer to EC-1422, "Diagnosis Procedure".

3.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-52, "Inspection".

Is leakage detected?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-52, "Inspection".
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RADIATOR CAP

cardiagn.com

Check radiator cap. Refer to CO-55, "RADIATOR CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace radiator cap.

6.CHECK THERMOSTAT

Check thermostat. Refer to CO-62, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace thermostat.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-21, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-52, "Inspection"
	4	• Radiator cap	• Pressure tester	CO-55, "RADIATOR CAP : Inspection"	CO-55, "RADIATOR CAP : Inspection"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-52, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-62, "Exploded View"
ON*1	7	• Cooling fan motor	• IPDM E/R (auto active test)	Operating	EC-1424, "Component Inspection (Cooling Fan Motor)"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-52, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-52, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-296, "Inspection"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	—

*1: Engine running at idle speed.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-48, "Troubleshooting Chart".

cardiagn.com

>> INSPECTION END

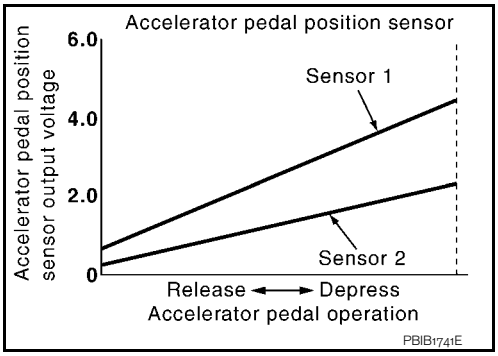
cardiagn.com

P0225 APP SENSOR

Description

INFOID:0000000001090480

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:0000000001115074

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0225	ACCELERATOR PEDAL POSITION SENSOR 1 AND ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • 1.DEF: Signal incoherence • 2.DEF: No signal • CO.0: Open circuit or short circuit to ground	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2.)

NOTE:
- **If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**
- **If DTC P0225 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1395, "DTC Logic".**
- **If DTC P2120 is present at the same time, check that the APP sensor connector is connected correctly.**
- Conditions for applying the diagnostic procedure to the stored DTCs:
- The DTC is declared present after a series of full load/no load action on the accelerator.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000955712

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110	4	Ground	Approx. 5V
2		5		

cardiagn.com

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	2	E60	127	Existed
2		1		120	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	3	E60	126	Existed
2		6		119	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace accelerator pedal position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001089326

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

cardiagn.com

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

cardiagn.com

P0235 TC BOOST SENSOR

Description

INFOID:0000000001090439

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.

DTC Logic

INFOID:0000000001115075

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0235	• CC.1: short circuit to +12V • CO.0: Open circuit or Short circuit to ground • 1.DEF: Micro-breaks • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor

NOTE:
- **If DTC P0235 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1395, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for 1 second, with a warm engine when the vehicle is stationary.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001089850

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F91	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	2	F85	43	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

cardiagn.com

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	3	F85	44	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK TUBOCHARGER BOOST SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001090195

1.CHECK TURBOCHARGER BOOST SENSOR-I

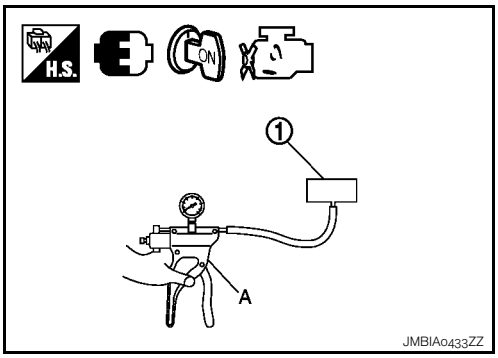
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST_PRESS” and “ATOMOS_PRESS” indication.

If the value is not very close to “ATOMOS_PRESS”, maximum pressure difference between “ATOMOS_PRESS” and “BOOST_PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump to apply turbocharger boost sensor as shown in the figure.
2. Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST_PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

cardiagn.com

P0335 CKP SENSOR

DTC Logic

INFOID:0000000001115076

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0335	CRANKSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Signal out side level • 4.DEF: Value out side level • 5.DEF: Configuration/ initialisation	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present with the engine cranking or idling.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000955831

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor (1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F89	2	F68	88	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F89	1	F68	84	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CKP SENSOR

Refer to EC-1364, "Component Inspection".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace crankshaft position sensor.

5.CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace signal plate.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000000955832

1.CHECK CKP SENSOR

1. Turn ignition switch OFF.
2. Disconnect CKP sensor harness connector.
3. Check resistance between CKP sensor terminals as follows.

Terminals	Resistance
1 and 2	612 - 748Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CKP sensor.

cardiagn.com

P0340 CMP SENSOR

DTC Logic

INFOID:0000000001115077

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0340	CAMSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Value out side level • 4.DEF: Configuration/ initialisation	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor • Timing belt • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started or following a load test.
- **Special note:**
  Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:0000000000955836

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor harness connector and ground.

CMP sensor		Ground	Voltage
Connector	Terminal		
F87	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121
- Harness for open or short between ECM and CMP sensor
- Harness for open or short between IPDM E/R and CMP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

cardiagn.com

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F87	1	F68	65	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F87	2	F68	75	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CMP SENSOR

Refer to EC-1364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor.

7.CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace sprocket.

8.CHECK TIMING BELT

Refer to EM-287, "Exploded View".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace timing belt.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

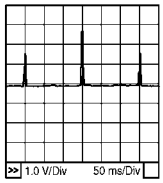
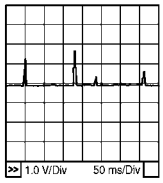
Component Inspection

INFOID:0000000000955837

1.CHECK CMP SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

cardiagn.com

ECM		Condition	Voltage
Connector	Terminal		
F68	75 (CMP sensor signal)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
		[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

cardiagn.com

P0380 GLOW RELAY

DTC Logic

INFOID:0000000001115078

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0380	GLOW PLUG DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after attempts have been made to start the engine.
- **Special notes:**
  If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:0000000000956057

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow relay connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
F94	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 80A fusible link (letter N)
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	3	F68	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

cardiagn.com

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	8	F68	76	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

cardiagn.com

P0381 GLOW CONTROL SYSTEM

DTC Logic

INFOID:0000000001115079

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0381	GLOW CONTROL UNIT CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay • Glow plug

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after several attempts have been made to start the engine.
- **Special notes:**
  If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:0000000001091154

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow relay connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
F94	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 80A fusible link (letter N)
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	3	F68	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

cardiagn.com

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	8	F68	76	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check the continuity between glow plug harness connector and ECM harness connector.

Glow relay			Glow plug		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F94	2	F95	1	Existed
2		7	F96	1	
3		1	F97	1	
4		6	F98	1	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK GLOW PLUG

Refer to EC-1371, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning glow plug.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

Component Inspection

INFOID:0000000001091182

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plug harness connector.
3. Check resistance between glow plug terminals as follows.

Terminal	Resistance
1 and engine ground	Not less than 2Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning glow plug.

cardiagn.com

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000001115080

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0409	EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR CIRCUIT • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve control position sensor

NOTE:
- **If DTC P0409 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1395, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine started.
- **If the DTC is present:**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000000956107

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

EGR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F99	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

cardiagn.com

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	5	F85	86	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

cardiagn.com

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000001115081

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0487	EGR VOLUME CONTROL VALVE CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Values outside the level • CC: Short circuit	• Harness or connectors (The EGR volume control valve control motor circuit is open or shorted.) • EGR volume control motor valve

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present with the engine idle speed.

Diagnosis Procedure

INFOID:0000000000956112

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F68	95	Existed
			96	Not existed
	6		95	Not existed
			96	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1375, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

cardiagn.com

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000000956113

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace EGR volume control valve.

cardiagn.com

P0488 EGR SYSTEM

DTC Logic

INFOID:0000000001115082

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0488	EGR VOLUME CONTROL • 1.DEF: Signal incoherence • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level • 4.DEF: Valve outside level • 5.DEF: Defective sensor	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR passage clogged

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started.
- **Special notes:**
- Engine instability, possibly even stalling.
- Difficult to start engine or even impossible when cold.
- Loss of performance.
- Possible smoke emissions.
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000956116

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install EGR volume control valve properly.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

GR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F99	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

cardiagn.com

OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	5	F85	86	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F68	95	Existed
			96	Not existed
	6		95	Not existed
			96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube

cardiagn.com

- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace EGR passage.

9.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1378, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

Component Inspection

INFOID:0000000001091544

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace EGR volume control valve.

cardiagn.com

P0500 VSS

Description

INFOID:0000000000956135

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000001115083

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0500	VEHICLE SPEED SIGNAL • 1.DEF: Value outside level	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

Diagnosis Procedure

INFOID:0000000000956137

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)" (with out ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK COMBINATION METER

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

>> **INSPECTION END**

cardiagn.com

P0530 REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001115155

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

DTC Logic

INFOID:0000000001115084

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0530	REFRIGERANT PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to +12V or open circuit • CC.1: Short circuit to ground	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor

NOTE:

- **If DTC P0530 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641 Refer to EC-1393, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000000956142

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E50	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

cardiagn.com

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E50	1	F68	74	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E50	2	F68	78	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E6, F123
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

cardiagn.com

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001115085

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0560	BATTERY VOLTAGE • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness connectors (ECM power supply circuit is open or shorted.) • Battery • Battery terminal • Alternator • IPDM E/R

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when the engine is running.

Diagnosis Procedure

INFOID:0000000000956409

1.CHECK BATTERY VOLTAGE

1. Turn ignition switch ON.
2. Check battery voltage.

Voltage: Above 11V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Recharge the battery.

2.CHECK BATTERY TERMINALS

1. Turn ignition switch OFF.
2. Check battery terminals condition.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the battery terminals.

3.CHECK BATTERY AND ALTERNATOR

Check that the proper type of battery and type of alternator are installed.
Refer to, STR-8, "System Diagram" and CHG-8, "System Diagram".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace with a proper one.

4.CHECK ECM POWER SUPPLY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.

cardiagn.com

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, E121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F68	60	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

8. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 52) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 20A fuse.

9. CHECK GROUND CONNECTION

Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

cardiagn.com

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace.

cardiagn.com

P0571 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000001115094

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0571	ASCD BRAKE SWITCH CIRCUIT • 1.DEF: Values outside the levels • 2.DEF: Signal incoherence • 3.DEF: Signal outside upper level	• Harness or connectors (Stop lamp switch circuit is open or shorted) (The CAN communication line is open or shorted) • Stop lamp switch • BCM

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after a series of actions on the brake pedal.

Diagnosis Procedure

INFOID:0000000000967569

1.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E60	116 (ASCD brake switch)	Ground	Brake pedal	Fully released	0V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (with ASCD brake switch) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E115	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E105, M77
- 10A fuse (No. 4)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

cardiagn.com

3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E115	3	E60	116	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD BRAKE SWITCH

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6.CHECK BCM

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace

7.CHECK CAN COMMUNICATION LINE

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000000967570

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

cardiagn.com

Terminals	Condition		Continuity
1 and 2 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

cardiagn.com

P0575 ASCD STEERING SWITCH

Description

INFOID:0000000001109187

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

DTC Logic

INFOID:0000000001115095

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0575	CRUISE CONTROL/SPEED LIMITER FUNCTION • 1.DEF: Values outside the levels • CC.1: Short circuit to +12V • 2.DEF: Signal outside upper level	• Harness or connectors (ASCD steering switch circuit is open or shorted) • ASCD steering switch • Combination switch

NOTE:
- **Special note:**
  If the DTC is present, the cruise control/speed limiter function will be inhibited.

Diagnosis Procedure

INFOID:0000000000967575

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage
Connector	Terminal			
E60	110 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M352	15	E60	111	Existed

5. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M352	14	E60	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1350, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001098400

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M352.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M352	14 and 15 (Combination switch)	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

cardiagn.com

NO >> Replace ASCD steering switch

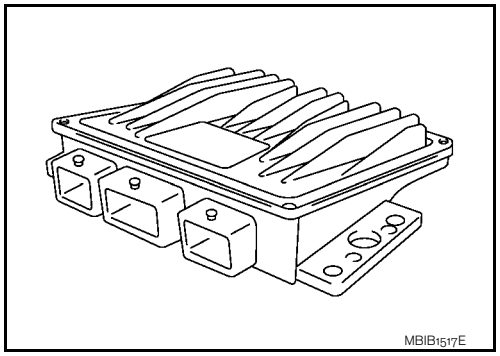
cardiagn.com

P0606 ECM

Description

INFOID:0000000000967577

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001115096

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0606	ECM • 1.DEF to 20.DEF: Internal electric malfunction	• ECM

NOTE:
- **If DTC P0606 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after an attempted start, or with the engine running.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000000967579

1.CHECK DTC

Make sure that which malfunction (DTC second line indication) is displayed.

A	Except 9.DEFF
B	9.DEF

A or B

A >> GO TO 2.
B >> GO TO 3.

2.REPLACE ECM

1. Perform EC-1273, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

3.CHECK CAN COMMUNICATION LINE

Refer to LAN-59, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

cardiagn.com

Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE ECM

1. Perform EC-1273, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

cardiagn.com

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001115097

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0641	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness or connectors (The APP sensor 2 power supply circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (EGR volume control valve control position sensor circuit is shorted.) (Mass air flow sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Fuel rail pressure sensor • EGR volume control valve control position sensor • Mass air flow sensor • Refrigerant pressure sensor

NOTE:
- **If DTC P0641 is displayed with DTC P0100, P0101, P0110, P0190, P0225, P0409, P0530, P2120, first perform trouble diagnosis for DTC P0641.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001098423

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E60	118	APP sensor	E110	5

cardiagn.com

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F68	89	Refrigerant pressure sensor	E50	3
	85	EGR volume control valve (EGR volume control valve control position sensor)	F99	1
F85	20	Fuel rail pressure sensor	F102	3
	28	Mass air flow sensor	E15	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

4. CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E60	120	APP sensor	E110	1
F68	74	Refrigerant pressure sensor	E50	1
	82	EGR volume control valve (EGR volume control valve control position sensor)	F99	3
F85	15	Fuel rail pressure sensor	F102	2
	30	Mass air flow sensor	E15	2

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to EC-1380, "Diagnosis Procedure".)
- EGR volume control valve (EGR volume control valve control position sensor) (Refer to EC-1372, "Diagnosis Procedure".)
- Fuel rail pressure sensor (Refer to EC-1350, "Component Inspection".)
- Mass air flow sensor (Refer to EC-1337, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6. CHECK APP SENSOR

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace APP sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001115098

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0651	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Parameter at minimum level • 2.DEF: Parameter at maximum level	• Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • Turbocharger boost sensor

NOTE:
- **If DTC P0651 is displayed with DTC P0225, P0235, first perform trouble diagnosis for DTC P0651.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001098822

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E60	122	APP sensor	E110	4
F85	36	Turbocharger boost sensor	F91	1

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

cardiagn.com

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E60	127	APP sensor	E110	2
F85	43	Turbocharger boost sensor	F91	2

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK TURBOCHARGER BOOST SENSOR

- Turbocharger boost sensor (Refer to EC-1330, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace Turbocharger boost sensor.

6.CHECK APP SENSOR

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace APP sensor.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P0685 ECM RELAY

DTC Logic

INFOID:0000000001115099

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0685	ECM RELAY CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The ECM relay circuit is open or shorted.) • IPDM E/R (ECM relay)

NOTE:
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000967588

1.CHECK ECM POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, E121
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E11.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

cardiagn.com

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F68	60	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5
NO >> Repair open circuit or short to ground or short power in harness or connectors.

5.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 52) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 20A fuse.

6.CHECK GROUND CONNECTION

Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace ground connection.

7.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace.

cardiagn.com

P0812 PNP SWITCH

DTC Logic

INFOID:0000000001115100

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0812	REVERSE GEAR SIGNAL • 1.DEF: Values outside the levels	• Harness or connectors (CAN communication line is open or shorted.) • Park/neutral position switch

NOTE:
- **If DTC P0812 is displayed, the reversing light will not work.**

Diagnosis Procedure

INFOID:0000000000967593

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-59, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK PNP SWITCH

Refer to TM-54, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

cardiagn.com

P0830 ASCD CLUTCH SWITCH

Description

INFOID:0000000000969604

ASCD clutch switch signal is applied to the ECM through the ASCD clutch switch when the clutch pedal is depressed.

DTC Logic

INFOID:0000000001115101

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0830	ASCD CLUTCH SWITCH CIRCUIT • 1.DEF: No possible classification	• Harness or connectors (ASCD clutch switch circuit is open or shorted.) • ASCD clutch switch

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after a series of actions on the clutch pedal during a road test [speed greater than 90 km/h (54 mph)].

Diagnosis Procedure

INFOID:0000000000967598

1.CHECK ASCD CLUTCH SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage
Connector	Terminal		
E111	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Continuity
Connector	Terminal		
E111	2	E60	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to power in harness or connectors.

3.CHECK ASCD CLUTCH SWITCH

Refer to EC-1401, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ASCD clutch switch.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

cardiagn.com

>> INSPECTION END

Component Inspection

INFOID:0000000000967599

1. CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

cardiagn.com

P1089 FUEL PUMP

DTC Logic

INFOID:0000000001115103

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1089	FUEL RAIL PRESSURE REGULATION FUNCTION • 1.DEF: High pressure supply pump (Pressure control valve) closed • 2.DEF: High pressure supply pump (Pressure control valve) open • 3.DEF: High pressure supply pump (Volumetric control valve) open • 4.DEF: High pressure supply pump (Volumetric control valve) closed • 5.DEF: Component malfunction: High pressure supply pump (Pressure control valve or Volumetric control valve) • 6.DEF: High pressure supply pump (Pressure control valve) oscillation • 7.DEF: High pressure supply pump (Volumetric control valve)) oscillation	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] [High pressure supply pump (Pressure control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) • High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel line • Fuel rail • Fuel injector • Fuel rail pressure sensor • Fuel rail pressure relief valve • Air mixture with fuel • Lack of fuel

NOTE:
- **NOTE:**
- **If DTC P1089 is displayed with DTC P0180, first perform trouble diagnosis for DTC P0180. Refer to EC-1347, "DTC Logic".**
- **If DTC P1089 is displayed with DTC P0190, first perform trouble diagnosis for DTC P0190. Refer to EC-1349, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC appears when the engine is running.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000970737

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 9.

cardiagn.com

4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Replace or replace. Then GO TO 9.

5. CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 9.

6. CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7. CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

Is the inspection result normal?

OK >> GO TO 8.
NG >> Replace or replace. Then GO TO 9.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9. CLEAR PRESSURE REGULATION

Perform “PRESS_REG_ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

cardiagn.com

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000000955032

By default the valve is open when in the rest position and is actuated only when the engine is switched off; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:0000000001115104

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2101	THROTTLECONTROL MOTOR CIRCUIT • 1.DEF: No signal • 2.DEF: • 3.DEF: Values out of range • 4.DEF: Signal incoherence	• Harness or connectors (Throttle control motor circuit is open or shorted.) • Throttle control motor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started or following a load test.
- **Special note:**
  If DTC P2101 2.DEF is displayed, first perform trouble diagnosis for DTC P0120. Refer to EC-1345, "DTC Logic".

Diagnosis Procedure

INFOID:0000000000955036

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F81	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and electric throttle control actuator
- Harness for open or short between ECM and electric throttle control actuator

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-I

cardiagn.com

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F81	5	F68	72	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-II

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F81	2	F68	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-III

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F81	4	F68	90	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace.

Component Inspection

INFOID:0000000000955037

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
1 and 2	21 ± 2.1Ω [23°C (73°F)]

Is the inspection result normal?

cardiagn.com

YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

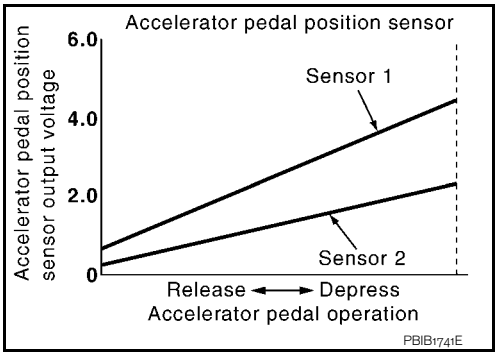
cardiagn.com

P2120 APP SENSOR

Description

INFOID:0000000001098978

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:0000000001115105

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2120	ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • CO.0: Open circuit or short circuit to ground	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 2)

NOTE:

- **If DTC P2120 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1393, "DTC Logic".**
- Conditions for applying the diagnostic procedure to the stored DTCs:
  - The DTC is declared present after a series of full load-no load accelerator pedal actions have been carried out (engine stopped, ignition on).
- **If the DTC is present:**
  - **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000970745

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
2	E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

cardiagn.com

2. Disconnect accelerator pedal position sensor.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E110	1	E60	120	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E110	6	E60	119	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace accelerator pedal position sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001098962

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

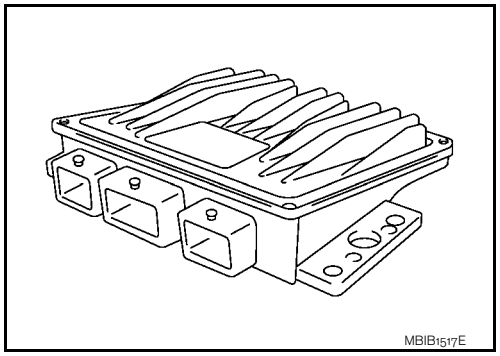
cardiagn.com

P2226 BARO SENSOR

Description

INFOID:0000000000970747

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.



DTC Logic

INFOID:0000000001115106

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2226	BAROMETRIC PRESSURE SENSOR CIRCUIT • CC.1: Short circuit to +12V • CO.0: Short circuit to ground or open circuit • CO.0: Micro -breaks	• ECM

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **Special note:**
  The barometric pressure sensor is integrated into the ECM, and cannot be separated.

Diagnosis Procedure

INFOID:0000000000970749

1.REPLACE ECM

1. Perform EC-1273, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

cardiagn.com

P2263 TC SYSTEM

DTC Logic

INFOID:0000000001115107

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2263	AIR INLET CIRCUIT • 1.DEF: Permanent at minimum limit • 2.DEF: Permanent at maximum limit	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Air inlet circuit • Vacuum pump • Vacuum hose • Turbocharger • Turbocharger boost control solenoid valve • Turbocharger boost sensor • Electric throttle control actuator

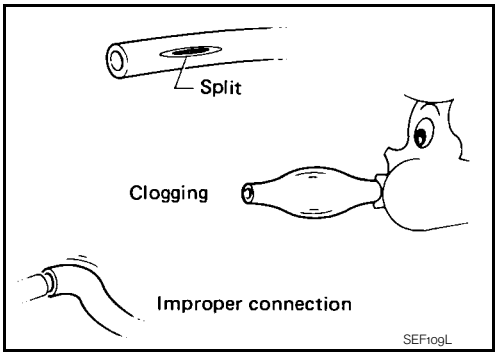
NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000970753

1.CECHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-1287, "Vacuum Hose Drawing".



Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 5.

5.CHECK TURBOCHARGER

cardiagn.com

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 6.

6. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

Turbocharger boost control solenoid valve		Ground	Voltage
Connector	Terminal		
E55	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E55	1	F68	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace turbocharger boost control solenoid valve.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1330, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace turbocharger boost sensor.

10. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1405, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace turbocharger boost sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

cardiagn.com

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

DTC Logic

INFOID:0000000001115113

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2299	ACCELERATOR PEDAL/BRAKE PEDAL INCONSISTENCY • 1.DEF: Inconsistency	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) (Stop lamp switch circuit is open or short-ed.) • Accelerator pedal position sensor (APP sensor 1 and 2.) • Stop lamp switch • Accelerator pedal

NOTE:
- **Special note:**
  The brake and accelerator pedals were detected as depressed simultaneously for 30 seconds.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000970929

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E60	115 (ASCD brake switch)	Ground	Brake pedal	Fully released	0V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 7.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110	4	Ground	Approx. 5V
2		5		

Is the inspection result normal?

YES >> GO TO 4.

cardiagn.com

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	2	E60	127	Existed
2		1		120	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	3	E60	126	Existed
2		6		119	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace accelerator pedal position sensor.

7. CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E115	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E105, M77
- 10A fuse (No. 11)
- Harness for open or short between fuse and stop lamp switch

cardiagn.com

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E115	2	E60	115	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace stop lamp switch.

11. CHECK ACCELERATOR PEDAL

Refer to ACC-3, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace accelerator pedal position sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

P2413 EGR SYSTEM

DTC Logic

INFOID:0000000001115114

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2413	EGR VOLUME CONTROL • 1.DEF: Jammed component	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR passage clogged

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **Special notes:**
- Engine instability, possibly even stalling.
- Difficult to start engine or even impossible when cold.
- Loss of performance.
- Possible smoke emissions.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000000970932

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install EGR volume control valve properly.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

GR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F99	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

cardiagn.com

OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	5	F85	86	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F68	95	Existed
			96	Not existed
	6		95	Not existed
			96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube

cardiagn.com

- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace EGR passage.

9. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1378, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1274, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

cardiagn.com

P2502 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001115115

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2502	ALTERNATOR CHARGE SIGNAL • 1.DEF: Values outside level	• Harness or connectors (The CAN communication line is open or shorted) • Alternator

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.

Diagnosis Procedure

INFOID:0000000000970935

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-59, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK ALTERNATOR

Refer to CHG-8, "System Diagram".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

cardiagn.com

P2610 ENGINE SAFETY STOP

DTC Logic

INFOID:0000000001115116

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2610	ENGINE SAFETY STOP • 1.DEF: Electric • 2.DEF: Hydraulic	• Harness or connectors (Fuel injector circuit is shorted) • Turbocharger • Fuel injector • Intake air leas • Electric throttle control actuator

NOTE:
- **Priorities when dealing with a number of DTCs:**
  If DTC P2610 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
- **Special notes:**
- The engine only stops after the ignition is switched off.

Diagnosis Procedure

INFOID:0000000000970938

1.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1327, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace turbocharger boost control solenoid valve.

5.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1404, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK FUEL INJECTOR

Refer to EC-1353, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace fuel injector.

cardiagn.com

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

cardiagn.com

ASCD INDICATOR

Description

INFOID:0000000001102019

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.

Component Function Check

INFOID:0000000001102020

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

CONDITION		INDICATOR
• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	Illuminated → Not illuminated
• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	Illuminated
	• ASCD: Not operating	Not illuminated

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Go to EC-1421, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102021

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-59, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER OPERATION

Refer to MWI-23, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

cardiagn.com

COOLING FAN

Description

INFOID:0000000001102014

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-1309, "System Description" for cooling fan operation.

Component Function Check

INFOID:0000000001102015

1.CHECK COOLING FAN LOW SPEED FUNCTION

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to EC-1422, "Diagnosis Procedure".

2.CHECK COOLING FAN HIGH SPEED FUNCTION

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to EC-1422, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102016

1.CHECK CAN COMMUNICATION LINE

Refer to EC-1321, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace

2.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3 harness connector.
3. Check the voltage between cooling fan relay-3 harness connectors and ground.

Cooling fan motor-1		Ground	Voltage
Connector	Terminal		
E59	1	Ground	Battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- 50A fusible link (letter M)
- Harness for open or short between cooling fan motor-3 and battery

>> Repair or replace malfunctioning part.

4.CHECK COOLING FAN CIRCUIT FOR OPEN AND SHORT

cardiagn.com

1. Disconnect cooling fan motor harness connector.
2. Disconnect IPDM E/R harness connectors E13 and E14.
3. Check the continuity between cooling fan motor harness connector and IPDM E/R harness connector.

Cooling fan motor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E14	52	Existed

4. Check the continuity between cooling fan motor harness connector and cooling fan relay-3 harness connector.

Cooling fan motor		Cooling fan relay-3		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E59	2	Existed

5. Check the continuity between IPDM E/R harness connector and cooling fan relay-3 harness connector.

IPDM E/R		Cooling fan relay-3		Continuity
Connector	Terminal	Connector	Terminal	
E13	48	E59	4	Existed

6. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E10	5	Ground	Existed
	6		

7. Check the continuity between cooling fan relay-3 and ground harness connector.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	2	Ground	Existed

8. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and cooling fan relay-3
- Harness for open or short between IPDM E/R and cooling fan relay-3
- Harness for open or short between IPDM E/R and ground
- Harness for open or short between cooling fan relay-3 anf ground
- Resitor E57

>> Repair or replace malfunctioning part.

6. CHECK COOLING FAN RELAY

Refer to EC-1424, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning cooling fan relay.

cardiagn.com

7. CHECK COOLING FAN MOTOR

Refer to EC-1424, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace cooling fan motor.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001102017

1. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E3.
3. Supply cooling fan motor terminal with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fans operate

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan motor.

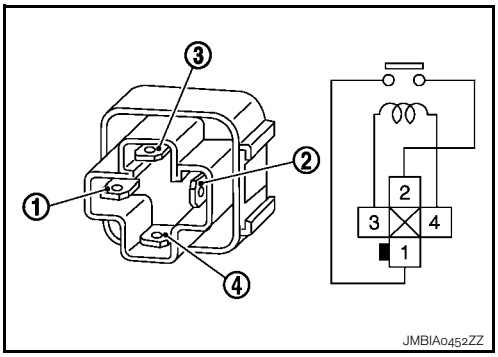
Component Inspection (Cooling Fan Relay)

INFOID:0000000001102018

1. CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 4	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



JMBIA0452ZZ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan relay.

cardiagn.com

STOP LAMP SWITCH

Description

INFOID:0000000001102060

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

Component Function Check

INFOID:0000000001102059

1.CHECK BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E60	115 (Brake switch signal)	Ground	Brake pedal	Fully released	0V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-1425, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001102022

1.CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E115	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E105, M77
- 10A fuse (No. 11)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E115	2	E60	115	Existed

4. Also check harness for short to ground and short to power.

cardiagn.com

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH

Refer to EC-1359, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace stop lamp switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001102061

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-52, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

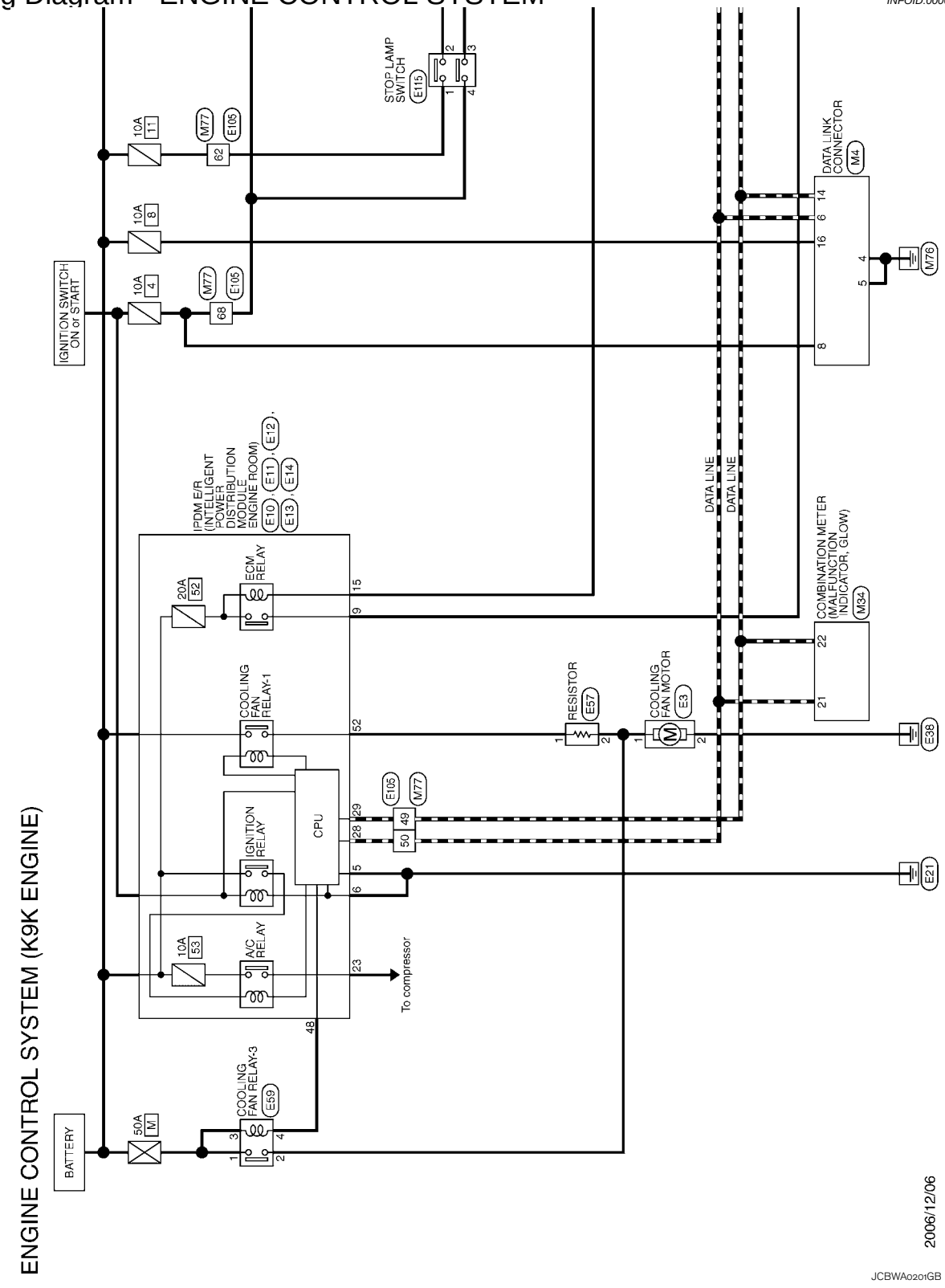
cardiagn.com

ECU DIAGNOSIS

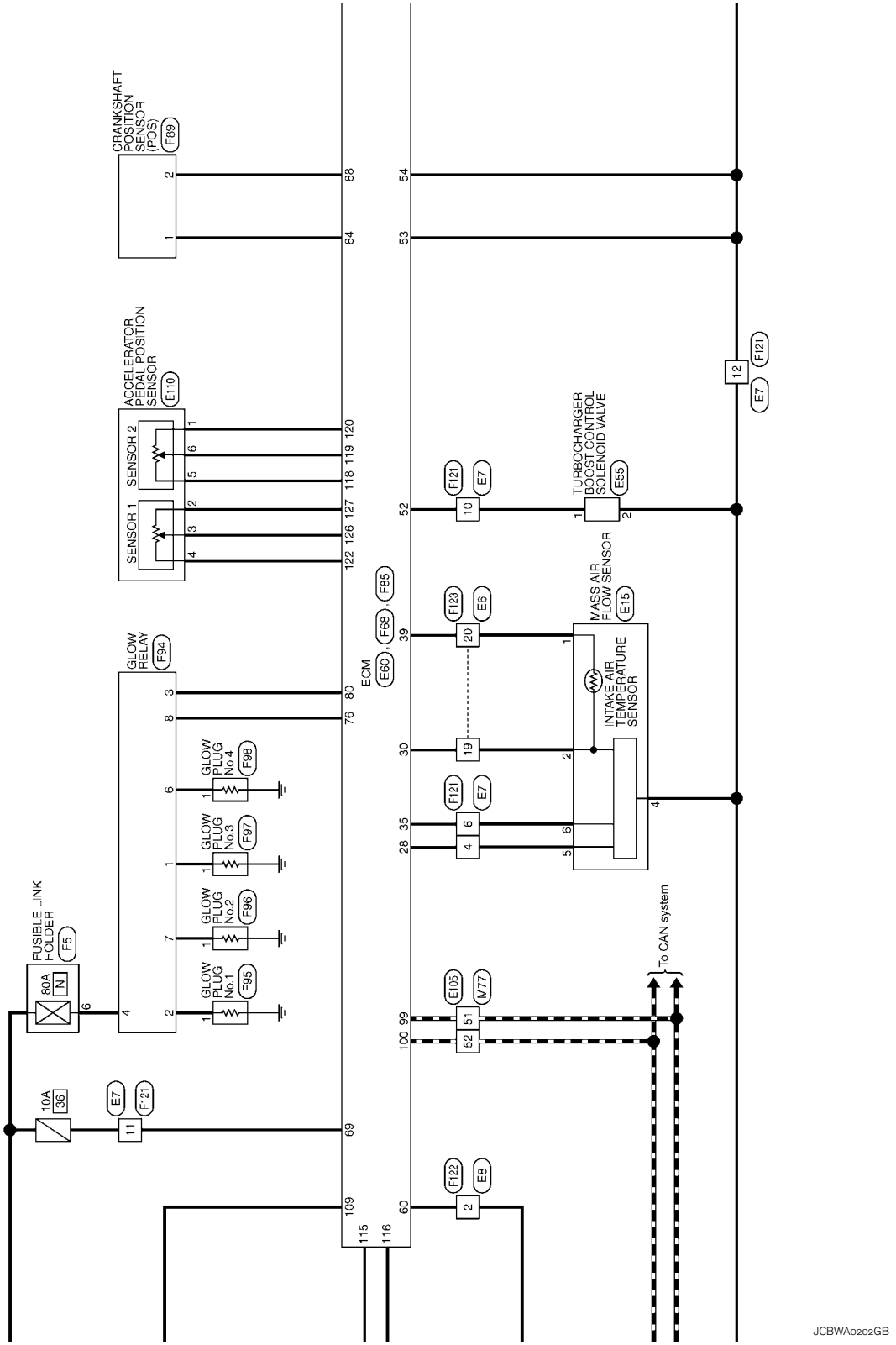
ECM

Wiring Diagram - ENGINE CONTROL SYSTEM -

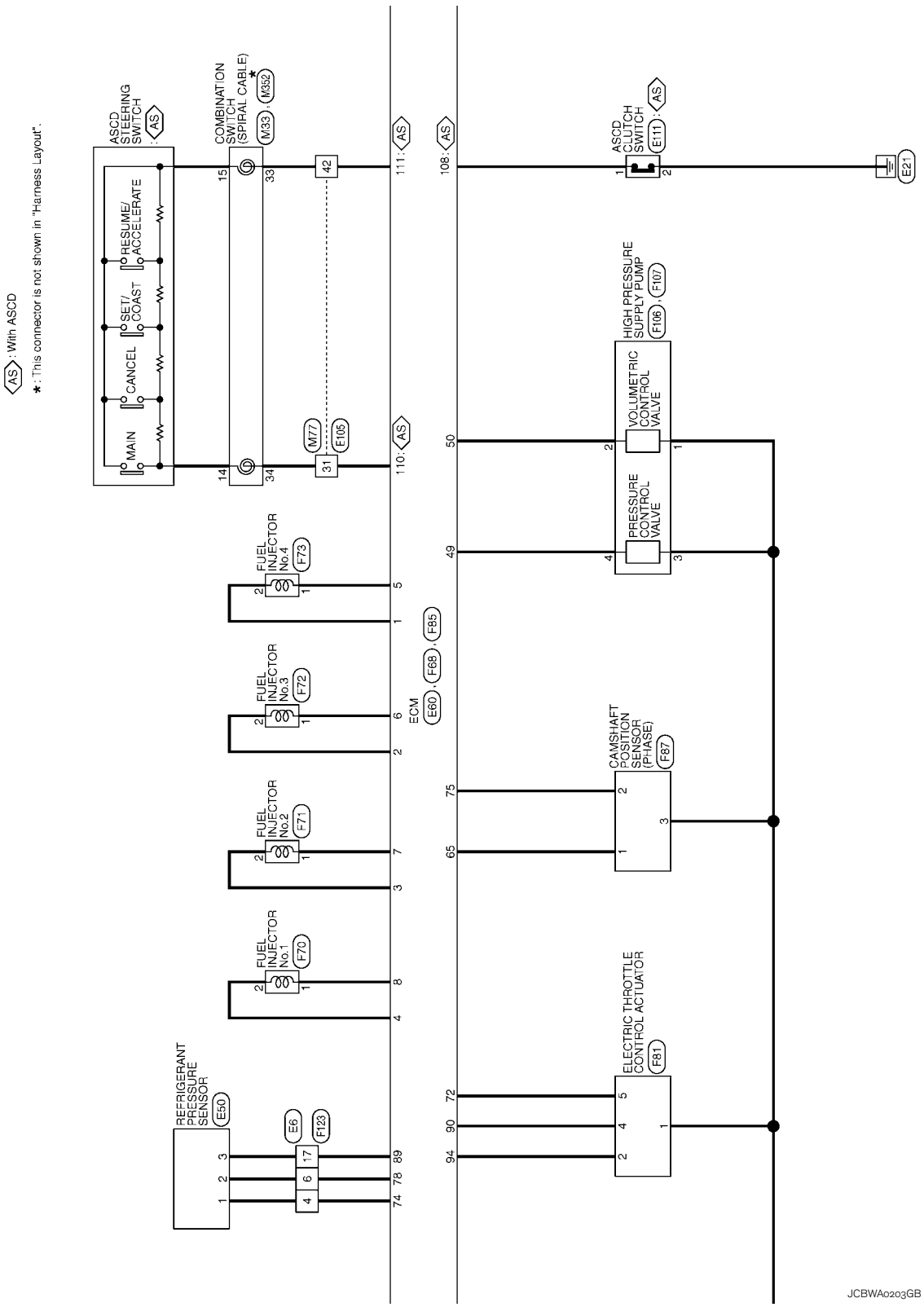
INFOID:0000000000902368



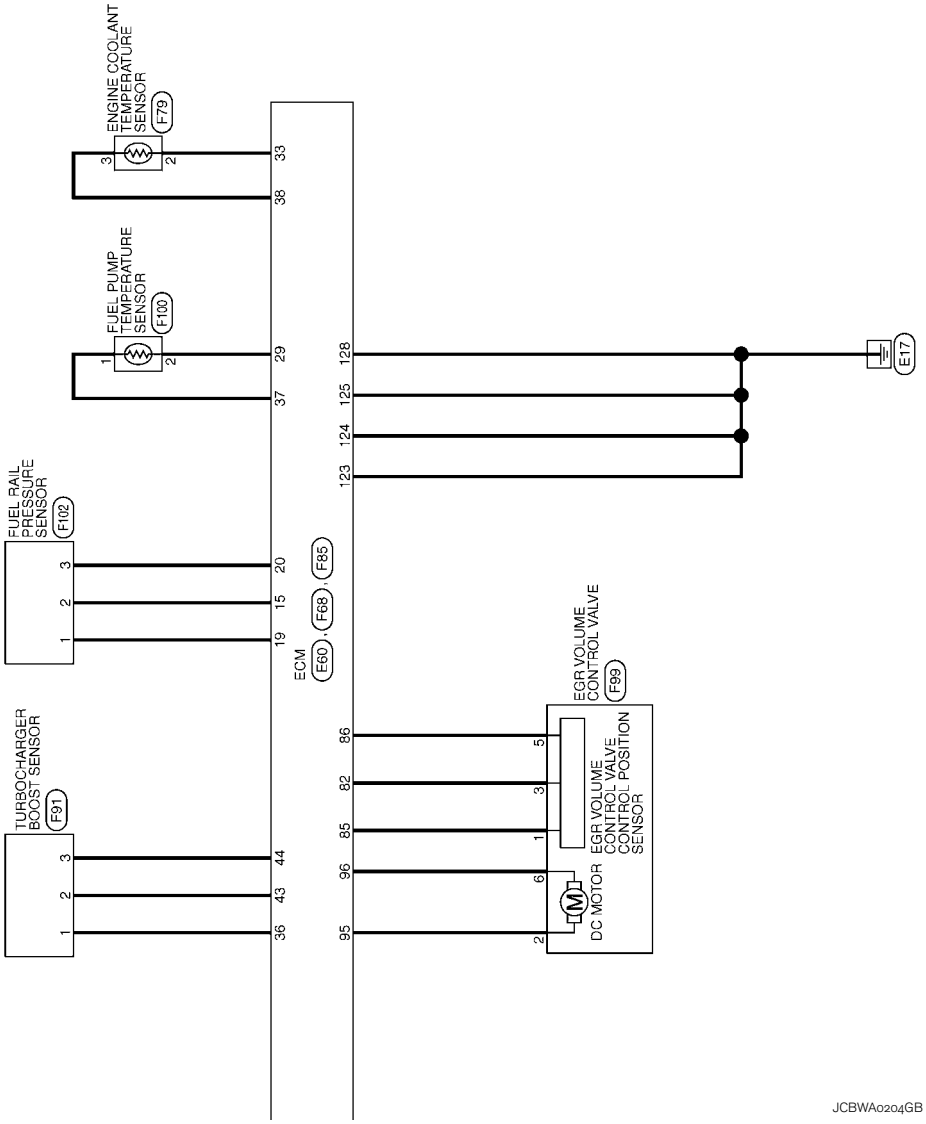
cardiagn.com



cardiagn.com



cardiagn.com



cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E3
Connector Name	COOLING FAN MOTOR
Connector Type	P80103895160Z

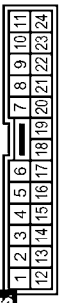
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1V

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	R/L	–
6	G/P	–
17	Y/W	–
19	GR/R	–[With diesel engine]
20	LG	–[With diesel engine]

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	R	–[With diesel engine]
6	B/Y	–[With diesel engine]
10	G/R	–[With diesel engine]
11	L/B	–[With diesel engine]
12	G	–

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	M02MW-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	–

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
5	B	–
6	B	–

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
9	G	–
15	B/R	–[With diesel engine]

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
23	Y/B	–
28	L	–
29	P	–

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
46	Y	–

JCBWA0205GB

cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	Y2K 7283-5591-40-F

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
92	W	-

Connector No.	E15
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	-
2	GR/R	-
4	G	-
5	R	-
6	B/Y	-

Connector No.	E50
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	D400997F

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	-
2	G/P	-
3	Y/W	-

Connector No.	E55
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Type	SUPPLIRE REF 282788-1

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G/R	-
2	G	-

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P8010389516O2

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	-
2	R	-

Connector No.	E59
Connector Name	COOLING FAN RELAY-3
Connector Type	24347 9F900

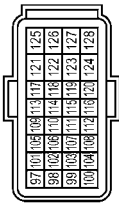
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	-
2	R	-
3	W/B	-
4	W	-

Connector No.	E60
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
93	P	MAIN CAN-L (BODY)
100	L	MAIN CAN-H (BODY)
108	G	CLUTCH PED SWITCH
109	W/L	IGN
110	V	ASCD STRG SW(+)
111	B	ASCD STRG SW(-)
115	O	BRAKE SWITCH MAIN
116	R/W	BNC SW
118	R	ACCEL PED SENS-2 +V
119	W	ACCEL PED SENS-2
120	B	ACCEL PED SENS-2 GND

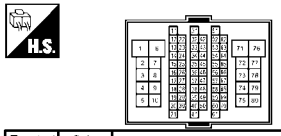
122	R	ACCEL PED SENS-1 +V
123	B	GND
124	B	GND
125	B	GND
126	W	ACCEL PED SENS-1
127	B	ACCEL PED SENS-1 GND
128	B	GND

JCBWA0206GB

cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-NS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
31	V	–
42	B	–
49	P	–
50	L	–
51	P	–
52	L	–
62	V	–
88	W/L	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–[Except HR engine]
2	B	–[With K9K engine]
3	W	–[Except HR engine]
4	R	–[With K9K engine]
5	R	–[With K9K engine]
6	W	–[With K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–[With diesel engine]
2	B	–[With diesel engine]

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC



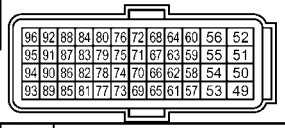
Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–
3	O	–[With diesel engine]
4	W/L	–[With diesel engine]

Connector No.	F5
Connector Name	FUSIBLE LINK HOLDER
Connector Type	L01FB-MC



Terminal No.	Color of Wire	Signal Name [Specification]
6	W	–

Connector No.	F68
Connector Name	ECM
Connector Type	MAA40FBR-MEA8-LH



Terminal No.	Color of Wire	Signal Name [Specification]
49	SB	HP PRES VALVE DRIVE
50	LG/B	HP REG VALVE DRIVE
52	G/R	VNT CONTROL VALVE
53	G	VBATT
54	G	VBATT
60	B/R	CU RELAY DRIVE
65	O	CAMSHAFT GND
69	L/B	VBD (DIRECTVBATT)
72	L	PWM SIGNAL
74	R/L	FREON PRESS GND
75	W	CAMSHAFT SENS
76	L/Y	GLOW-PLUG COMMOND
78	G/P	FREON PRESS SENS
80	R/G	GLOW PLUG DIAGNOSTICS
82	GR	EGR POSS GND
84	R/O	CRANKSHAFT SENS +
85	SB	EGR POSS +V
86	Y/G	EGR POSS SENS
88	L/O	CRANKSHAFT SENS –
89	Y/W	FREON PRESURE +V
90	R/Y	INLET THROTTLE FBACK
94	O	INLET THROTTLE GND
95	R	EGR DC MOTOR+
96	L/W	EGR DC MOTOR–

Connector No.	F70
Connector Name	FUEL INJECTOR No.1
Connector Type	KOSTAL 09441231



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	R/Y	–

JCBWA0207GB

cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F71
Connector Name	FUEL INJECTOR No.2
Connector Type	KOSTAL 09441231

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	-
2	L/W	-

Connector No.	F72
Connector Name	FUEL INJECTOR No.3
Connector Type	KOSTAL 09441231

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	G/Y	-

Connector No.	F73
Connector Name	FUEL INJECTOR No.4
Connector Type	KOSTAL 09441231

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	-
2	B/R	-

Connector No.	F79
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	GHW 1784300000-F

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
2	Y/B	-
3	GR/L	-

Connector No.	F81
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	FEP 42121200

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	O	-
4	R/Y	-
5	L	-

Connector No.	F85
Connector Name	ECM
Connector Type	MAA40FGY-MEAB-RH

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	B/R	PIEZO INJECTOR 4 LSD
2	G/Y	PIEZO INJECTOR 3 LSD
3	L/W	PIEZO INJECTOR 2 LSD
4	R/Y	PIEZO INJECTOR 1 LSD
5	B	PIEZO INJECTOR 4 HSD
6	G	PIEZO INJECTOR 3 HSD
7	L	PIEZO INJECTOR 2 HSD
8	R	PIEZO INJECTOR 1 HSD
15	GR	RAIL PRESS GND
19	LG	RAIL PRESS SENS
20	L	RAIL PRESS +V

28	R	AIR MASS FLOW SENS +V
29	L/G	FUEL TEMP GND
30	GR/R	AIR MASS-FLOW SENS GND
33	Y/B	WATER TEMP GND
35	B/Y	AIR MASS FLOW
36	V	BOOST PRES +V
37	P	FUEL TEMP SENS
38	GR/L	WATER TEMP SENS
39	LG	INTAKE AIR TEMP SENS
43	G	BOOST PRES GND
44	O	BOOST PRES SENS

Connector No.	F87
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	FEA03FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	-
2	W	-
3	G	-

JCBWA0208GB

cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F89
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	FEA02FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/O	–
2	L/O	–

Connector No.	F91
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Type	BOSCH 1928404073

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	G	–
3	O	–

Connector No.	F94
Connector Name	GLOW RELAY
Connector Type	FCI 240PC089S0015

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	L	–
3	R/G	–
4	W	–
6	Y	–
7	LG	–
8	L/Y	–

Connector No.	F95
Connector Name	GLOW PLUG No.1
Connector Type	–

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–

Connector No.	F96
Connector Name	GLOW PLUG No.2
Connector Type	–

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–

Connector No.	F97
Connector Name	GLOW PLUG No.3
Connector Type	–

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–

Connector No.	F98
Connector Name	GLOW PLUG No.4
Connector Type	–

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–

Connector No.	F99
Connector Name	EGR VOLUME CONTROL VALVE
Connector Type	FEP-4212/200

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	R	–
3	GR	–
5	Y/G	–
6	L/W	–

JCBWA0209GB

cardiagn.com

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F100
Connector Name	FUEL PUMP TEMPERATURE SENSOR
Connector Type	FEA02FGY

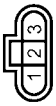
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	P	-
2	L/G	-

Connector No.	F102
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	FCI-211PC032S2049

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	-
2	GR	-
3	L	-

Connector No.	F106
Connector Name	HIGH PRESSURE SUPPLY PUMP
Connector Type	FEA02FO

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	-
2	LG/B	-

Connector No.	F107
Connector Name	HIGH PRESSURE SUPPLY PUMP
Connector Type	FEA02FW

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
3	G	-
4	SB	-

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	R	-[With diesel engine]
6	B/Y	-[With diesel engine]
10	G/R	-[With diesel engine]
11	L/B	-[With diesel engine]
12	G	-

Connector No.	F122
Connector Name	WIRE TO WIRE
Connector Type	M02FW-LC

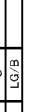
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	-

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

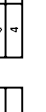
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	R/L	-
6	G/P	-
17	Y/W	-
19	GR/R	-[With diesel engine]
20	LG	-[With diesel engine]

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

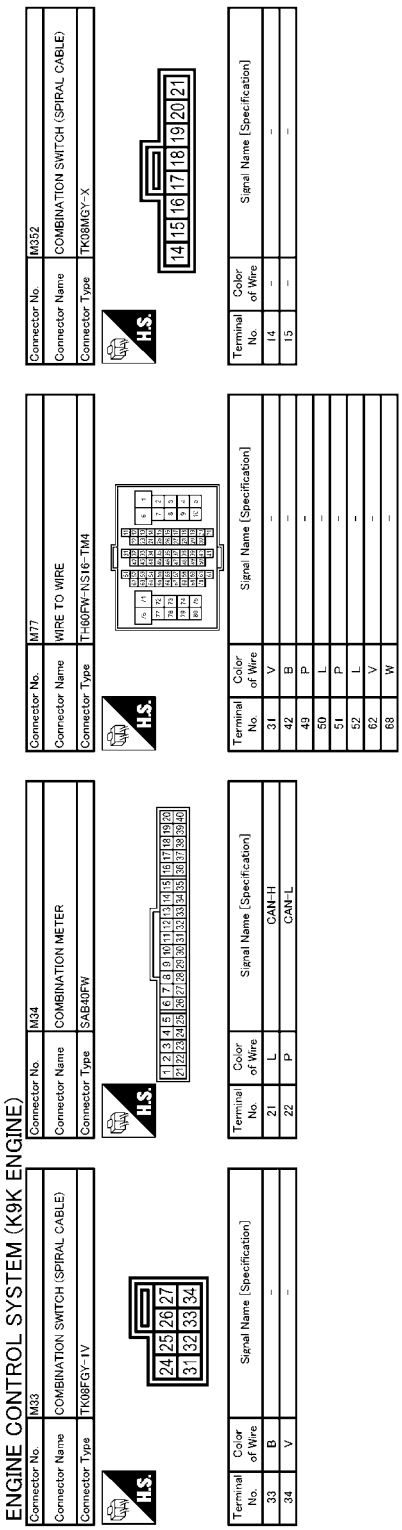
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
4	B	-
5	B	-
6	L	-
8	W	-
14	P	-
16	Y	-

JCBWA0210GB

cardiagn.com



JCBWA0211GB

DTC Index

INFOID:0000000000896336

X: Applicable —: Not applicable

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0001	FUEL SYSTEM	3	–	×	EC-1320
P0002	FUEL SYSTEM	3	–	–	EC-1320

cardiagn.com

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0016	COHERENCE CMSFT/SN	3	–	–	EC-1320
P0045	TURBO ACT CIRC	3	–	×	EC-1327
P0069	PRESSURE COHERENCE	3	–	×	EC-1329
P0087	LOW FUEL PRESS	3	–	–	EC-1331
P0090	FUEL SYSTEM	3	–	×	EC-1333
P0100	AIR FLOW SEN CIRC	3	–	–	EC-1335
P0101	AIR FLOW SEN CIRC	3	–	–	EC-1338
P0110	IN-AIR TMP SEN CIR	3	–	–	EC-1341
P0115	WATER TMP SEN	1 or 3	–	–	EC-1343
P0120	TP SEN CIRC	3	–	–	EC-1345
P0180	FUEL TEMP SEN CIRC	1 or 3	–	–	EC-1347
P0190	RAIL/PRESS SEN CIR	3	–	×	EC-1349
P0200	INJECTOR CTRL CIRC	3	–	×	EC-1351
P0201	CYL 1 INJ CTRL CIR	3	×	×	EC-1353
P0202	CYL 2 INJ CTRL CIR	3	×	×	EC-1353
P0203	CYL 3 INJ CTRL CIR	3	×	×	EC-1353
P0204	CYL 4 INJ CTRL CIR	3	×	×	EC-1353
P0217	ENG OVER TEMP	1	–	–	EC-1355
P0225	PDL POTEN CIRC TK1	3	–	×	EC-1358
P0235	IN-MANI PRES CIRC	3	–	×	EC-1361
P0335	ENGNE SPD SEN CIRC	1	–	×	EC-1363
P0340	CAMSHAFT SEN CIRC	3	–	–	EC-1365
P0380	PRHT UNIT CTRL CIR	3	–	–	EC-1368
P0381	PRHT DGNSTC CNECT	3	–	–	EC-1370
P0409	EGR POSITN OFFSET	3	×	–	EC-1372
P0487	EGR COMMAND CIRC	3	–	–	EC-1374
P0488	EGR/V POSITN CTRL	3	–	× or –	EC-1376
P0500	VEHL/SPD INF CIRC	1	–	–	EC-1379
P0530	REFRIGERNT SEN CIR	1	–	–	EC-1380
P0560	CPU SUPPLY VOLTAGE	1	–	–	EC-1382
P0571	BRAKE SWITCH CIRC	1	–	–	EC-1385
P0575	SPD LIM/CRS CTRL	1	–	–	EC-1388
P0606	COMPUTER(C/U)	1 or 3	× or –	×	EC-1391
P0641	SEN SUPPLY N-1 VOL	3	–	×	EC-1393
P0651	SEN SUPPLY N-2 VOL	3	–	×	EC-1395
P0685	MAIN RLY CTRL CIRC	3	–	×	EC-1397
P0812	REVERSE INFO	1	–	–	EC-1399
P0830	CLUTCH SWITCH CIRC	1	–	–	EC-1400
P1089	RAIL PRESS REGULTN	3	–	× or –	EC-1402
P2101	ETC FUNCTION/CIRC	3	–	–	EC-1404
P2120	PDL POTEN CIRC TK2	3	–	×	EC-1407
P2226	ATMOS PRES SE CIR	3	–	–	EC-1409
P2263	T/C SYSTEM	3	–	×	EC-1410

cardiagn.com

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P2299	BRK/ACCEL PDL PSTN	3	–	×	EC-1412
P2413	EGR SYSTEM	3	×	×	EC-1415
P2502	ALT CHARGE INFO	1	–	–	EC-1418
P2610	ENGINE PROTECTION	1	–	–	EC-1419

*: This number is prescribed by ISO 15031-6.

cardiagn.com

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000000902356

NOTE:
Only consult this customer complaint after a complete check using the CONSULT-III.

Symptom		Trouble diagnosis	Reference page
No communication with the ECM		CHART 1	EC-1441, "Diagnosis Procedure"
Starting malfunction	Engine does not start or starts with difficulty	CHART 2	EC-1442, "Diagnosis Procedure"
	Starting difficult with cold engine	CHART 3	EC-1444, "Diagnosis Procedure"
	Impossible to shut off engine	CHART 4	EC-1446, "Diagnosis Procedure"
Idle speed malfunction	Engine Idle speed too high	CHART 5	EC-1447, "Diagnosis Procedure"
	Engine Idle speed too low or unstable	CHART 6	EC-1448, "Diagnosis Procedure"
Behavior while driving	Engine stalling	CHART 7	EC-1450, "Diagnosis Procedure"
	No or very little acceleration, increase in engine speed	CHART 8	EC-1452, "Diagnosis Procedure"
	Engine bucking	CHART 9	EC-1455, "Diagnosis Procedure"
	Erratic acceleration	CHART 10	EC-1457, "Diagnosis Procedure"
	No engine braking	CHART 11	EC-1459, "Diagnosis Procedure"
	Loss of power	CHART 12	EC-1460, "Diagnosis Procedure"
	Too much power	CHART 13	EC-1463, "Diagnosis Procedure"
	Overspeed at idle speed or on releasing brake	CHART 14	EC-1465, "Diagnosis Procedure"
	Excessive consumption	CHART 15	EC-1466, "Diagnosis Procedure"
	Engine knock	CHART 16	EC-1468, "Diagnosis Procedure"
	Engine overheating	CHART 17	EC-1470, "Diagnosis Procedure"
Noise, odors or smoke	Engine smokes when started	CHART 18	EC-1471, "Diagnosis Procedure"
	Engine emits blue smoke	CHART 19	EC-1472, "Diagnosis Procedure"
	Engine smokes when revved	CHART 20	EC-1474, "Diagnosis Procedure"
	Engine emits white smoke (especially when starting)	CHART 21	EC-1475, "Diagnosis Procedure"
	Emission control not satisfactory	CHART 22	EC-1476, "Diagnosis Procedure"

cardiagn.com

NOT COMMUNICATION WITH THE ECM

Description

INFOID:0000000000912031

CHART 1: NO COMMUNICATION WITH THE ECM

Diagnosis Procedure

INFOID:0000000000912033

1.INSPECTION START

Ensure that CONSULT-III is not causing the malfunction by trying to establish dialogue with an ECM on another vehicle. If the CONSULT-III is not at malfunction, and dialogue cannot be established with any other ECM on the same vehicle, the cause could be a suspected ECM interfering on the CAN communication line.
Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (9.5 V < U battery < 17.5 V).

>> GO TO 2.

2.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ECM GROUND

Check the ECM earth (ground) point on the side strut tower.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK DATA LINK CONNECTOR CIRCUIT

Check for the presence of 12 V on terminal 16 with ignition switch OFF, 12 V on terminal 8 with ignition switch ON and an earth (ground) on terminals 4 and 5 of the data link connector.
Repair if necessary.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

cardiagn.com

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Description

INFOID:0000000000912038

CHART 2: ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Diagnosis Procedure

INFOID:0000000000912039

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK BATTERY

Check the battery. Refer to PG-118, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace battery. Refer to PG-118, "Removal and Installation"

3.CHECK STARTER MOTOR

Check the starter and starter motor relay. Refer to STR-8, "System Diagram".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace starter motor or starter relay. Refer to STR-20, "K9K MODELS : Removal and Installation"

4.CHECK ECM RELAY

Check the ECM relay. Refer to EC-1397, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace IPDM E/R. Refer to PCS-32, "Removal and Installation".

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK CAMSHAFT POSITION SENSOR

Check the camshaft position sensor. Refer to EC-1366, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CAMSHAFT

Check the camshaft. Refer to EM-296, "Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace camshaft. Refer to EM-294, "Removal and Installation".

9.CHECK AIR INTAKE SYSTEM

cardiagn.com

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace air intake system. Refer to EM-265, "Removal and Installation"

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 12.

12. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 15.

15. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 16.

16. CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 17.

17. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

STARTING DIFFICULT WITH COLD ENGINE

Description

INFOID:0000000000912047

CHART 3: STARTING DIFFICULT WITH COLD ENGINE

Diagnosis Procedure

INFOID:0000000000912048

1.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 2.
No >> Top up the oil.

2.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

3.CHECK BATTERY

Check the battery. Refer to PG-118, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace battery. Refer to PG-118, "Removal and Installation"

4.CHECK STARTER MOTOR

Check the starter motor. Refer to STR-20, "K9K MODELS : Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace starter motor. Refer to STR-20, "K9K MODELS : Removal and Installation"

5.CHECK COMPONENT PART

Check the following.
- Engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".
- Fuel pump temperature sensor. Refer to EC-1348, "Component Inspection".
- Intake air temperature sensor. Refer to EC-1342, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK GLOW SYSTEM

Check the glow system. Refer to EC-1370, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace glow system. Refer to EM-275, "Removal and Installation"

7.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 8.

8.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

cardiagn.com

>> GO TO 9.

9. CHECK COMPRESSION PRESSURE

Check the compression pressure. Refer to EM-263, "Inspection".

>> **INSPECTION END**

cardiagn.com

IMPOSSIBLE TO SHUT OFF ENGINE

Description

INFOID:0000000000912051

CHART 4: IMPOSSIBLE TO SHUT OFF ENGINE

Diagnosis Procedure

INFOID:0000000000912052

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

cardiagn.com

ENGINE IDLE SPEED TOO HIGH

Description

INFOID:0000000000912063

CHART 5: ENGINE IDLE SPEED TOO HIGH

Diagnosis Procedure

INFOID:0000000000912064

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

cardiagn.com

ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Description

INFOID:0000000000912060

CHART 6: ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Diagnosis Procedure

INFOID:0000000000912061

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system. Refer to EM-265, "Removal and Installation".

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to EC-1380, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

cardiagn.com

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

ENGINE STALLING

Description

INFOID:0000000000912066

CHART 7: ENGINE STALLING

Diagnosis Procedure

INFOID:0000000000912067

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CAN COMMUNICATION

cardiagn.com

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness or connector.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Description

INFOID:0000000000912069

CHART 8: NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Diagnosis Procedure

INFOID:0000000000912070

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace harness or connector.

12. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 13.

13. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 15.

15. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 16.

16. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 17.

17. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 18.

18. CHECK INCORRECT FUEL INJECTION QUANTITY

cardiagn.com

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

ENGINE BUCKING

Description

INFOID:0000000000912072

CHART 9: ENGINE BUCKING

Diagnosis Procedure

INFOID:0000000000912073

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1401, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-23, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace air intake system.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

cardiagn.com

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

ERRATIC ACCELERATION

Description

INFOID:0000000000912075

CHART 10: Erratic acceleration

Diagnosis Procedure

INFOID:0000000000912076

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1401, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-23, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 8.

8.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

cardiagn.com

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 9.

9. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 10.

10. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 11.

11. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

NO ENGINE BRAKING

Description

INFOID:0000000000912078

CHART 11: NO ENGINE BRAKING

Diagnosis Procedure

INFOID:0000000000912079

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK IDLE SPEED

Check idle speed. Refer to EC-1483, "Idle Speed".

>> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 6.

6.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

LOSS OF POWER

Description

INFOID:0000000000912081

CHART 12: LOSS OF POWER

Diagnosis Procedure

INFOID:0000000000912082

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 3.
No >> Replace the fuel filter with an genuine part.

3.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

4.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 5.
No >> Top up the oil.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1401, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace.

12. CHECK VEHICLE SPEED SIGNAL

Check the following component.

- "ABS actuator and electric unit (control unit)" [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-23, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

13. CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 14.
No >> Repair or replace.

14. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace harness or connector.

15. CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace.

16. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 18.

18. CHECK INTERNAL FUEL TRANSFER PUMP

cardiagn.com

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 19.

19. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 20.

20. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 21.

21. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 22.

22. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 23.

23. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

TOO MUCH POWER

Description

INFOID:0000000000912084

CHART 13: TOO MUCH POWER

Diagnosis Procedure

INFOID:0000000000912085

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".

Is the turbocharger correct?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK CLUTCH SWITCH

Check clutch switch. Refer to EC-1401, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-23, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace harness or connector.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

cardiagn.com

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Description

INFOID:0000000000912087

CHART 14: OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Diagnosis Procedure

INFOID:0000000000912088

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-59, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Perform trouble diagnosis on the “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”. Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-96, "CONSULT-III Function (ABS)" (with ESP).

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Repair or replace.

cardiagn.com

EXCESSIVE CONSUMPTION

Description

INFOID:0000000000912090

CHART 15:EXCESSIVE CONSUMPTION

Diagnosis Procedure

INFOID:0000000000912091

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1262, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 9.

9.CHECK INTERNAL FUEL TRANSFER PUMP

cardiagn.com

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 11.

11. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 12.

12. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 13.

13. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 14.

14. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

ENGINE KNOCK

Description

INFOID:0000000000912093

CHART 16: ENGINE KNOCK

Diagnosis Procedure

INFOID:0000000000912094

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

cardiagn.com

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 11.

11. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 12.

12. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 13.

13. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

ENGINE OVERHEATING

Description

INFOID:0000000000912096

CHART 17: ENGINE OVERHEATING

Diagnosis Procedure

INFOID:0000000000912097

1.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-48, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING FAN OPERATION

Check cooling fan operation. Refer to EC-1422, "Component Function Check".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

cardiagn.com

ENGINE SMOKES WHEN STARTED

Description

INFOID:0000000000912099

CHART 18: ENGINE SMOKES WHEN STARTED

Diagnosis Procedure

INFOID:0000000000912100

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL PUMP TEMPERATURE SENSOR

Check fuel pump temperature sensor. Refer to EC-1348, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-48, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 7.

7.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 8.

8.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> **INSPECTION END**

cardiagn.com

ENGINE EMITS BLUE SMOKE

Description

INFOID:0000000000912102

CHART 19: ENGINE EMITS BLUE SMOKE

Diagnosis Procedure

INFOID:0000000000912103

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 9.
No >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

cardiagn.com

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 13.

13. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 14.

14. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 15.

15. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> GO TO 16.

16. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace harness or connector.

17. CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

cardiagn.com

ENGINE SMOKES WHEN REVVED

Description

INFOID:0000000000912111

CHART 20: ENGINE SMOKES WHEN REVVED

Diagnosis Procedure

INFOID:0000000000912112

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1344, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

cardiagn.com

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Description

INFOID:0000000000912105

CHART 21: ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Diagnosis Procedure

INFOID:0000000000912106

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-48, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK GLOW SYSTEM

Check the glow system. Refer to EC-1370, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace glow system. Refer to EM-275, "Removal and Installation"

4.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 5.

5.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

EMISSION CONTROL NOT SATISFACTORY

Description

INFOID:0000000000912108

CHART 22: EMISSION CONTROL NOT SATISFACTORY

Diagnosis Procedure

INFOID:0000000000912109

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1317, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-265, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1345, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1337, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1410, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1415, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1263, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

cardiagn.com

9.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1264, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1267, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1271, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 12.

12.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1272, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

cardiagn.com

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001102479

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

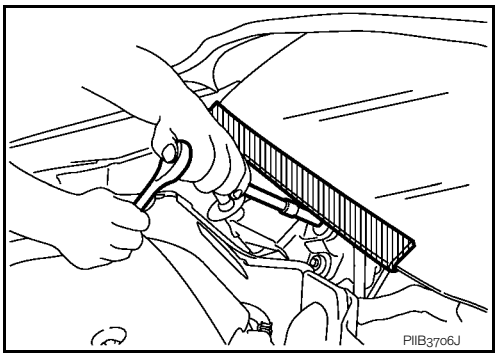
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRC section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001102480

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnostic (OBD) System of Engine

INFOID:0000000000913967

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

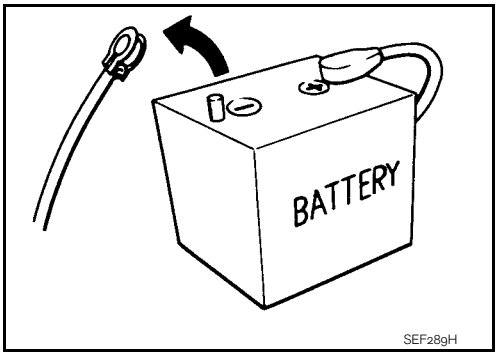
- **Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-105, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

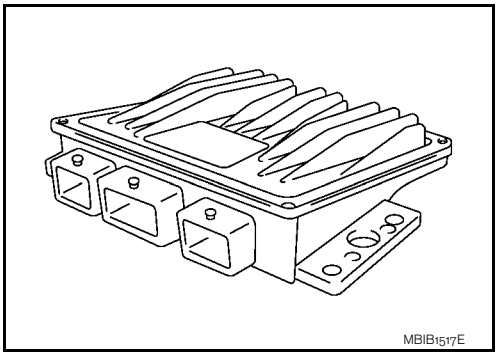
INFOID:0000000000913950

cardiagn.com

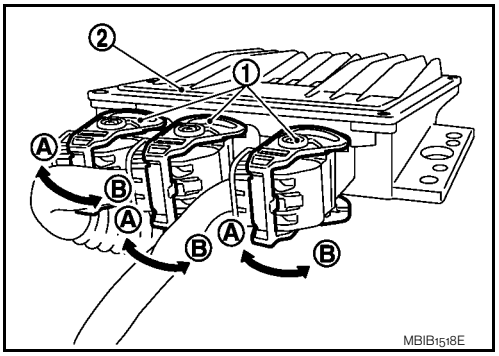
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF, wait 3 minutes and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**



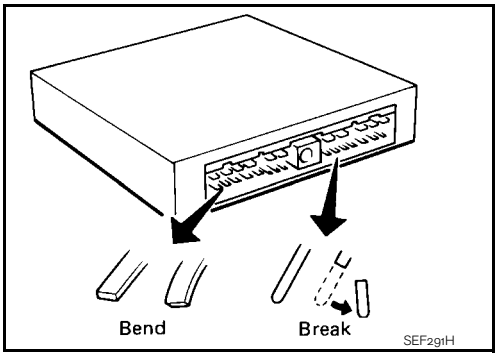
- **Do not disassemble ECM.**



- **When connecting ECM harness connector, fasten (A) it securely with levers (1) as far as they will go as shown in the figure.**
- **ECM (2)**
- **Loosen (B)**

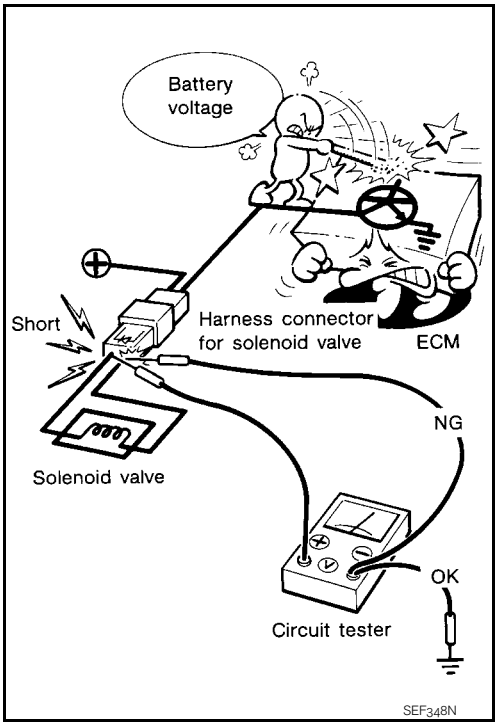


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**

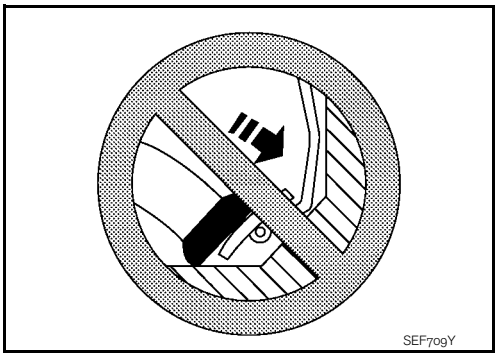


cardiagn.com

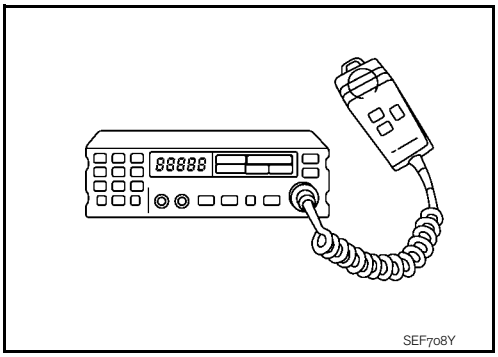
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.



- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**

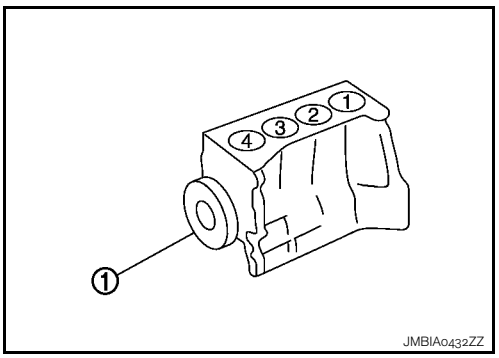


- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



cardiagn.com

- **Cylinder NO.1 is at the flywheel end.**
  -1: Crankshaft pulley



ENGINE RUNNING

- **No work should be carried out on the hydraulic system while engine is running.**
- **Remember that fuel pressure values in hydraulic circuit can reach up to 1,600 bar.**
- **Keep hands or face (particularly eyes) out of any high pressure leak.**
- **Recall that fuel is dangerous for health.**

FUEL RAIL PRESSURE SENSOR

- **Under warranty, do not remove the fuel rail pressure sensor from the rail.**
- **Do not try to measure the resistance of the fuel rail pressure sensor. This test is destructive for the internal components.**

FUEL INJECTOR

- **Fuel injectors are driven by over 100V.**
- **FUEL injector electronics are polarised. In case of intervention on wiring harness, do not invertwires. It is destructive for the piezo components.**
- **Do not drive the fuel injectors if their body is not connected to the battery ground (risk ofelectro-static discharge). For instance, fuel injector body have to be in contact with cylinder.**
- **Piezo fuel injector connector must not be unplugged while engine is running. Risk of majordamage to the engine (fuel injector could stay opened).**

Cleanliness

INFOID:0000000001077696

Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated withcontamination are:

- damage to or destruction of the high pressure injection system,
- components jamming,
- components losing seal integrity.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) should have entered the system during dismantling.

The cleanliness principle must be applied from the filter to the fuel injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,
- fibres:
  - from cardboard,
  - from brushes,
  - from paper,
  - from clothing,
  - from cloths,
- foreign bodies such as hair,
- ambient air
- etc.

NOTE:

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunction.

INSTRUCTIONS TO BE FOLLOWED BEFORE CARRYING OUT ANY WORK

cardiagn.com

NOTE:
Before any work is carried out on the high pressure injection system, protect:
- the accessories and timing belts,
- the electrical accessories, (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any diesel from running onto the clutch friction plate.

- Check that you have plugs for the unions to be opened (set of plugs available from the Parts Department). The plugs are single-use only. After use, they must be discarded (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be discarded.
- Check that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags are to be used once only, and discarded after use.
- Use lint-free cleaning cloths. Using normal cloth or paper is prohibited. They are not lint-free and could contaminate the fuel circuit. Each cloth should only be used once.
- Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into an uncontaminated container.
- For each operation, use a clean brush in good condition (the brush must not shed its bristles).
- Use a brush and cleaning agent to clean the unions to be opened.
- Blast compressed air over the cleaned parts (tools, workbench, the parts, unions and injection system zones). Check that no bristles remain.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves cover them with latex gloves to prevent contamination.

INSTRUCTIONS TO BE FOLLOWED WHEN CARRYING OUT ANY WORK
- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The plugs must not be reused under any circumstances.
- Seal the pouch shut, even if it has to be opened shortly afterwards. Ambient air carries contamination.
- All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been plugged.
- Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow contamination to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

cardiagn.com

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001102283

Condition	Specification
No load* (in Neutral position)	800 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, glow plug, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

cardiagn.com

cardiagn.com

cardiagn.com

cardiagn.com

cardiagn.com