SECTION EC
ENGINE CONTROL SYSTEM

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Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to “IDENTIFICATION PLATE”, GI-40.

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

×: Applicable –: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
APP SEN 1/CIRC	P0227	0227	1	×	EC-328
APP SEN 1/CIRC	P0228	0228	1	×	EC-328
APP SEN 2/CIRC	P1227	1227	1	×	EC-494
APP SEN 2/CIRC	P1228	1228	1	×	EC-494
APP SENSOR	P0226	0226	1	×	EC-322
BRAKE SW/CIRCUIT	P1805	1805	2	–	EC-509
CAN COMM CIRCUIT	U1001	1001*5	2	–	EC-145
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-343
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-349
CTP LEARNING	P1225	1225	2	–	EC-490
CTP LEARNING	P1226	1226	2	–	EC-492
CYL 1 MISFIRE	P0301	0301	2	×	EC-334
CYL 2 MISFIRE	P0302	0302	2	×	EC-334
CYL 3 MISFIRE	P0303	0303	2	×	EC-334
CYL 4 MISFIRE	P0304	0304	2	×	EC-334
ECM	P0605	0605	1 or 2	× or –	EC-377
ECM BACK UP/CIRC	P1065	1065	2	×	EC-380
ECT SEN/CIRCUIT	P0117	0117	1	×	EC-188
ECT SEN/CIRCUIT	P0118	0118	1	×	EC-188
ENG OVER TEMP	P1217	1217	1	×	EC-473
ETC ACTR	P1121	1121	1 or 2	×	EC-389
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-391
ETC MOT	P1128	1128	1	×	EC-404
ETC MOT PWR	P1124	1124	1	×	EC-398
ETC MOT PWR	P1126	1126	1	×	EC-398
FUEL SYS-LEAN-B1	P0171	0171	2	×	EC-281
FUEL SYS-RICH-B1	P0172	0172	2	×	EC-296
HO2S1 (B1)	P0132	0132	2	×	EC-193
HO2S1 (B1)	P0133	0133	2	×	EC-208
HO2S1 (B1)	P0134	0134	2	×	EC-230
HO2S1 (B1)	P1143	1143	2	×	EC-409
HO2S1 (B1)	P1144	1144	2	×	EC-421
HO2S1 HTR (B1)	P0031	0031	2	×	EC-151
HO2S1 HTR (B1)	P0032	0032	2	×	EC-151

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
HO2S2 (B1)	P0138	0138	2	×	EC-247
HO2S2 (B1)	P0139	0139	2	×	EC-262
HO2S2 (B1)	P1146	1146	2	×	EC-433
HO2S2 (B1)	P1147	1147	2	×	EC-452
HO2S2 HTR (B1)	P0037	0037	2	×	EC-165
HO2S2 HTR (B1)	P0038	0038	2	×	EC-165
IAT SEN/CIRCUIT	P0112	0112	2	×	EC-184
IAT SEN/CIRCUIT	P0113	0113	2	×	EC-184
INT/V TIM CONT-B1	P0011	0011	2	–	EC-148
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-384
KNOCK SEN/CIRC-B1	P0327	0327	2	–	EC-339
KNOCK SEN/CIRC-B1	P0328	0328	2	–	EC-339
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-178
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-178
MULTI CYL MISFIRE	P0300	0300	2	×	EC-334
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	–	EC-70
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	–	Flashing*4	EC-71
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	–	–	**—**
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-504
PURG VOLUME CONT/V	P0444	0444	2	×	EC-365
PW ST P SEN/CIRC	P0550	0550	2	–	EC-373
SENSOR POWER/CIRC	P1229	1229	1	×	EC-500
TCS C/U FUNCTN	P1211	1211	2	–	EC-471
TCC SOLENOID/CIRC	P1212	1212	2	–	EC-472
TP SEN 1/CIRC	P0222	0222	1	×	EC-316
TP SEN 1/CIRC	P0223	0223	1	×	EC-316
TP SEN 2/CIRC	P1223	1223	1	×	EC-484
TP SEN 2/CIRC	P1224	1224	1	×	EC-484
TP SENSOR	P0221	0221	1	×	EC-310
TW CATALYST SYS-B1	P0420	0420	2	×	EC-355
VEH SPEED SEN/CIRC	P0500	0500	2	×	EC-371

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.

A/T MODELS

×: Applicable –: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
A/T 1ST GR FNCTN	P0731	0731	2	×	AT-135
A/T 2ND GR FNCTN	P0732	0732	2	×	AT-141
A/T 3RD GR FNCTN	P0733	0733	2	×	AT-147
A/T 4TH GR FNCTN	P0734	0734	2	×	AT-153
APP SEN 1/CIRC	P0227	0227	1	×	EC-328
APP SEN 1/CIRC	P0228	0228	1	×	EC-328
APP SEN 2/CIRC	P1227	1227	1	×	EC-494
APP SEN 2/CIRC	P1228	1228	1	×	EC-494
APP SENSOR	P0226	0226	1	×	EC-322
ATF TEMP SEN/CIRC	P0710	0710	2	×	AT-119
BRAKE SW/CIRCUIT	P1805	1805	2	–	EC-509
CAN COMM CIRCUIT	U1000	1000*5	1	×	EC-145
CAN COMM CIRCUIT	U1001	1001*5	2	–	EC-145
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-343
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-349
CTP LEARNING	P1225	1225	2	–	EC-490
CTP LEARNING	P1226	1226	2	–	EC-492
CYL 1 MISFIRE	P0301	0301	2	×	EC-334
CYL 2 MISFIRE	P0302	0302	2	×	EC-334
CYL 3 MISFIRE	P0303	0303	2	×	EC-334
CYL 4 MISFIRE	P0304	0304	2	×	EC-334
ECM	P0605	0605	1 or 2	× or –	EC-377
ECM BACK UP/CIRC	P1065	1065	2	×	EC-380
ECT SEN/CIRCUIT	P0117	0117	1	×	EC-188
ECT SEN/CIRCUIT	P0118	0118	1	×	EC-188
ENG OVER TEMP	P1217	1217	1	×	EC-473
ENGINE SPEED SIG	P0725	0725	2	×	AT-131
ETC ACTR	P1121	1121	1 or 2	×	EC-389
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-391
ETC MOT	P1128	1128	1	×	EC-404
ETC MOT PWR	P1124	1124	1	×	EC-398
ETC MOT PWR	P1126	1126	1	×	EC-398
FUEL SYS-LEAN-B1	P0171	0171	2	×	EC-288
FUEL SYS-LEAN-B2	P0174	0174	2	×	EC-288
FUEL SYS-RICH-B1	P0172	0172	2	×	EC-302
FUEL SYS-RICH-B2	P0175	0175	2	×	EC-302
HO2S1 (B1)	P0132	0132	2	×	EC-199
HO2S1 (B1)	P0133	0133	2	×	EC-218
HO2S1 (B1)	P0134	0134	2	×	EC-237
HO2S1 (B1)	P1143	1143	2	×	EC-415
HO2S1 (B1)	P1144	1144	2	×	EC-427

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
HO2S1 (B2)	P0152	0152	2	×	EC-199
HO2S1 (B2)	P0153	0153	2	×	EC-218
HO2S1 (B2)	P0154	0154	2	×	EC-237
HO2S1 (B2)	P1163	1163	2	×	EC-415
HO2S1 (B2)	P1164	1164	2	×	EC-427
HO2S1 HTR (B1)	P0031	0031	2	×	EC-157
HO2S1 HTR (B1)	P0032	0032	2	×	EC-157
HO2S1 HTR (B2)	P0051	0051	2	×	EC-157
HO2S1 HTR (B2)	P0052	0052	2	×	EC-157
HO2S2 (B1)	P0138	0138	2	×	EC-253
HO2S2 (B1)	P0139	0139	2	×	EC-270
HO2S2 (B1)	P1146	1146	2	×	EC-441
HO2S2 (B1)	P1147	1147	2	×	EC-460
HO2S2 (B2)	P0158	0158	2	×	EC-253
HO2S2 (B2)	P0159	0159	2	×	EC-270
HO2S2 (B2)	P1166	1166	2	×	EC-441
HO2S2 (B2)	P1167	1167	2	×	EC-460
HO2S2 HTR (B1)	P0037	0037	2	×	EC-170
HO2S2 HTR (B1)	P0038	0038	2	×	EC-170
HO2S2 HTR (B2)	P0057	0057	2	×	EC-170
HO2S2 HTR (B2)	P0058	0058	2	×	EC-170
IAT SEN/CIRCUIT	P0112	0112	2	×	EC-184
IAT SEN/CIRCUIT	P0113	0113	2	×	EC-184
INT/V TIM CONT-B1	P0011	0011	2	–	EC-148
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-384
KNOCK SEN/CIRC-B1	P0327	0327	2	–	EC-339
KNOCK SEN/CIRC-B1	P0328	0328	2	–	EC-339
L/PRESS SOL/CIRC	P0745	0745	2	×	AT-166
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-178
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-178
MULTI CYL MISFIRE	P0300	0300	2	×	EC-334
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	–	EC-70
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	–	Flashing*4	EC-71
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	–	–	**—**
O/R CLTCH SOL/CIRC	P1760	1760	2	×	AT-189
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-504
PNP SW/CIRC	P0705	0705	2	×	AT-113
PURG VOLUME CONT/V	P0444	0444	2	×	EC-365
PW ST P SEN/CIRC	P0550	0550	2	–	EC-373
SENSOR POWER/CIRC	P1229	1229	1	×	EC-500

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
SFT SOL A/CIRC	P0750	0750	1	×	AT-173
SFT SOL B/CIRC	P0755	0755	1	×	AT-178
TCS C/U FUNCTN	P1211	1211	2	–	EC-471
TCS/CIRC	P1212	1212	2	–	EC-472
TCC SOLENOID/CIRC	P0740	0740	2	×	AT-161
TP SEN 1/CIRC	P0222	0222	1	×	EC-316
TP SEN 1/CIRC	P0223	0223	1	×	EC-316
TP SEN 2/CIRC	P1223	1223	1	×	EC-484
TP SEN 2/CIRC	P1224	1224	1	×	EC-484
TP SENSOR	P0221	0221	1	×	EC-310
TPV SEN/CIRC A/T	P1705	1705	1	×	AT-183
TW CATALYST SYS-B1	P0420	0420	2	×	EC-360
TW CATALYST SYS-B2	P0430	0430	2	×	EC-360
VEH SPD SEN/CIR AT*6	P0720	0720	2	×	AT-125
VEH SPEED SEN/CIRC*6	P0500	0500	2	×	EC-371

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: The trouble shooting for these DTCs needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

NOTE:
Regarding V10 models with A/T, “B1” indicates bank 1 (cylinders number 1 and 4), “B2” indicates bank 2 (cylinders number 2 and 3).

DTC No. Index

EBS00QG4

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to “IDENTIFICATION PLATE”, GI-40.

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

×: Applicable –: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	–	Flashing*4	EC-71
U1001	1001*5	CAN COMM CIRCUIT	2	–	EC-145
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	–	–	—
P0011	0011	INT/V TIM CONT-B1	2	–	EC-148
P0031	0031	HO2S1 HTR (B1)	2	×	EC-151
P0032	0032	HO2S1 HTR (B1)	2	×	EC-151
P0037	0037	HO2S2 HTR (B1)	2	×	EC-165
P0038	0038	HO2S2 HTR (B1)	2	×	EC-165

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-178
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-178
P0112	0112	IAT SEN/CIRCUIT	2	×	EC-184
P0113	0113	IAT SEN/CIRCUIT	2	×	EC-184
P0117	0117	ECT SEN/CIRCUIT	1	×	EC-188
P0118	0118	ECT SEN/CIRCUIT	1	×	EC-188
P0132	0132	HO2S1 (B1)	2	×	EC-193
P0133	0133	HO2S1 (B1)	2	×	EC-208
P0134	0134	HO2S1 (B1)	2	×	EC-230
P0138	0138	HO2S2 (B1)	2	×	EC-247
P0139	0139	HO2S2 (B1)	2	×	EC-262
P0171	0171	FUEL SYS-LEAN-B1	2	×	EC-281
P0172	0172	FUEL SYS-RICH-B1	2	×	EC-296
P0221	0221	TP SENSOR	1	×	EC-310
P0222	0222	TP SEN 1/CIRC	1	×	EC-316
P0223	0223	TP SEN 1/CIRC	1	×	EC-316
P0226	0226	APP SENSOR	1	×	EC-322
P0227	0227	APP SEN 1/CIRC	1	×	EC-328
P0228	0228	APP SEN 1/CIRC	1	×	EC-328
P0300	0300	MULTI CYL MISFIRE	2	×	EC-334
P0301	0301	CYL 1 MISFIRE	2	×	EC-334
P0302	0302	CYL 2 MISFIRE	2	×	EC-334
P0303	0303	CYL 3 MISFIRE	2	×	EC-334
P0304	0304	CYL 4 MISFIRE	2	×	EC-334
P0327	0327	KNOCK SEN/CIRC-B1	2	–	EC-339
P0328	0328	KNOCK SEN/CIRC-B1	2	–	EC-339
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-343
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-349
P0420	0420	TW CATALYST SYS-B1	2	×	EC-355
P0444	0444	PURG VOLUME CONT/V	2	×	EC-365
P0500	0500	VEH SPEED SEN/CIRC	2	×	EC-371
P0550	0550	PW ST P SEN/CIRC	2	–	EC-373
P0605	0605	ECM	1 or 2	× or –	EC-377
P1065	1065	ECM BACK UP/CIRC	2	×	EC-380
P1111	1111	INT/V TIM V/CIR-B1	2	×	EC-384
P1121	1121	ETC ACTR	1 or 2	×	EC-389
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-391
P1124	1124	ETC MOT PWR	1	×	EC-398
P1126	1126	ETC MOT PWR	1	×	EC-398
P1128	1128	ETC MOT	1	×	EC-404
P1143	1143	HO2S1 (B1)	2	×	EC-409
P1144	1144	HO2S1 (B1)	2	×	EC-421

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1146	1146	HO2S2 (B1)	2	×	EC-433
P1147	1147	HO2S2 (B1)	2	×	EC-452
P1211	1211	TCS C/U FUNCTN	2	–	EC-471
P1212	1212	TCS/CIRC	2	–	EC-472
P1217	1217	ENG OVER TEMP	1	×	EC-473
P1223	1223	TP SEN 2/CIRC	1	×	EC-484
P1224	1224	TP SEN 2/CIRC	1	×	EC-484
P1225	1225	CTP LEARNING	2	–	EC-490
P1226	1226	CTP LEARNING	2	–	EC-492
P1227	1227	APP SEN 2/CIRC	1	×	EC-494
P1228	1228	APP SEN 2/CIRC	1	×	EC-494
P1229	1229	SENSOR POWER/CIRC	1	×	EC-500
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	–	EC-70
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-504
P1805	1805	BRAKE SW/CIRCUIT	2	–	EC-509

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: The trouble shooting for this DTC needs CONSULT-II.

A/T MODELS

×: Applicable –: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	–	Flashing*4	EC-71
U1000	1000*5	CAN COMM CIRCUIT	1	×	EC-145
U1001	1001*5	CAN COMM CIRCUIT	2	–	EC-145
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	–	–	—
P0011	0011	INT/V TIM CONT-B1	2	–	EC-148
P0031	0031	HO2S1 HTR (B1)	2	×	EC-157
P0032	0032	HO2S1 HTR (B1)	2	×	EC-157
P0037	0037	HO2S2 HTR (B1)	2	×	EC-170
P0038	0038	HO2S2 HTR (B1)	2	×	EC-170
P0051	0051	HO2S1 HTR (B2)	2	×	EC-157
P0052	0052	HO2S1 HTR (B2)	2	×	EC-157
P0057	0057	HO2S2 HTR (B2)	2	×	EC-170
P0058	0058	HO2S2 HTR (B2)	2	×	EC-170
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-178
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-178
P0112	0112	IAT SEN/CIRCUIT	2	×	EC-184

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0113	0113	IAT SEN/CIRCUIT	2	×	EC-184
P0117	0117	ECT SEN/CIRCUIT	1	×	EC-188
P0118	0118	ECT SEN/CIRCUIT	1	×	EC-188
P0132	0132	HO2S1 (B1)	2	×	EC-199
P0133	0133	HO2S1 (B1)	2	×	EC-218
P0134	0134	HO2S1 (B1)	2	×	EC-237
P0138	0138	HO2S2 (B1)	2	×	EC-253
P0139	0139	HO2S2 (B1)	2	×	EC-270
P0152	0152	HO2S1 (B2)	2	×	EC-199
P0153	0153	HO2S1 (B2)	2	×	EC-218
P0154	0154	HO2S1 (B2)	2	×	EC-237
P0158	0158	HO2S2 (B2)	2	×	EC-253
P0159	0159	HO2S2 (B2)	2	×	EC-270
P0171	0171	FUEL SYS-LEAN-B1	2	×	EC-288
P0172	0172	FUEL SYS-RICH-B1	2	×	EC-302
P0174	0174	FUEL SYS-LEAN-B2	2	×	EC-288
P0175	0175	FUEL SYS-RICH-B2	2	×	EC-302
P0221	0221	TP SENSOR	1	×	EC-310
P0222	0222	TP SEN 1/CIRC	1	×	EC-316
P0223	0223	TP SEN 1/CIRC	1	×	EC-316
P0226	0226	APP SENSOR	1	×	EC-322
P0227	0227	APP SEN 1/CIRC	1	×	EC-328
P0228	0228	APP SEN 1/CIRC	1	×	EC-328
P0300	0300	MULTI CYL MISFIRE	2	×	EC-334
P0301	0301	CYL 1 MISFIRE	2	×	EC-334
P0302	0302	CYL 2 MISFIRE	2	×	EC-334
P0303	0303	CYL 3 MISFIRE	2	×	EC-334
P0304	0304	CYL 4 MISFIRE	2	×	EC-334
P0327	0327	KNOCK SEN/CIRC-B1	2	–	EC-339
P0328	0328	KNOCK SEN/CIRC-B1	2	–	EC-339
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-343
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-349
P0420	0420	TW CATALYST SYS-B1	2	×	EC-360
P0430	0430	TW CATALYST SYS-B2	2	×	EC-360
P0444	0444	PURG VOLUME CONT/V	2	×	EC-365
P0500	0500	VEH SPEED SEN/CIRC*6	2	×	EC-371
P0550	0550	PW ST P SEN/CIRC	2	–	EC-373
P0605	0605	ECM	1 or 2	× or –	EC-377
P0705	0705	PNP SW/CIRC	2	×	AT-113
P0710	0710	ATF TEMP SEN/CIRC	2	×	AT-119
P0720	0720	VEH SPD SEN/CIRC AT*6	2	×	AT-125
P0725	0725	ENGINE SPEED SIG	2	×	AT-131

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0731	0731	A/T 1ST GR FNCTN	2	×	AT-135
P0732	0732	A/T 2ND GR FNCTN	2	×	AT-141
P0733	0733	A/T 3RD GR FNCTN	2	×	AT-147
P0734	0734	A/T 4TH GR FNCTN	2	×	AT-153
P0740	0740	TCC SOLENOID/CIRC	2	×	AT-161
P0745	0745	L/PRESS SOL/CIRC	2	×	AT-166
P0750	0750	SFT SOL A/CIRC	1	×	AT-173
P0755	0755	SFT SOL B/CIRC	1	×	AT-178
P1065	1065	ECM BACK UP/CIRC	2	×	EC-380
P1111	1111	INT/V TIM V/CIR-B1	2	×	EC-384
P1121	1121	ETC ACTR	1 or 2	×	EC-389
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-391
P1124	1124	ETC MOT PWR	1	×	EC-398
P1126	1126	ETC MOT PWR	1	×	EC-398
P1128	1128	ETC MOT	1	×	EC-404
P1143	1143	HO2S1 (B1)	2	×	EC-415
P1144	1144	HO2S1 (B1)	2	×	EC-427
P1146	1146	HO2S2 (B1)	2	×	EC-441
P1147	1147	HO2S2 (B1)	2	×	EC-460
P1163	1163	HO2S1 (B2)	2	×	EC-415
P1164	1164	HO2S1 (B2)	2	×	EC-427
P1166	1166	HO2S2 (B2)	2	×	EC-441
P1167	1167	HO2S2 (B2)	2	×	EC-460
P1211	1211	TCS C/U FUNCTN	2	–	EC-471
P1212	1212	TCS/CIRC	2	–	EC-472
P1217	1217	ENG OVER TEMP	1	×	EC-473
P1223	1223	TP SEN 2/CIRC	1	×	EC-484
P1224	1224	TP SEN 2/CIRC	1	×	EC-484
P1225	1225	CTP LEARNING	2	–	EC-490
P1226	1226	CTP LEARNING	2	–	EC-492
P1227	1227	APP SEN 2/CIRC	1	×	EC-494
P1228	1228	APP SEN 2/CIRC	1	×	EC-494
P1229	1229	SENSOR POWER/CIRC	1	×	EC-500
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	–	EC-70
P1705	1705	TPV SEN/CIRC A/T	1	×	AT-183
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-504
P1760	1760	O/R CLTCH SOL/CIRC	2	×	AT-189
P1805	1805	BRAKE SW/CIRCUIT	2	–	EC-509

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: The trouble shooting for these DTCs need CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur at the same time, the MI illuminates.

NOTE:
Regarding V10 models with A/T, “B1” indicates bank 1 (cylinders number 1 and 4), “B2” indicates bank 2 (cylinders number 2 and 3).

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS00QG5

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. Information necessary to service the system safely is included in the SRS 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 SRS 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.**

On Board Diagnostic (OBD) System of Engine and A/T

EBS00QG6

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.

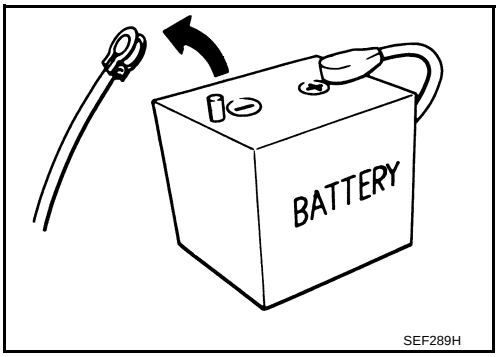
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground 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 “HARNESS CONNECTOR”, EL-7.**
- **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 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.**

Precaution

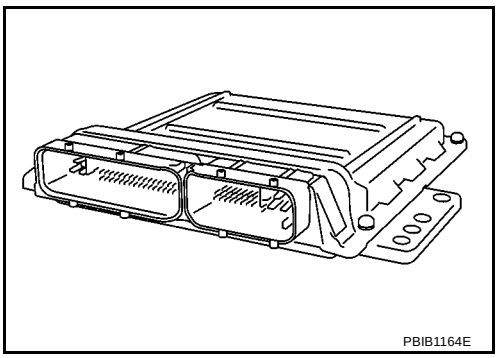
EBS00QG7

- **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 battery ground 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.**

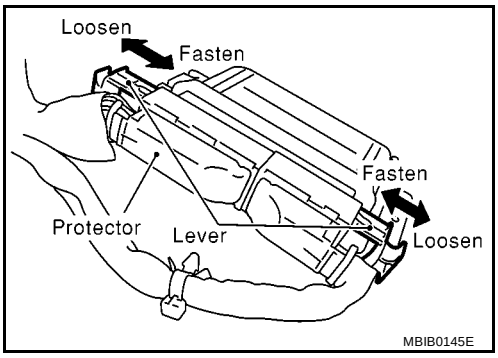


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

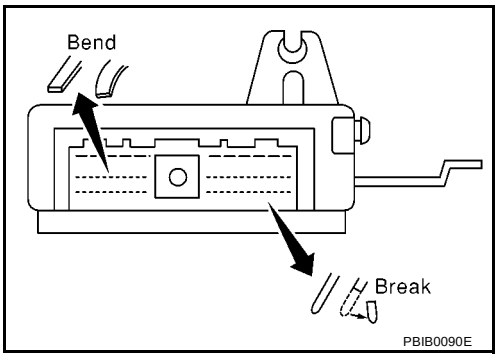

PBIB1164E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown at right.**



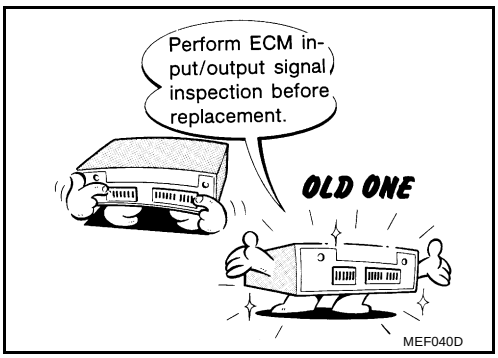
MBIB0145E

- **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.**



PBIB0090E

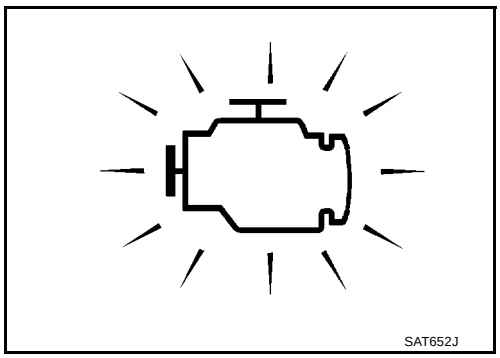
- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-102, "ECM Terminals and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**



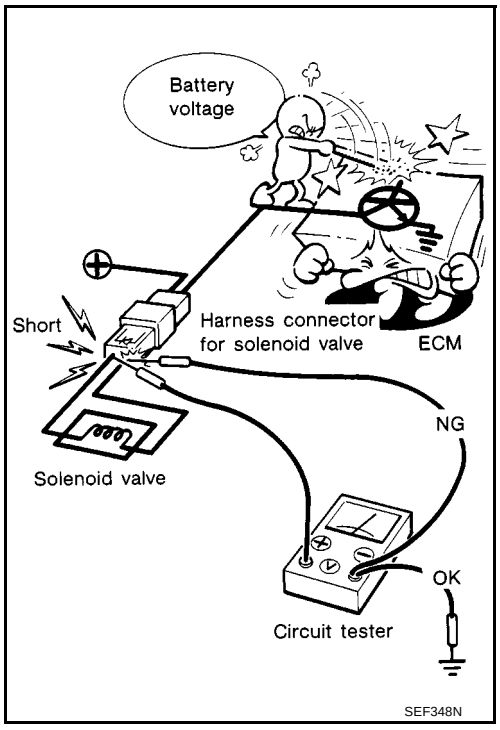
MEF040D

- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

- **After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".**
  The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.

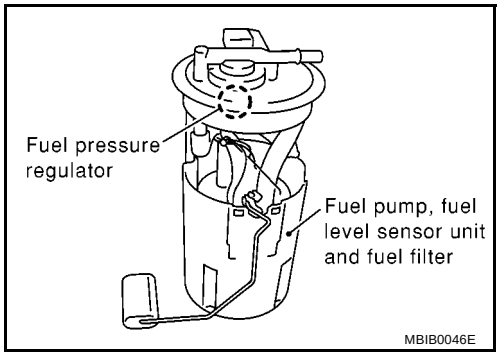

SAT652J

- **When measuring ECM signals with a circuit tester, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.**
- **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.**



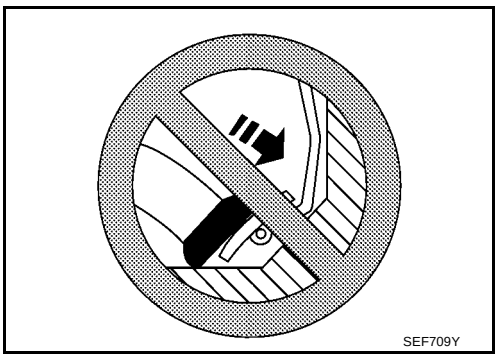
SEF348N

- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

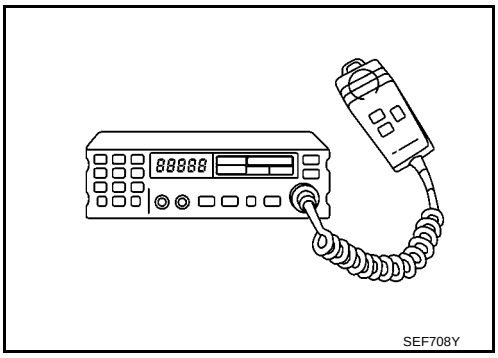


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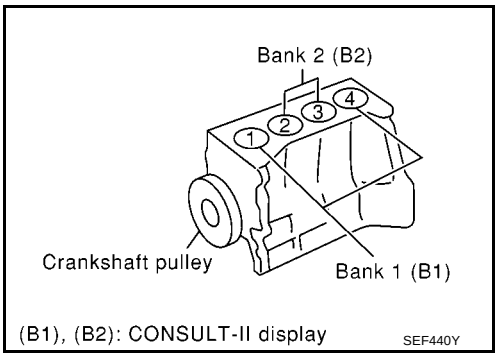
- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **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 radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**


SEF708Y

- **Regarding V10 models with A/T, "B1" indicates bank 1 (cylinders number 1 and 4), "B2" indicates bank 2 (cylinders number 2 and 3).**



SEF440Y

Wiring Diagrams and Trouble Diagnosis

EBS00QG8

When you read wiring diagrams, refer to the following:

- "HOW TO READ WIRING DIAGRAMS", GI-11
- "POWER SUPPLY ROUTING", EL-11 for power distribution circuit

When you perform trouble diagnosis, refer to the following:

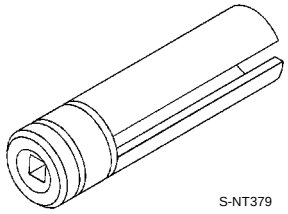
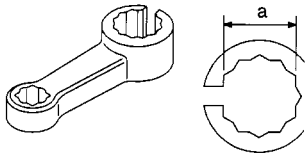
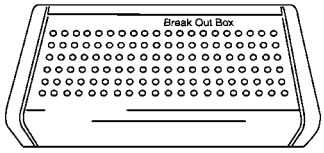
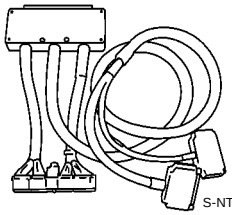
- "How to Follow Test Groups in Trouble Diagnoses", GI-32
- "HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT", GI-21

PREPARATION

PFP:00002

Special Service Tools

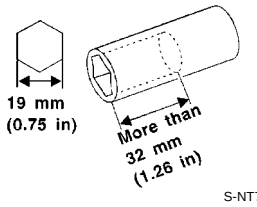
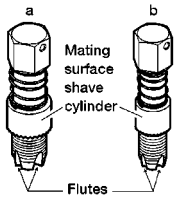
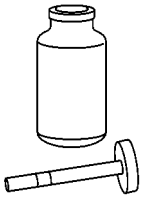
EBS00QG9

Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors **a: 22 mm (0.87 in)**
KV109E0010 Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

EBS00QGA

Tool name	Description	
Quick connector release	 PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter	 S-NT653	Checking fuel tank vacuum relief valve opening pressure

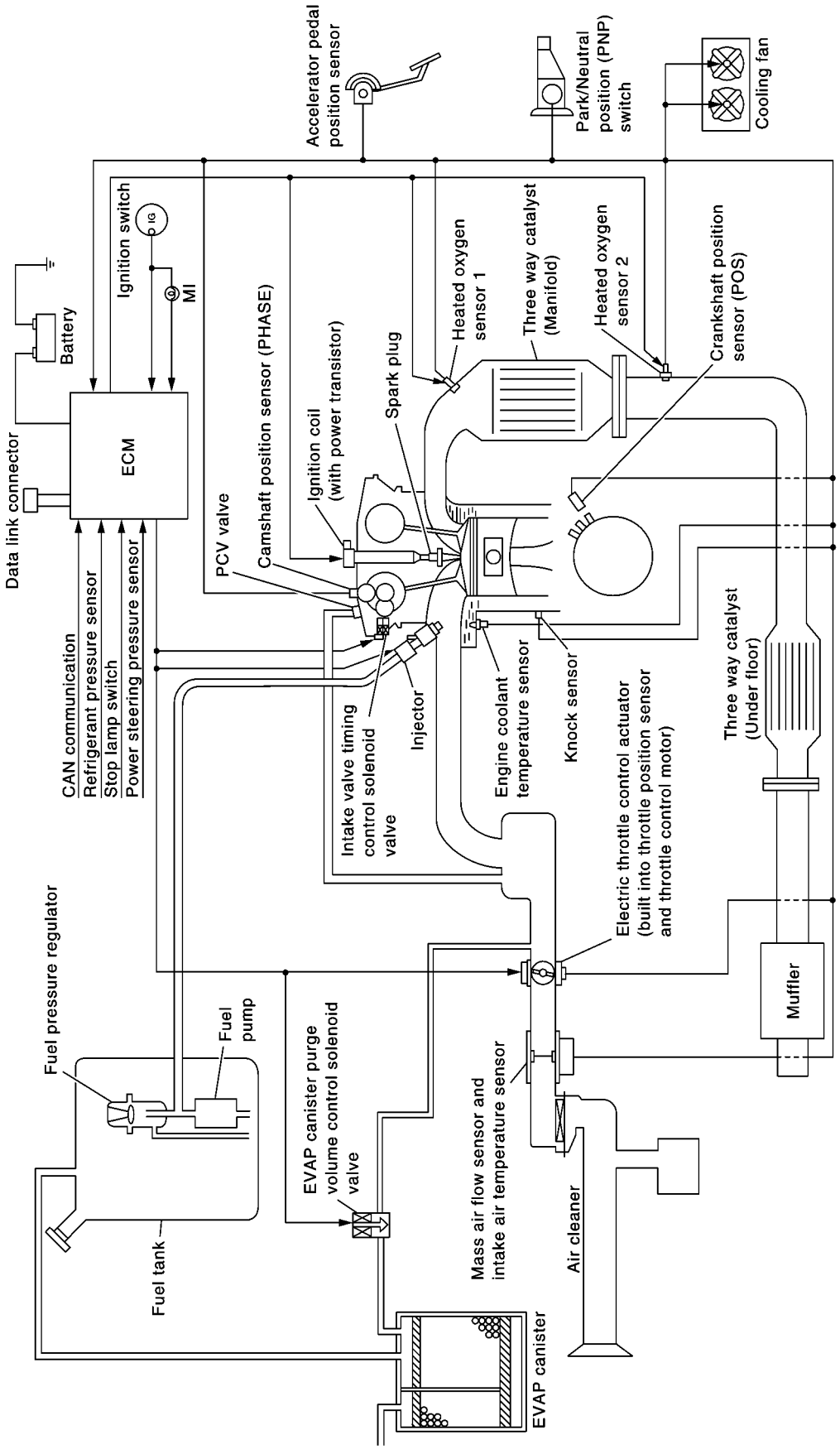
Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 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 ie: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram - M/T Models

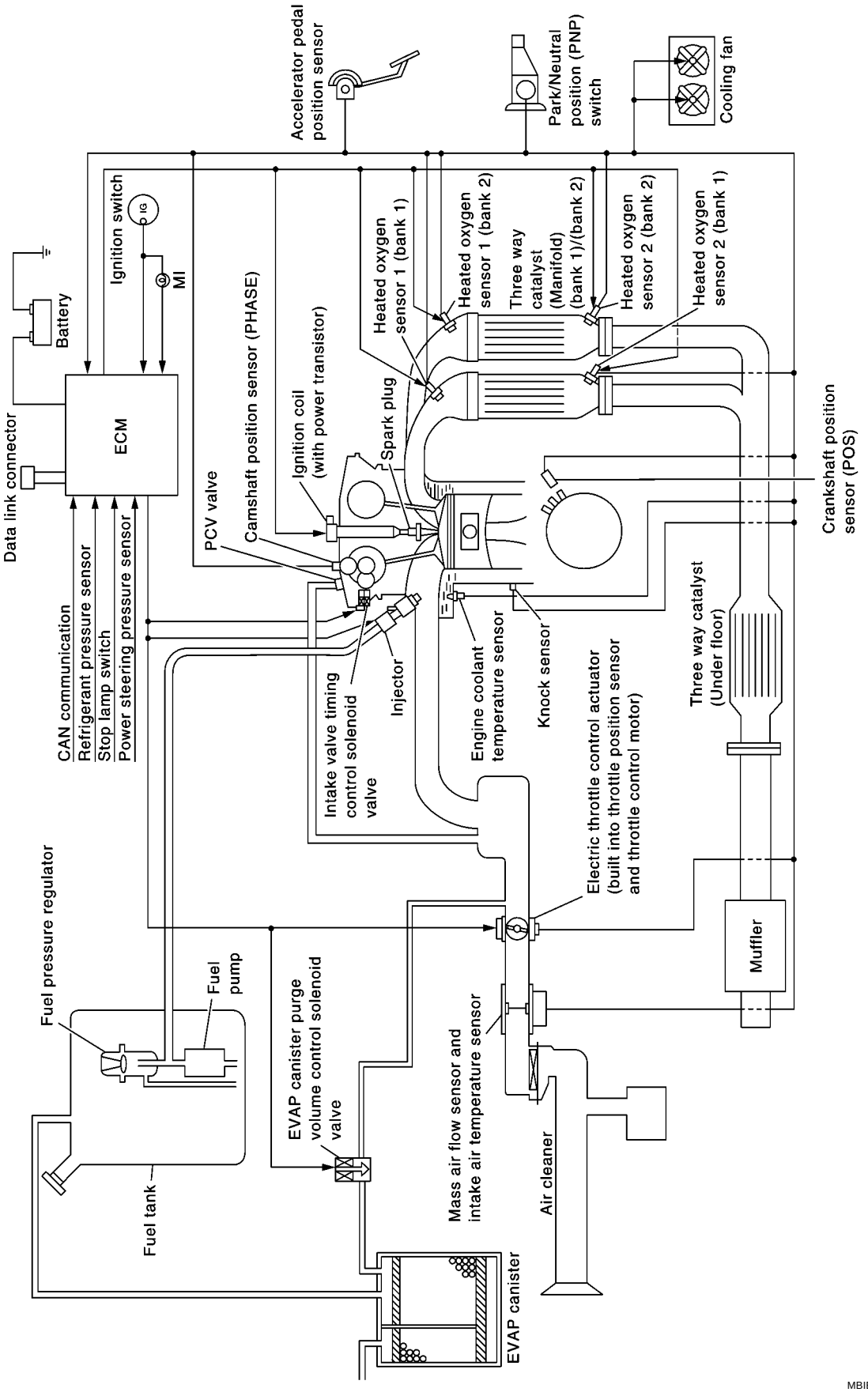
EBS00QGB



MBIB0239E

System Diagram - A/T Models

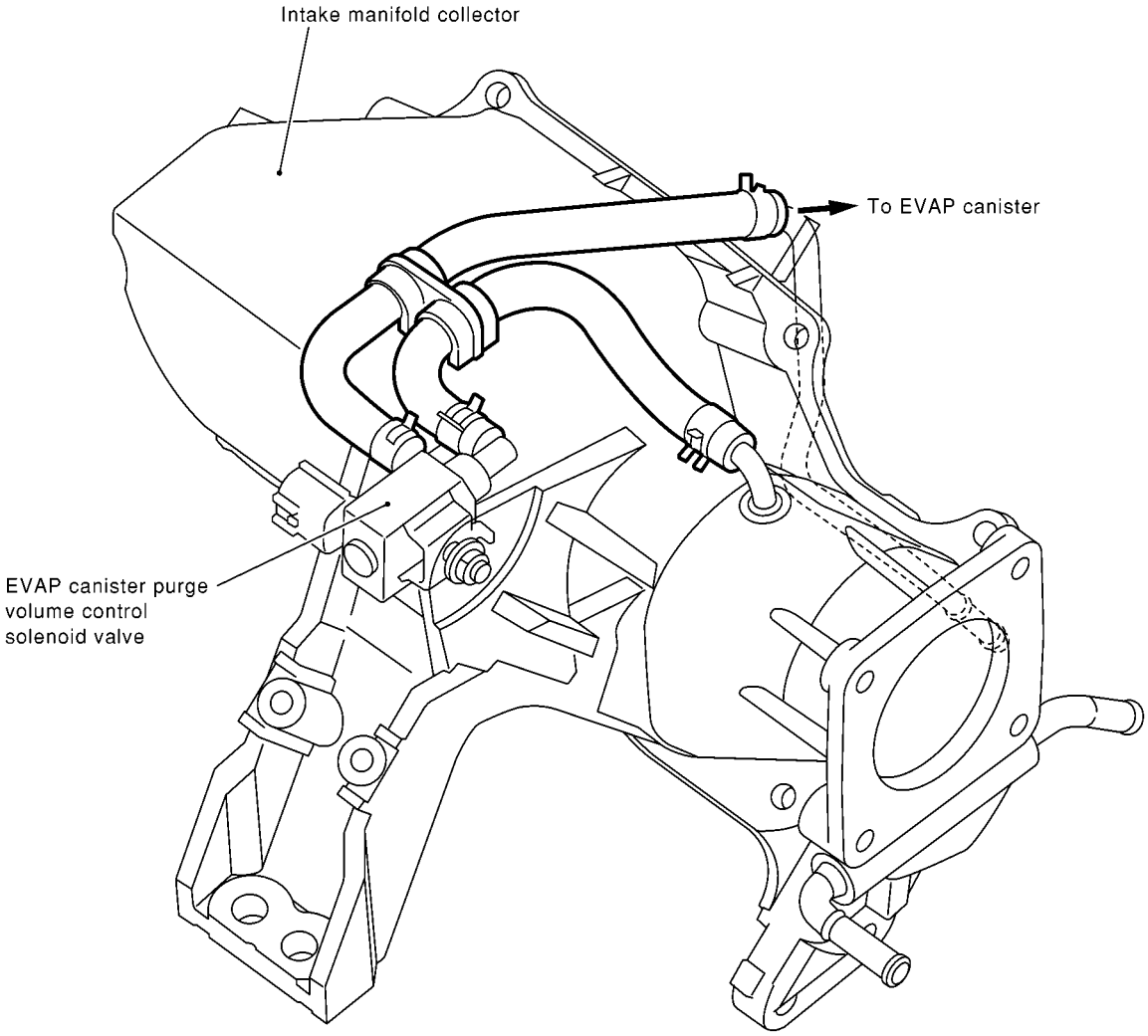
EBS00QGC



MBIB0240E

Vacuum Hose Drawing

EBS00QGD



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

MBIB0013E

Refer to EC-36, "System Diagram - M/T Models" or EC-37, "System Diagram - A/T Models" for Vacuum Control System.

System Chart

EBS00QGE

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Power steering pressure sensor ● Ignition switch ● Stop lamp switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Heated oxygen sensor 2*1 ● TCM (Transmission control module)*2 ● Air conditioner switch*2 ● Vehicle speed signal*2 ● Electrical load signal*2	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MI (On the instrument panel)*3
	Intake valve timing control	Intake valve timing control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay*3
	Cooling fan control	Cooling fan relay*3

*1: This sensor is not used to control the engine system under normal conditions.
*2: The signals are sent to the ECM through CAN communication line.
*3: The output signals are sent from the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

EBS00QGF

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*3 and piston position	Fuel injection & mixture ratio control	Fuel injectors
Mass air flow sensor	Amount of intake air		
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		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Vehicle speed signal*2	Vehicle speed		
Air conditioner switch*2	Air conditioner operation		

*1: Under normal conditions, this sensor is not for engine control operation.
*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.

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), the 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.

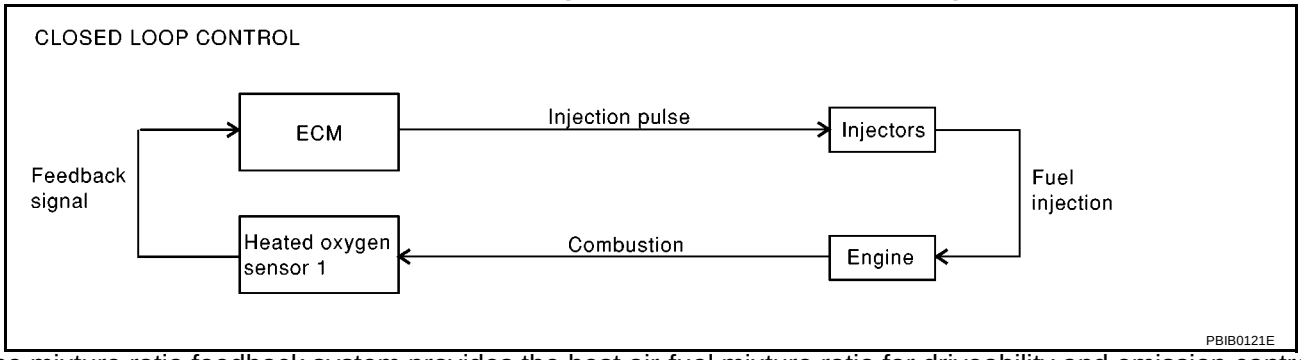
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D” (A/T 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 if 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-208 (M/T models) or EC-218 (A/T models). 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.

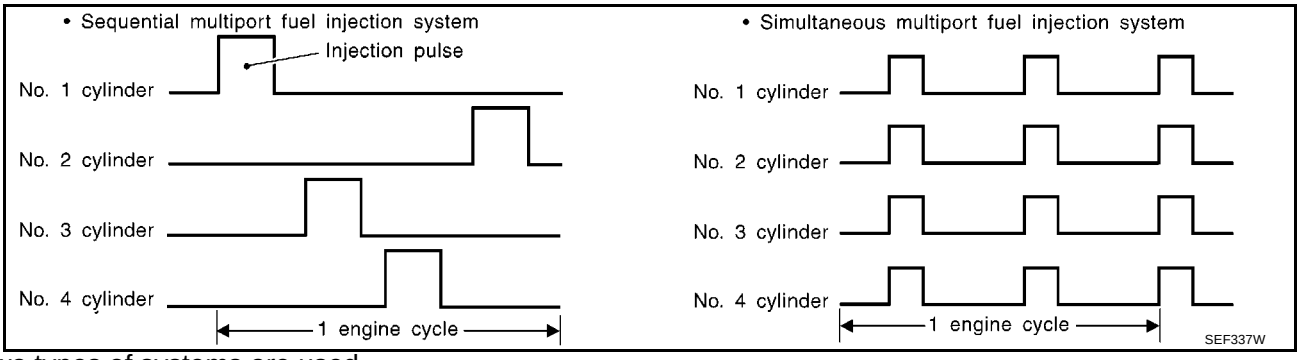
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from “N” to “D” (A/T models)
- 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 orig-

inally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., 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.
“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 or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

EBS00QGG

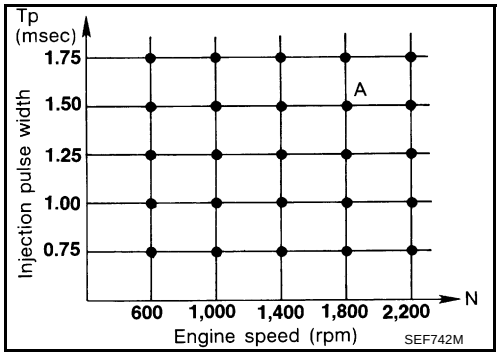
INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2 and piston position	Ignition timing control	Power transistor
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		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Vehicle speed signal*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

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. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC



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 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.

Air Conditioning Cut Control

EBS00QGH

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch*1	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
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		
Power steering pressure sensor	Power steering operation		
Vehicle speed signal*1	Vehicle speed		

*1: These signals are 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.

Fuel Cut Control (at No Load and High Engine Speed)

EBS00QGI

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injectors
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed signal*1	Vehicle speed		

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

SYSTEM DESCRIPTION

If the engine speed is above 3,950 rpm with no load (for example, in neutral and engine speed over 3,950 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 operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-39 .

CAN Communication

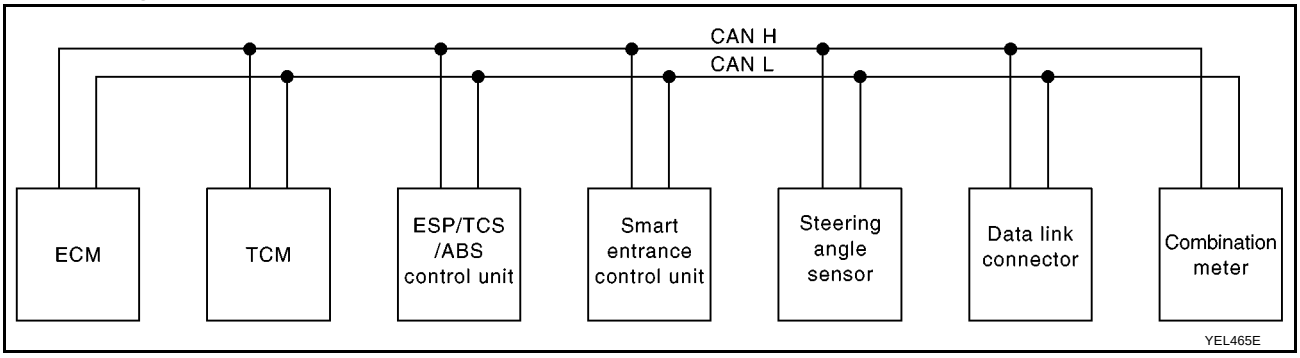
EBS00QGJ

SYSTEM DESCRIPTION

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.

A/T MODELS WITH ESP

System diagram



Input/output signal chart

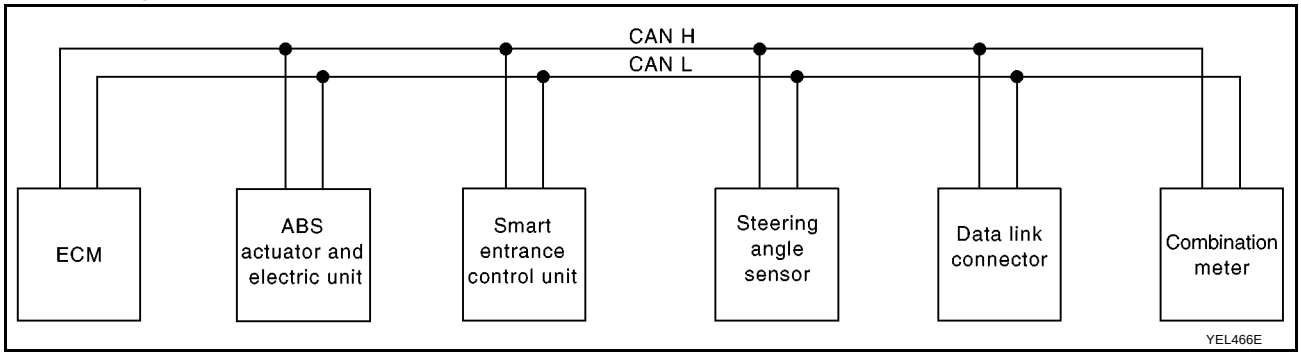
T: Transmit R: Receive

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Engine speed signal	T		R			R
Brake switch signal		R				T
Rear window defogger signal	R			T		
Heater fan switch signal	R					T
Air conditioner switch signal	R					T
MI signal	T					R
Engine coolant temperature signal	T					R
Fuel consumption signal	T					R

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Vehicle speed signal			T			R
	R					T
Seat belt reminder signal				R		T
Headlamp switch signal				T		R
Flashing indicator signal				T		R
Engine cooling fan speed signal	T			R		
Door switches state signal				T		R
A/C compressor signal	T			R		
A/C compressor feedback signal	T					R
Accelerator pedal position signal	T		R			
Output shaft revolution signal	R	T				
OD OFF switch signal		R				T
OD OFF indicator signal		T				R
A/T self-diagnosis signal	R	T				
P range signal		T	R			
Steering angle sensor signal			R		T	
A/T position indicator signal	R	T	R			R
ABS warning lamp signal			T			R
Slip indicator lamp signal			T			R
VDC Off indicator lamp signal			T			R
Brake warning lamp signal			T			R
N range switch signal		R				T
P range switch signal		R				T

M/T MODELS WITH ESP

System diagram



Input/output signal chart

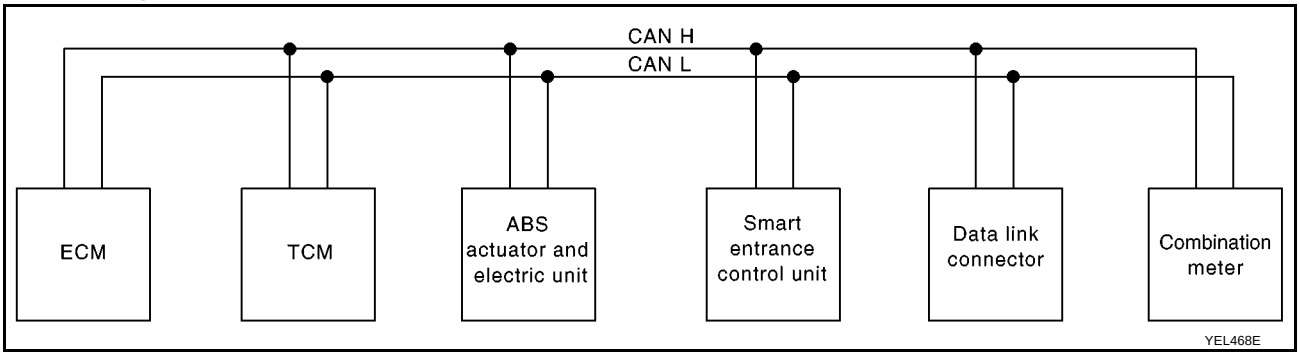
T: Transmit R: Receive

Signals	ECM	ESP/TCS/ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Engine speed signal	T	R			R
Rear window defogger signal	R		T		
Heater fan switch signal	R				T
Air conditioner switch signal	R				T
MI signal	T				R
Engine coolant temperature signal	T				R

Signals	ECM	ESP/TCS/ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Fuel consumption signal	T				R
Vehicle speed signal		T			R
	R				T
Seat belt reminder signal			R		T
Headlamp switch signal			T		R
Flashing indicator signal			T		R
Engine cooling fan speed signal	T		R		
Door switches state signal			T		R
A/C compressor signal	T		R		
A/C compressor feedback signal	T				R
Accelerator pedal position signal	T	R			
Steering angle sensor signal		R		T	
ABS warning lamp signal		T			R
Slip indicator lamp signal		T			R
VDC off indicator lamp signal		T			R
Brake warning lamp signal		T			R

A/T MODELS WITHOUT ESP

System diagram



Input/output signal chart

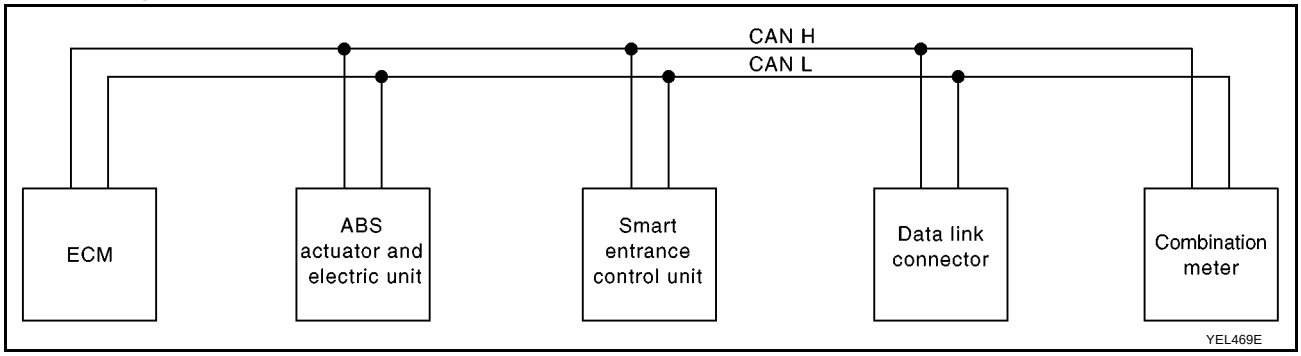
T: Transmit R: Receive

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T				R
Brake switch signal		R			T
Rear window defogger signal	R			T	
Heater fan switch signal	R				T
Air conditioner switch signal	R				T
MI signal	T				R
Engine coolant temperature signal	T				R
Fuel consumption signal	T				R
Vehicle speed signal			T		R
	R				T
Seat belt reminder signal				R	T
Headlamp switch signal				T	R

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Flashing indicator signal				T	R
Engine cooling fan speed signal	T			R	
Door switches state signal				T	R
A/C compressor signal	T			R	
A/C compressor feedback signal	T				R
Accelerator pedal position signal	T	R			
Output shaft revolution signal	R	T			
ABS operation signal			T		R
OD OFF switch signal		R			T
OD OFF indicator signal		T			R
A/T self-diagnosis signal	R	T			
ABS warning lamp signal			T		R
N range switch signal		R			T
P range switch signal		R			T

M/T MODELS WITHOUT ESP

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T			R
Rear window defogger signal	R		T	
Heater fan switch signal	R			T
Air conditioner switch signal	R			T
MI signal	T			R
Engine coolant temperature signal	T			R
Fuel consumption signal	T			R
Vehicle speed signal		T		R
	R			T
Seat belt reminder signal			R	T
Headlamp switch signal			T	R
Flashing indicator signal			T	R
Engine cooling fan speed signal	T		R	
Door switches state signal			T	R

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
A/C compressor signal	T		R	
A/C compressor feedback signal	T			R
ABS operation signal		T		R
ABS warning lamp signal		T		R

BASIC SERVICE PROCEDURE

PFP:00018

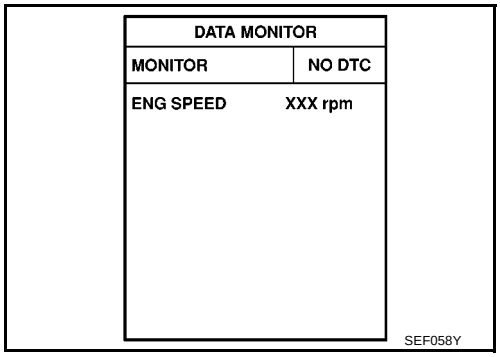
Idle Speed and Ignition Timing Check

EBS00QGK

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



With GST

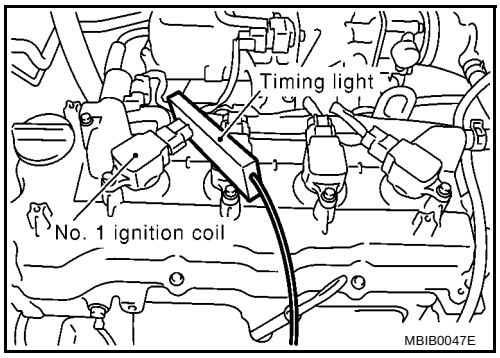
Check idle speed in with GST.

IGNITION TIMING

Any of following two methods may be used.

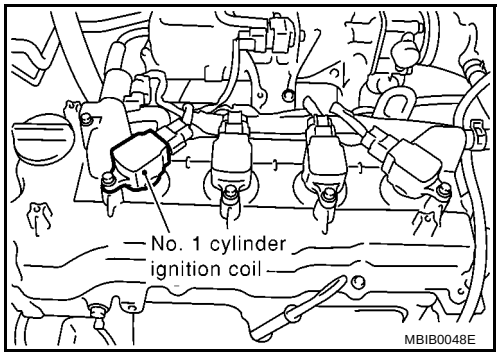
Method A

1. Slide the harness protector of ignition coil No. 1 to clear the wires.
2. Attach timing light to the wires as shown.
3. Check ignition timing.

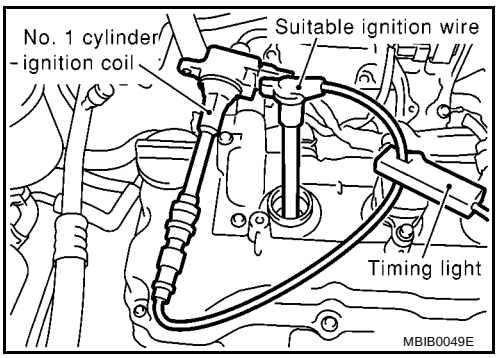


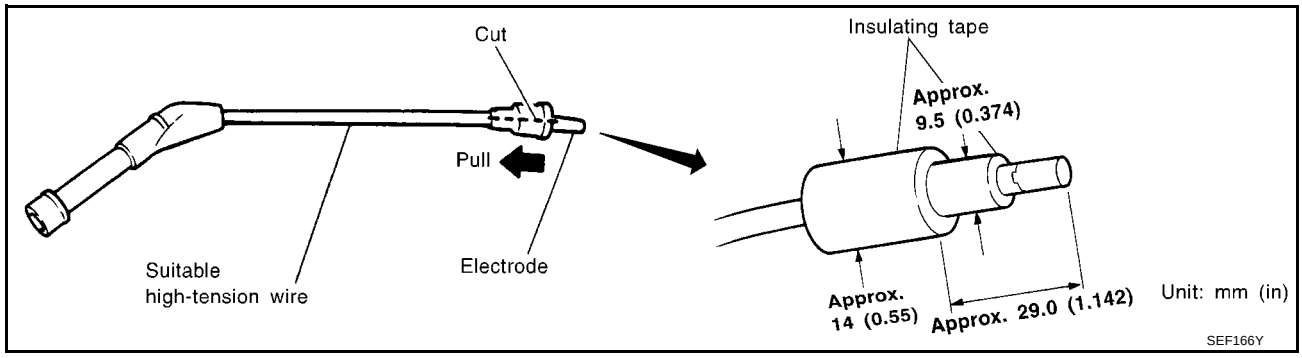
Method B

1. Remove No. 1 ignition coil.



2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.

Accelerator Pedal Released Position Learning

EBS00QGL

DESCRIPTION

"Accelerator Pedal Released Position Learning" is an operation 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.

OPERATION PROCEDURE

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

Throttle Valve Closed Position Learning

EBS00QGM

DESCRIPTION

"Throttle Valve Closed Position Learning" is an operation 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.

OPERATION PROCEDURE

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

Idle Air Volume Learning

EBS00QGN

DESCRIPTION

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine 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.

PREPARATION

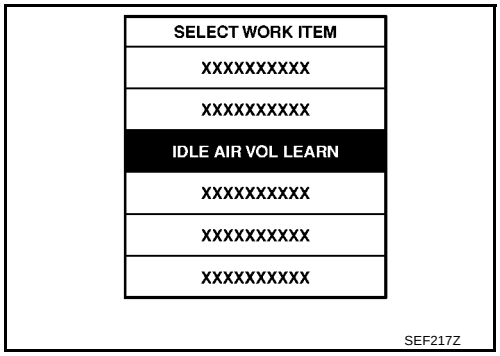
Before performing “Idle Air Volume Learning”, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP 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
  For models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

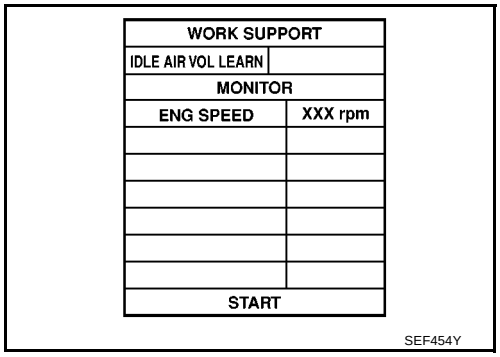
OPERATION PROCEDURE

With CONSULT-II

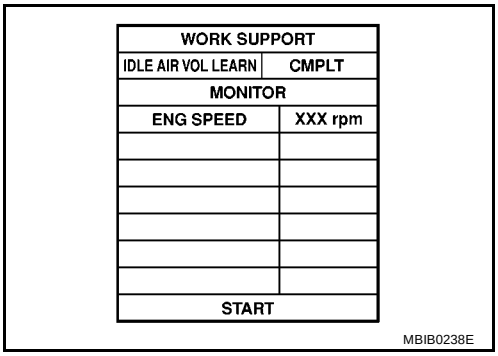
1. Perform EC-49, "Accelerator Pedal Released Position Learning" .
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.



ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm (in “Neutral” position) A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 8±5° BTDC (in “Neutral” position) A/T: 10±5° BTDC (in “P” or “N” position)

Without CONSULT-II

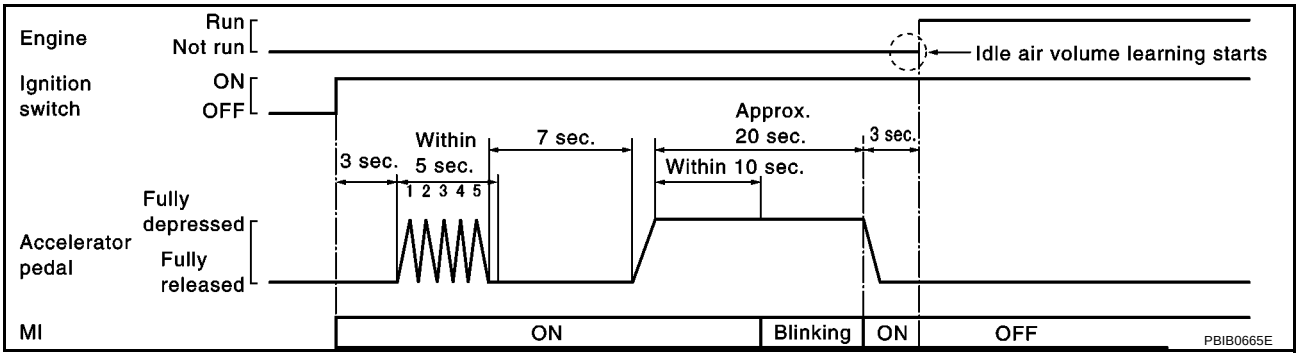
NOTE:

- **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 EC-49, "Accelerator Pedal Released Position Learning" .
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

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



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

ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm (in “Neutral” position) A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 8±5° BTDC (in “Neutral” position) A/T: 10±5° BTDC (in “P” or “N” position)

13. If idle speed and ignition timing are not within the specification, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-134, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **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.**

Fuel Pressure Check

EBS00QGO

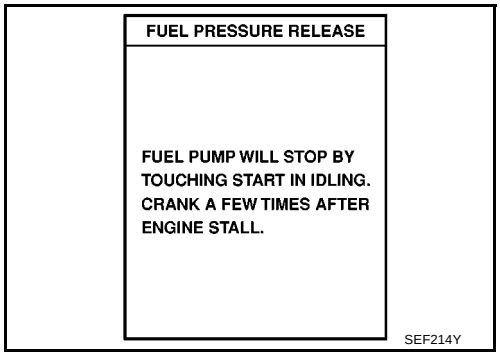
FUEL PRESSURE RELEASE

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because V10 models do not have fuel return system.

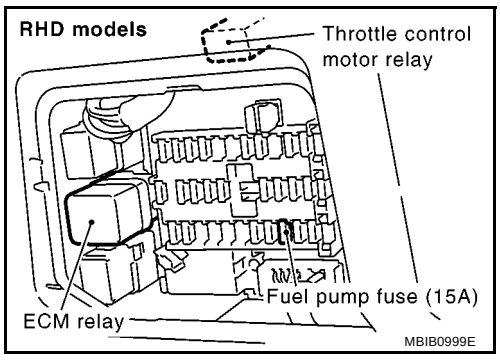
With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch "OFF".



Without CONSULT-II

1. Remove fuel pump fuse located in fuse box.
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

NOTE:

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**

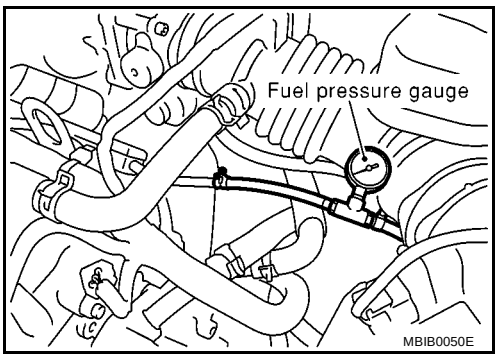
1. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .

2. Install the fuel pressure gauge into the fuel line as shown in the figure.
3. Turn ignition switch “ON”, and check for fuel leakage.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling: **Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)**

6. If result is unsatisfactory, go to next step.
7. 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.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS00QGP

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	ISO Standard
Diagnostic Trouble Code (DTC)	Mode 3 of ISO 15031-5
Freeze Frame data	Mode 2 of ISO 15031-5
System Readiness Test (SRT) code	Mode 1 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of ISO 15031-5
Calibration ID	Mode 9 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-II	×	×	×	×	×	—
GST	×	×*1	×	—	×	×
ECM	×	×*2	—	—	—	—

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.
*2: 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-85 .)

Two Trip Detection Logic

EBS00QGQ

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-20 .)	—	×	—	—	×	—	×	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.

The fail-safe function also operate when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

EBS00QGR

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

M/T Models

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
CAN COMM CIRCUIT	U1001	1001*3	—	—	×	EC-145
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	×	EC-148
HO2S1 HTR (B1)	P0031	0031	×	×	×*4	EC-151
HO2S1 HTR (B1)	P0032	0032	×	×	×*4	EC-151
HO2S2 HTR (B1)	P0037	0037	×	×	×*4	EC-165
HO2S2 HTR (B1)	P0038	0038	×	×	×*4	EC-165
MAF SEN/CIRCUIT	P0102	0102	—	—	—	EC-178
MAF SEN/CIRCUIT	P0103	0103	—	—	—	EC-178
IAT SEN/CIRCUIT	P0112	0112	—	—	×	EC-184
IAT SEN/CIRCUIT	P0113	0113	—	—	×	EC-184
ECT SEN/CIRCUIT	P0117	0117	—	—	—	EC-188
ECT SEN/CIRCUIT	P0118	0118	—	—	—	EC-188
HO2S1 (B1)	P0132	0132	×	×	×*4	EC-193
HO2S1 (B1)	P0133	0133	×	×	×*4	EC-208
HO2S1 (B1)	P0134	0134	×	×	×*4	EC-230
HO2S2 (B1)	P0138	0138	×	×	×*4	EC-247
HO2S2 (B1)	P0139	0139	×	×	×*4	EC-262
FUEL SYS-LEAN-B1	P0171	0171	—	—	×	EC-281
FUEL SYS-RICH-B1	P0172	0172	—	—	×	EC-296
TP SENSOR	P0221	0221	—	—	—	EC-310
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-316
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-316
APP SENSOR	P0226	0226	—	—	—	EC-322
APP SEN 1/CIRC	P0227	0227	—	—	—	EC-328
APP SEN 1/CIRC	P0228	0228	—	—	—	EC-328
MULTI CYL MISFIRE	P0300	0300	—	—	×	EC-334
CYL 1 MISFIRE	P0301	0301	—	—	×	EC-334
CYL 2 MISFIRE	P0302	0302	—	—	×	EC-334
CYL 3 MISFIRE	P0303	0303	—	—	×	EC-334
CYL 4 MISFIRE	P0304	0304	—	—	×	EC-334
KNOCK SEN/CIRC-B1	P0327	0327	—	—	×	EC-339
KNOCK SEN/CIRC-B1	P0328	0328	—	—	×	EC-339
CKP SEN/CIRCUIT	P0335	0335	—	—	×	EC-343

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
CMP SEN/CIRC-B1	P0340	0340	—	—	×	EC-349
TW CATALYST SYS-B1	P0420	0420	×	×	×*4	EC-355
PURG VOLUME CONT/V	P0444	0444	—	—	×	EC-365
VEH SPEED SEN/CIRC	P0500	0500	—	—	×	EC-371
PW ST P SEN/CIRC	P0550	0550	—	—	×	EC-373
ECM	P0605	0605	—	—	×	EC-377
ECM BACK UP/CIRC	P1065	1065	—	—	×	EC-380
INT/V TIM V/CIR-B1	P1111	1111	—	—	×	EC-384
ETC ACTR	P1121	1121	—	—	×	EC-389
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-391
ETC MOT PWR	P1124	1124	—	—	—	EC-398
ETC MOT PWR	P1126	1126	—	—	—	EC-398
ETC MOT	P1128	1128	—	—	—	EC-404
HO2S1 (B1)	P1143	1143	×	×	×*4	EC-409
HO2S1 (B1)	P1144	1144	×	×	×*4	EC-421
HO2S2 (B1)	P1146	1146	×	×	×*4	EC-433
HO2S2 (B1)	P1147	1147	×	×	×*4	EC-452
TCS C/U FUNCTN	P1211	1211	—	—	×	EC-471
TCS/CIRC	P1212	1212	—	—	×	EC-472
ENG OVER TEMP	P1217	1217	—	—	—	EC-473
TP SEN 2/CIRC	P1223	1223	—	—	—	EC-484
TP SEN 2/CIRC	P1224	1224	—	—	—	EC-484
CTP LEARNING	P1225	1225	—	—	×	EC-490
CTP LEARNING	P1226	1226	—	—	×	EC-492
APP SEN 2/CIRC	P1227	1227	—	—	—	EC-494
APP SEN 2/CIRC	P1228	1228	—	—	—	EC-494
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-500
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	×	EC-70
P-N POS SW/CIRCUIT	P1706	1706	—	—	×	EC-504
BRAKE SW/CIRCUIT	P1805	1805	—	—	×	EC-509

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: The trouble shooting for this DTC needs CONSULT-II.
*4: These are not displayed with GST.

A/T Models

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
CAN COMM CIRCUIT	U1000	1000*3	—	—	—	EC-145
CAN COMM CIRCUIT	U1001	1001*3	—	—	×	EC-145
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	**—**

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
INT/V TIM CONT-B1	P0011	0011	—	—	×	EC-148
HO2S1 HTR (B1)	P0031	0031	×	×	×*4	EC-157
HO2S1 HTR (B1)	P0032	0032	×	×	×*4	EC-157
HO2S2 HTR (B1)	P0037	0037	×	×	×*4	EC-170
HO2S2 HTR (B1)	P0038	0038	×	×	×*4	EC-170
HO2S1 HTR (B2)	P0051	0051	×	×	×*4	EC-157
HO2S1 HTR (B2)	P0052	0052	×	×	×*4	EC-157
HO2S2 HTR (B2)	P0057	0057	×	×	×*4	EC-170
HO2S2 HTR (B2)	P0058	0058	×	×	×*4	EC-170
MAF SEN/CIRCUIT	P0102	0102	—	—	—	EC-178
MAF SEN/CIRCUIT	P0103	0103	—	—	—	EC-178
IAT SEN/CIRCUIT	P0112	0112	—	—	×	EC-184
IAT SEN/CIRCUIT	P0113	0113	—	—	×	EC-184
ECT SEN/CIRCUIT	P0117	0117	—	—	—	EC-188
ECT SEN/CIRCUIT	P0118	0118	—	—	—	EC-188
HO2S1 (B1)	P0132	0132	×	×	×*4	EC-199
HO2S1 (B1)	P0133	0133	×	×	×*4	EC-218
HO2S1 (B1)	P0134	0134	×	×	×*4	EC-237
HO2S2 (B1)	P0138	0138	×	×	×*4	EC-253
HO2S2 (B1)	P0139	0139	×	×	×*4	EC-270
HO2S1 (B2)	P0152	0152	×	×	×*4	EC-199
HO2S1 (B2)	P0153	0153	×	×	×*4	EC-218
HO2S1 (B2)	P0154	0154	×	×	×*4	EC-237
HO2S2 (B2)	P0158	0158	×	×	×*4	EC-253
HO2S2 (B2)	P0159	0159	×	×	×*4	EC-270
FUEL SYS-LEAN-B1	P0171	0171	—	—	×	EC-288
FUEL SYS-RICH-B1	P0172	0172	—	—	×	EC-302
FUEL SYS-LEAN-B2	P0174	0174	—	—	×	EC-288
FUEL SYS-RICH-B2	P0175	0175	—	—	×	EC-302
TP SENSOR	P0221	0221	—	—	—	EC-310
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-316
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-316
APP SENSOR	P0226	0226	—	—	—	EC-322
APP SEN 1/CIRC	P0227	0227	—	—	—	EC-328
APP SEN 1/CIRC	P0228	0228	—	—	—	EC-328
MULTI CYL MISFIRE	P0300	0300	—	—	×	EC-334
CYL 1 MISFIRE	P0301	0301	—	—	×	EC-334
CYL 2 MISFIRE	P0302	0302	—	—	×	EC-334
CYL 3 MISFIRE	P0303	0303	—	—	×	EC-334
CYL 4 MISFIRE	P0304	0304	—	—	×	EC-334

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
KNOCK SEN/CIRC-B1	P0327	0327	—	—	×	EC-339
KNOCK SEN/CIRC-B1	P0328	0328	—	—	×	EC-339
CKP SEN/CIRCUIT	P0335	0335	—	—	×	EC-343
CMP SEN/CIRC-B1	P0340	0340	—	—	×	EC-349
TW CATALYST SYS-B1	P0420	0420	×	×	×*4	EC-360
TW CATALYST SYS-B2	P0430	0430	×	×	×*4	EC-360
PURG VOLUME CONT/V	P0444	0444	—	—	×	EC-365
VEH SPEED SEN/CIRC*5	P0500	0500	—	—	×	EC-371
PW ST P SEN/CIRC	P0550	0550	—	—	×	EC-373
ECM	P0605	0605	—	—	×	EC-377
PNP SW/CIRC	P0705	0705	—	—	×	AT-113
ATF TEMP SEN/CIRC	P0710	0710	—	—	×	AT-119
VEH SPD SEN/CIRC AT*5	P0720	0720	—	—	×	AT-125
ENGINE SPEED SIG	P0725	0725	—	—	×	AT-131
A/T 1ST GR FNCTN	P0731	0731	—	—	×	AT-135
A/T 2ND GR FNCTN	P0732	0732	—	—	×	AT-141
A/T 3RD GR FNCTN	P0733	0733	—	—	×	AT-147
A/T 4TH GR FNCTN	P0734	0734	—	—	×	AT-153
TCC SOLENOID/CIRC	P0740	0740	—	—	×	AT-161
L/PRESS SOL/CIRC	P0745	0745	—	—	×	AT-166
SFT SOL A/CIRC	P0750	0750	—	—	—	AT-173
SFT SOL B/CIRC	P0755	0755	—	—	—	AT-178
ECM BACK UP/CIRC	P1065	1065	—	—	×	EC-380
INT/V TIM V/CIR-B1	P1111	1111	—	—	×	EC-384
ETC ACTR	P1121	1121	—	—	×	EC-389
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-391
ETC MOT PWR	P1124	1124	—	—	—	EC-398
ETC MOT PWR	P1126	1126	—	—	—	EC-398
ETC MOT	P1128	1128	—	—	—	EC-404
HO2S1 (B1)	P1143	1143	×	×	×*4	EC-415
HO2S1 (B1)	P1144	1144	×	×	×*4	EC-427
HO2S2 (B1)	P1146	1146	×	×	×*4	EC-441
HO2S2 (B1)	P1147	1147	×	×	×*4	EC-460
HO2S1 (B2)	P1163	1163	×	×	×*4	EC-415
HO2S1 (B2)	P1164	1164	×	×	×*4	EC-427
HO2S2 (B2)	P1166	1166	×	×	×*4	EC-441
HO2S2 (B2)	P1167	1167	×	×	×*4	EC-460
TCS C/U FUNCTN	P1211	1211	—	—	×	EC-471
TCS/CIRC	P1212	1212	—	—	×	EC-472
ENG OVER TEMP	P1217	1217	—	—	—	EC-473
TP SEN 2/CIRC	P1223	1223	—	—	—	EC-484

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Value/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM				
TP SEN 2/CIRC	P1224	1224	—	—	—	EC-484
CTP LEARNING	P1225	1225	—	—	×	EC-490
CTP LEARNING	P1226	1226	—	—	×	EC-492
APP SEN 2/CIRC	P1227	1227	—	—	—	EC-494
APP SEN 2/CIRC	P1228	1228	—	—	—	EC-494
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-500
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	×	EC-70
TPV SEN/CIRC A/T	P1705	1705	—	—	—	AT-183
P-N POS SW/CIRCUIT	P1706	1706	—	—	×	EC-504
O/R CLTCH SOL/CIRC	P1760	1760	—	—	×	AT-189
BRAKE SW/CIRCUIT	P1805	1805	—	—	×	EC-509

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by ISO 15031-5.
*3: The trouble shooting for these DTCs need CONSULT-II.
*4: These are not displayed with GST.
*5: When the fail-safe operations for both self-diagnoses occur at the same time, the MI illuminates.

NOTE:
Regarding V10 models with A/T, “B1” indicates bank 1 (cylinders number 1 and 4), “B2” indicates bank 2 (cylinders number 2 and 3).

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 EC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-55, "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-II.
1st trip DTC is specified in Mode 7 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 II, refer to EC-80, "WORK FLOW" . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0705, P0750, etc.
These DTCs are prescribed by ISO 15031-5.
(CONSULT-II 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: 0102, 0340 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-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. 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]”.

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

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, 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-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-119, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
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, P0174* , P0175*
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

*: For A/T models

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 EC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 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:
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-II indication)	Performance Priority*1	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.	
			M/T models	A/T models
CATALYST	2	Three way catalyst function	P0420	P0420, P0430
HO2S	1	Heated oxygen sensor 1	P0132	P0132, P0152
		Heated oxygen sensor 1	P0133	P0133, P0153
		Heated oxygen sensor 1	P0134	P0134, P0154
		Heated oxygen sensor 1	P1143	P1143, P1163
		Heated oxygen sensor 1	P1144	P1144, P1164
		Heated oxygen sensor 2	P0138	P0138, P0158
		Heated oxygen sensor 2	P0139	P0139, P0159
		Heated oxygen sensor 2	P1146	P1146, P1166
		Heated oxygen sensor 2	P1147	P1147, P1167
HO2S HTR	1	Heated oxygen sensor 1 heater	P0031, P0032	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038	P0037, P0038, P0057, P0058

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

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

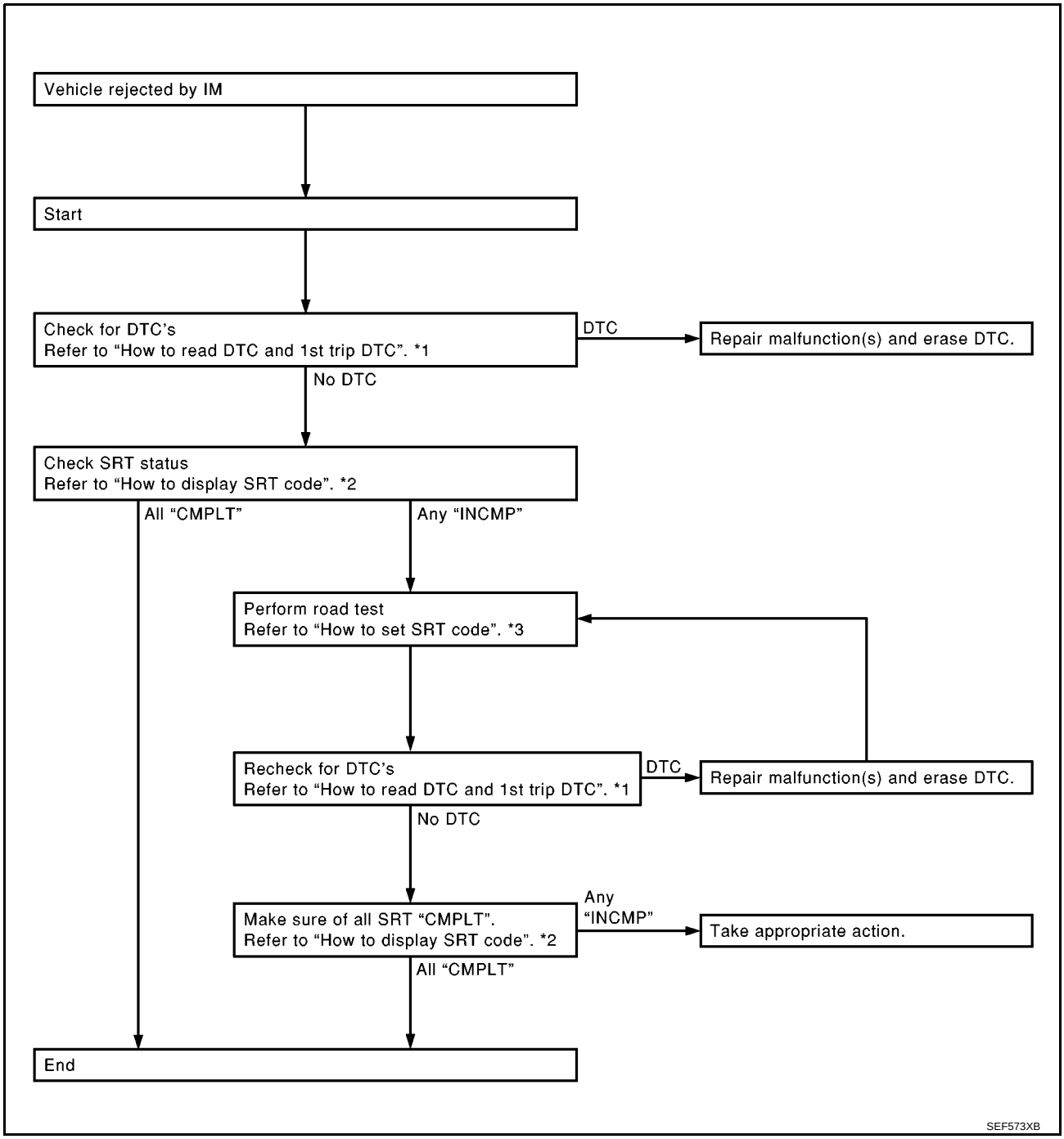
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
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 EC-59 *2 EC-64 *3 EC-65

How to Display SRT Code

WITH CONSULT-II

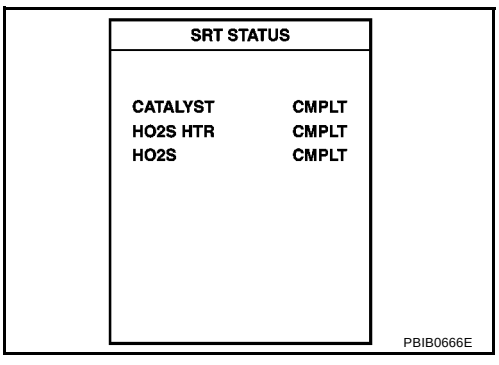
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT-II display for SRT code is shown at right.

"INCMP" means the self-diagnosis is incomplete and SRT is not set.

"CMPLT" means the self-diagnosis is complete and SRT is set.



WITH GST

Selecting Mode 1 with GST (Generic Scan Tool)

How to Set SRT Code

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.

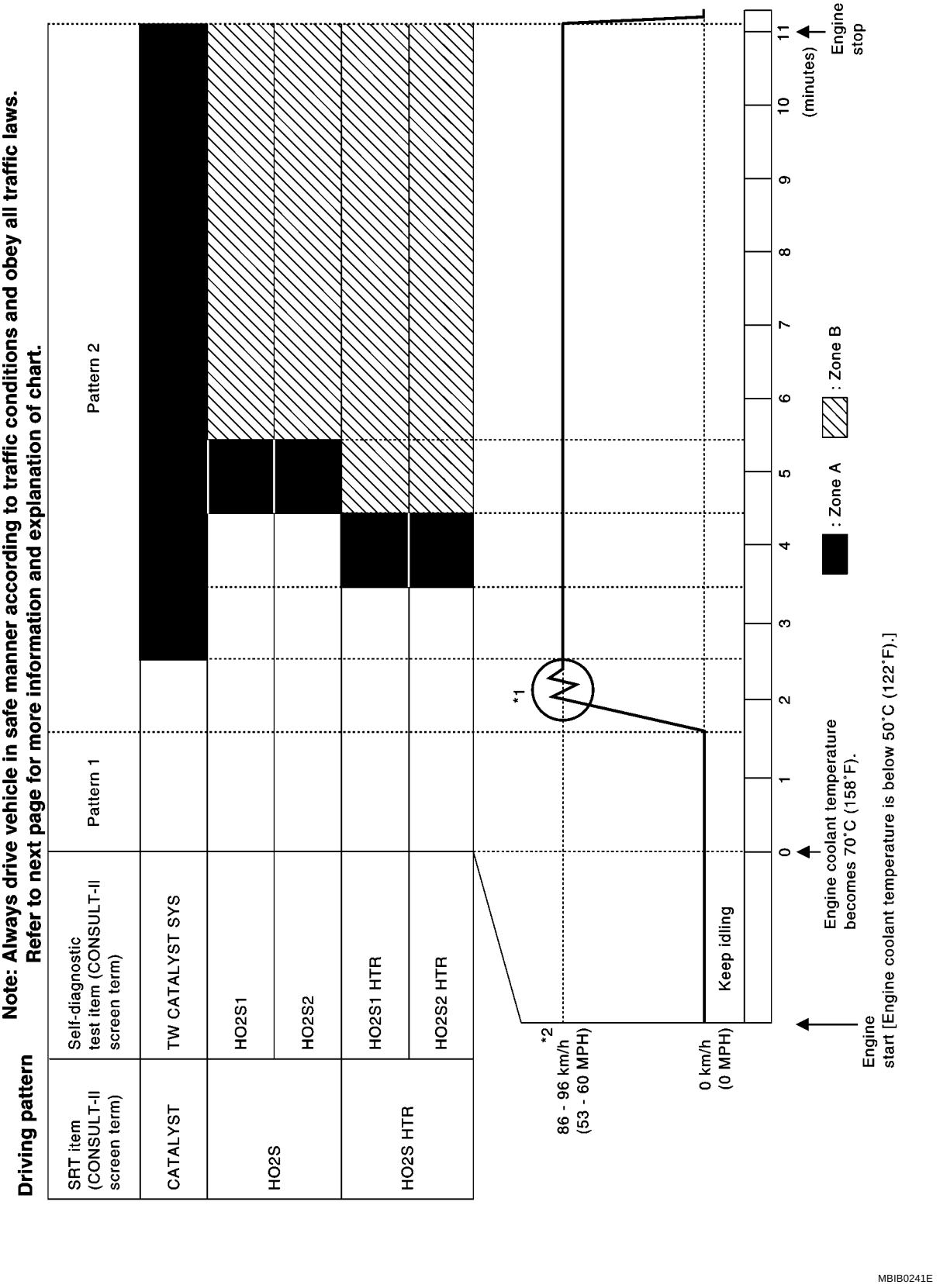
WITH CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-62, "SRT Item" .

WITHOUT CONSULT-II

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.

Driving Pattern



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- 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:

- 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 72 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 72 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.
Suggested Transmission Gear Position for A/T Models
Set the selector lever in the “D” position with the overdrive switch turned ON.

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Mode 6 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.
Items for which these data (test value and test limit) are displayed are the same as SRT code items.
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.

M/T Models

×: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	×
HO2S	Heated oxygen sensor 1	09H	04H	Max.	×
		0AH	84H	Min.	×
		0BH	04H	Max.	×
		0CH	04H	Max.	×
		0DH	04H	Max.	×
	Heated oxygen sensor 2	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
HO2S HTR	Heated oxygen sensor 1 heater	29H	08H	Max.	×
		2AH	88H	Min.	×
	Heated oxygen sensor 2 heater	2DH	0AH	Max.	×
		2EH	8AH	Min.	×

A/T Models

×: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Bank1)	01H	01H	Max.	×
		02H	81H	Min.	×
	Three way catalyst function (Bank2)	03H	02H	Max.	×
		04H	82H	Min.	×
HO2S	Heated oxygen sensor 1 (Bank 1)	09H	04H	Max.	×
		0AH	84H	Min.	×
		0BH	04H	Max.	×
		0CH	04H	Max.	×
		0DH	04H	Max.	×
	Heated oxygen sensor 1 (Bank 2)	11H	05H	Max.	×
		12H	85H	Min.	×
		13H	05H	Max.	×
		14H	05H	Max.	×
		15H	05H	Max.	×
	Heated oxygen sensor 2 (Bank 1)	19H	86H	Min.	×
		1AH	86H	Min.	×
		1BH	06H	Max.	×
		1CH	06H	Max.	×
	Heated oxygen sensor 2 (Bank 2)	21H	87H	Min.	×
		22H	87H	Min.	×
		23H	07H	Max.	×
		24H	07H	Max.	×
HO2S HTR	Heated oxygen sensor 1 heater (Bank 1)	29H	08H	Max.	×
		2AH	88H	Min.	×
	Heated oxygen sensor 1 heater (Bank 2)	2BH	09H	Max.	×
		2CH	89H	Min.	×
	Heated oxygen sensor 2 heater (Bank 1)	2DH	0AH	Max.	×
		2EH	8AH	Min.	×
	Heated oxygen sensor 2 heater (Bank 2)	2FH	0BH	Max.	×
		30H	8BH	Min.	×

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

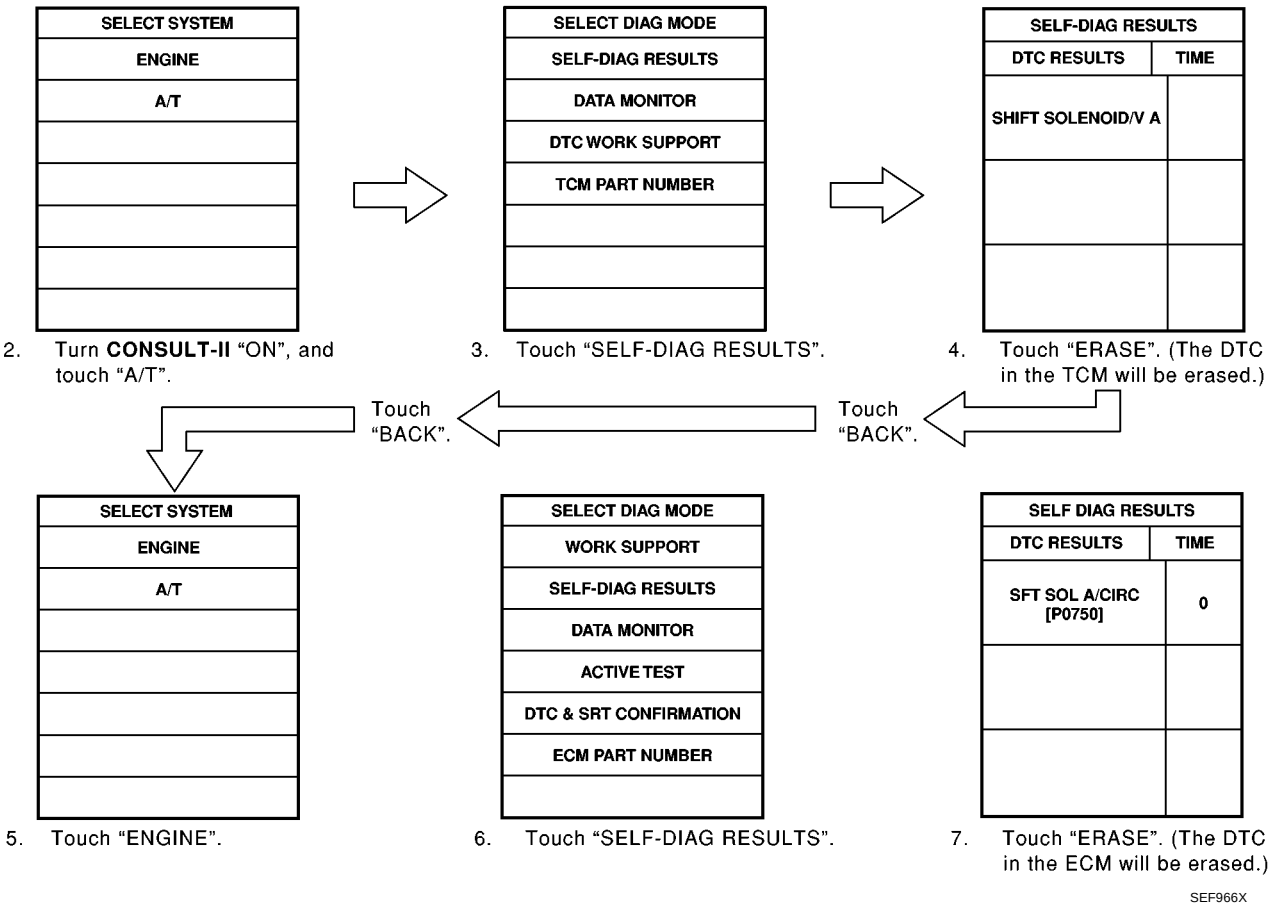
The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

NOTE:
If the DTC is not for A/T related items (see EC-20, "INDEX FOR DTC"), skip steps 2 through 4.

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. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF-DIAG RESULTS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

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.



How to Erase DTC (With GST)

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

NOTE:
If the DTC is not for A/T related items (see EC-20, "INDEX FOR DTC"), 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 “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT section titled “TROUBLE DIAGNOSIS”, “Self-diagnosis”. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to Erase DTC (No Tools)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch OFF” once.

2. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-72, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 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
– Others

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.

NATS (Nissan Anti-theft System)

EBS00QGS

- **If the security indicator lights up with the ignition switch in the “ON” position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to “NATS (NISSAN ANTI-THEFT SYSTEM”, EL-352.**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF515Y

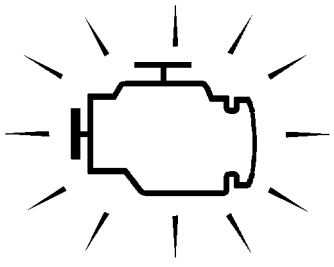
Malfunction Indicator (MI)

EBS00QGT

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 “WARNING LAMPS”, EL-115 or see EC-545 .
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.



SAT652J

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.

When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operate when above diagnoses except MI are detected circuit and demands the driver to repair the trouble.

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, EC-72, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
How to switch the diagnostic test (function) modes, and details of the above functions are described later, EC-72, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
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
- Others

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”.**

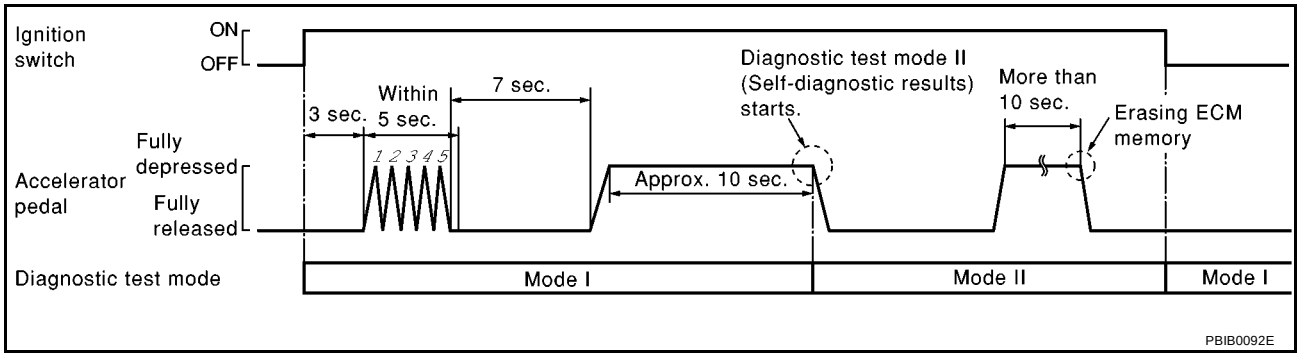
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

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).

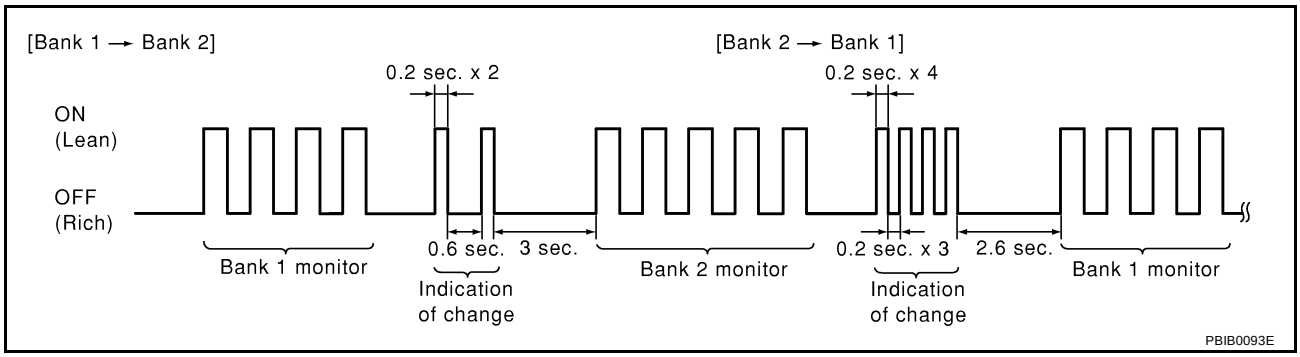


How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-72, "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).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor for A/T models.

How to Switch Monitored Sensor From Bank 1 to Bank 2 or Vice Versa

1. Fully depress the accelerator pedal quickly and then release it immediately.
2. Make sure that monitoring sensor has changed by MI blinking as follows.



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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-72, "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 the bulb. Refer to "WARNING LAMPS", EL-115 or see EC-545 .

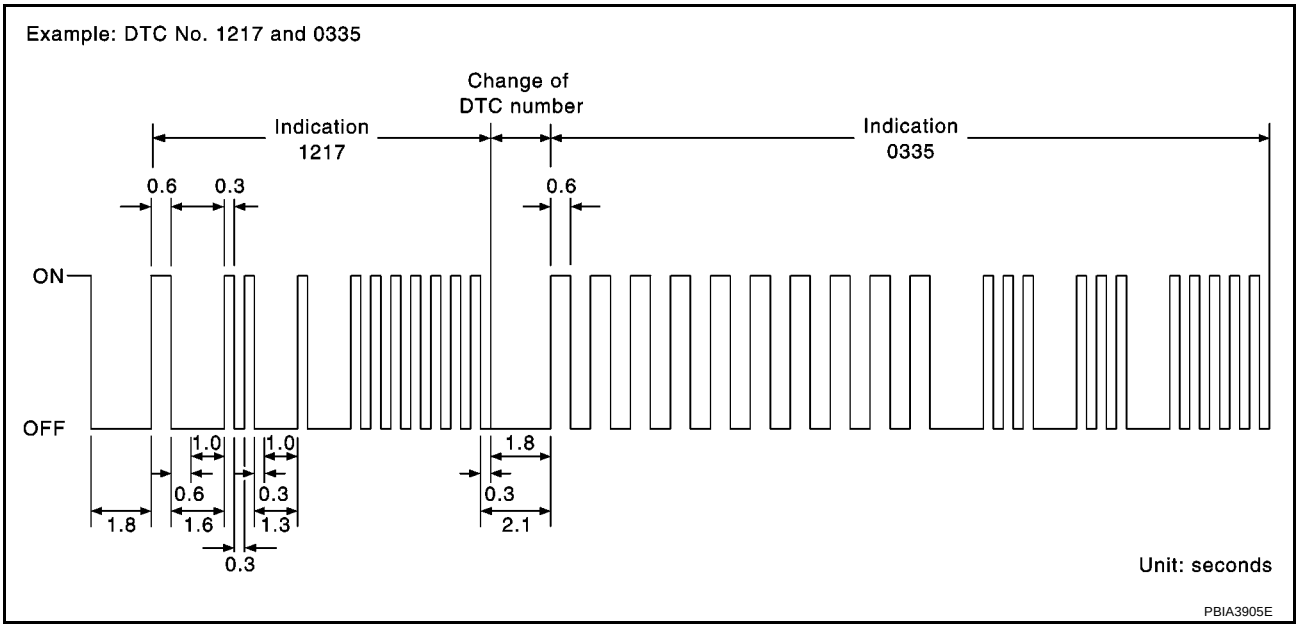
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

- These DTC numbers are 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 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-II 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-20, "INDEX FOR DTC")

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 EC-72, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the DTC will be lost from the backup memory after approx 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.

OBD System Operation Chart

EBS00QGU

RELATIONSHIP BETWEEN MI, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

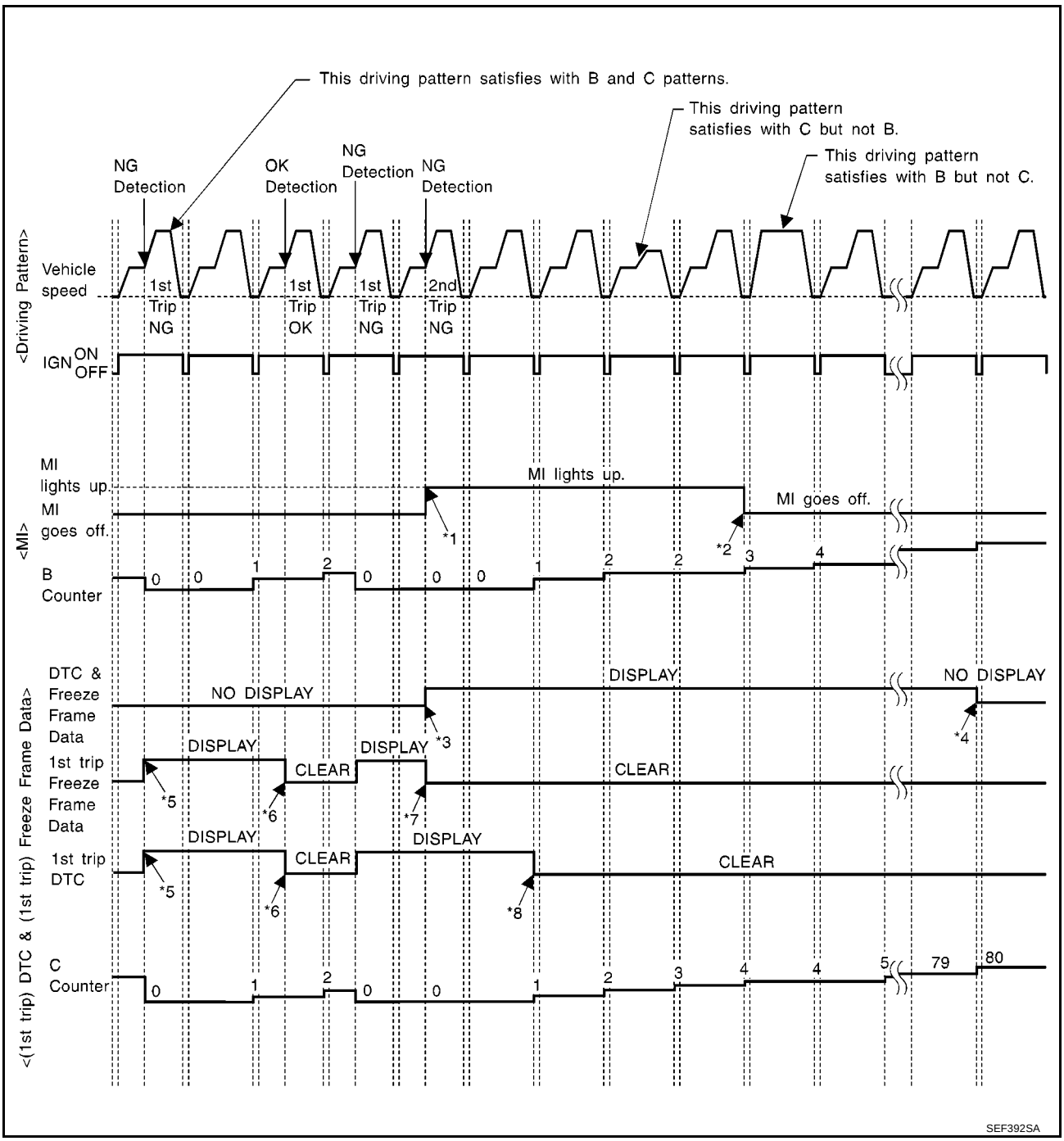
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on. For details, refer to EC-54, "Two Trip Detection Logic" .
- The MI will go off after the vehicle is driven 3 times 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 (driving 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 (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II 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 EC-76 .
For details about patterns “A” and “B” under “Other”, see EC-78 .
*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"



*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.

- 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>

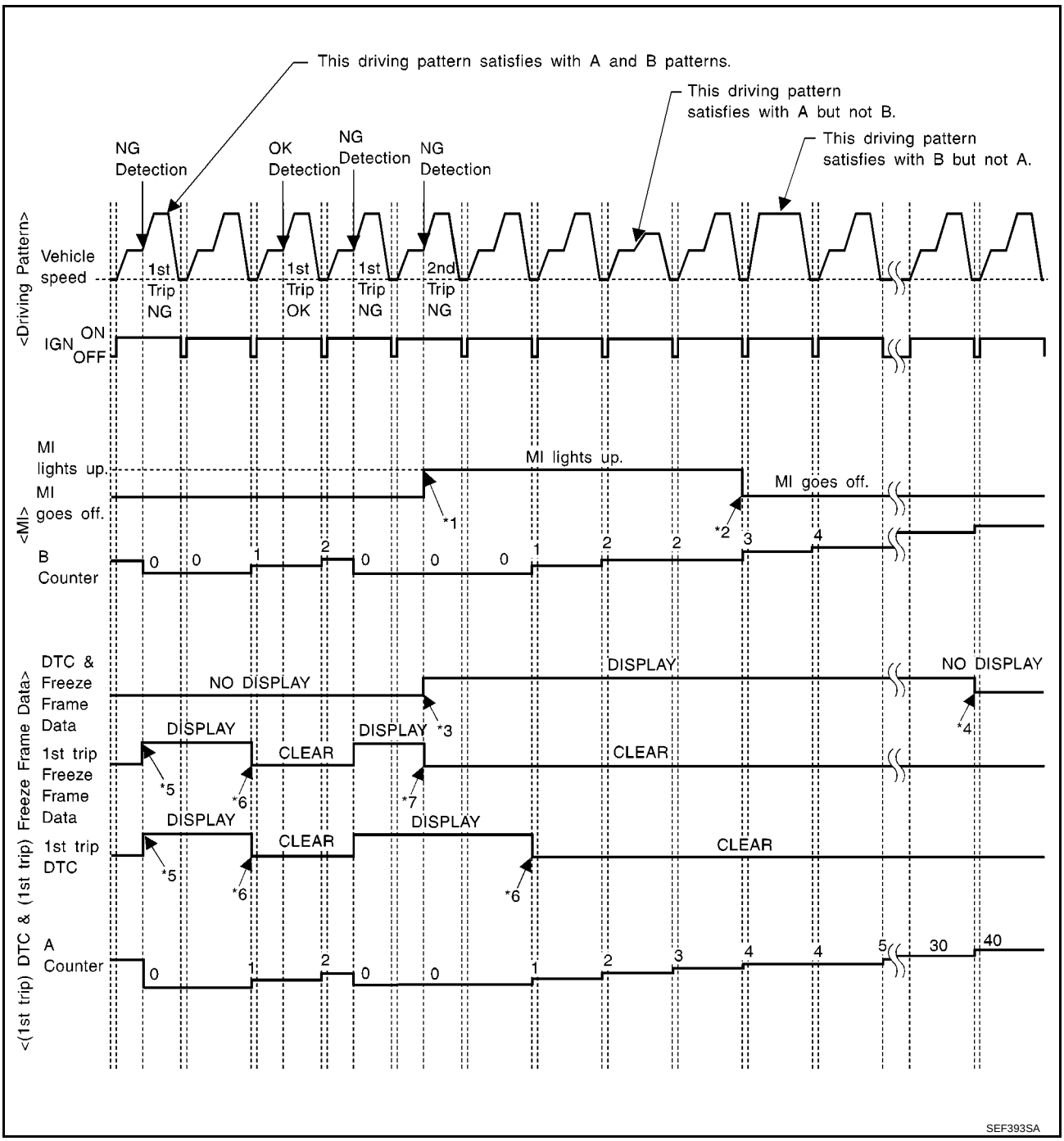
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T)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



*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.)

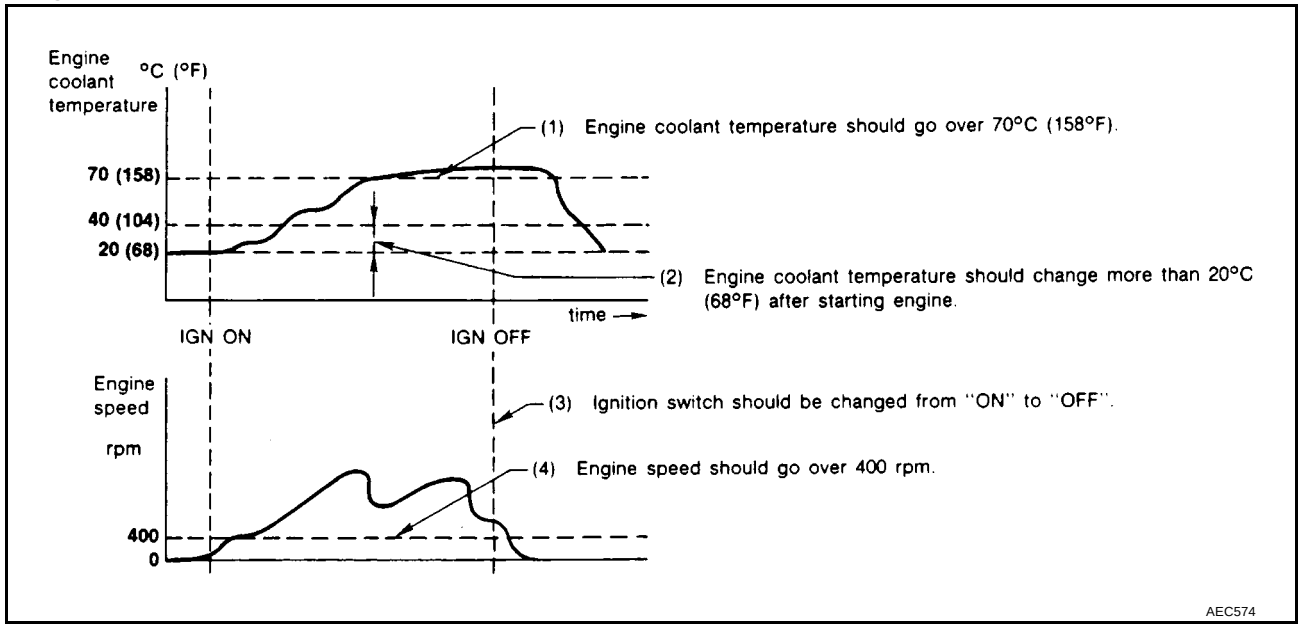
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*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"

<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").

TROUBLE DIAGNOSIS

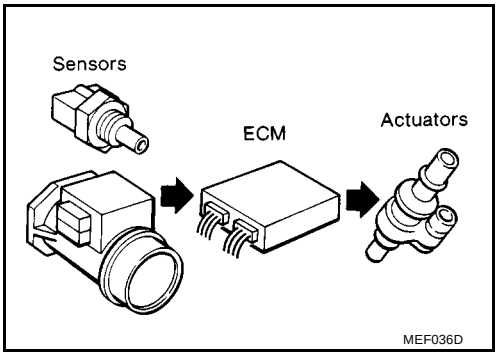
PFP:00004

Trouble Diagnosis Introduction

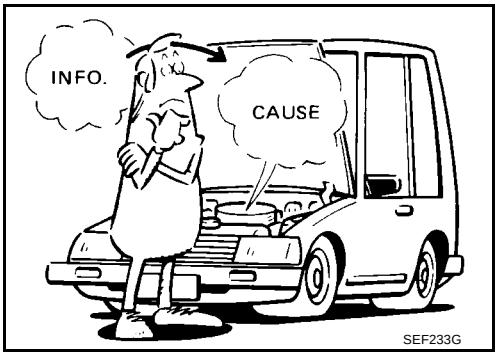
EBS00QGV

INTRODUCTION

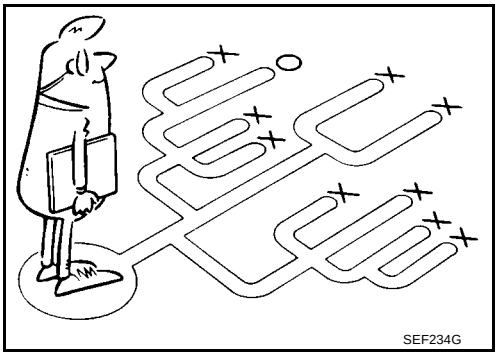
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.
It is much more difficult to diagnose a incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-80 .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on EC-83 should be used.
Start your diagnosis by looking for “conventional” malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



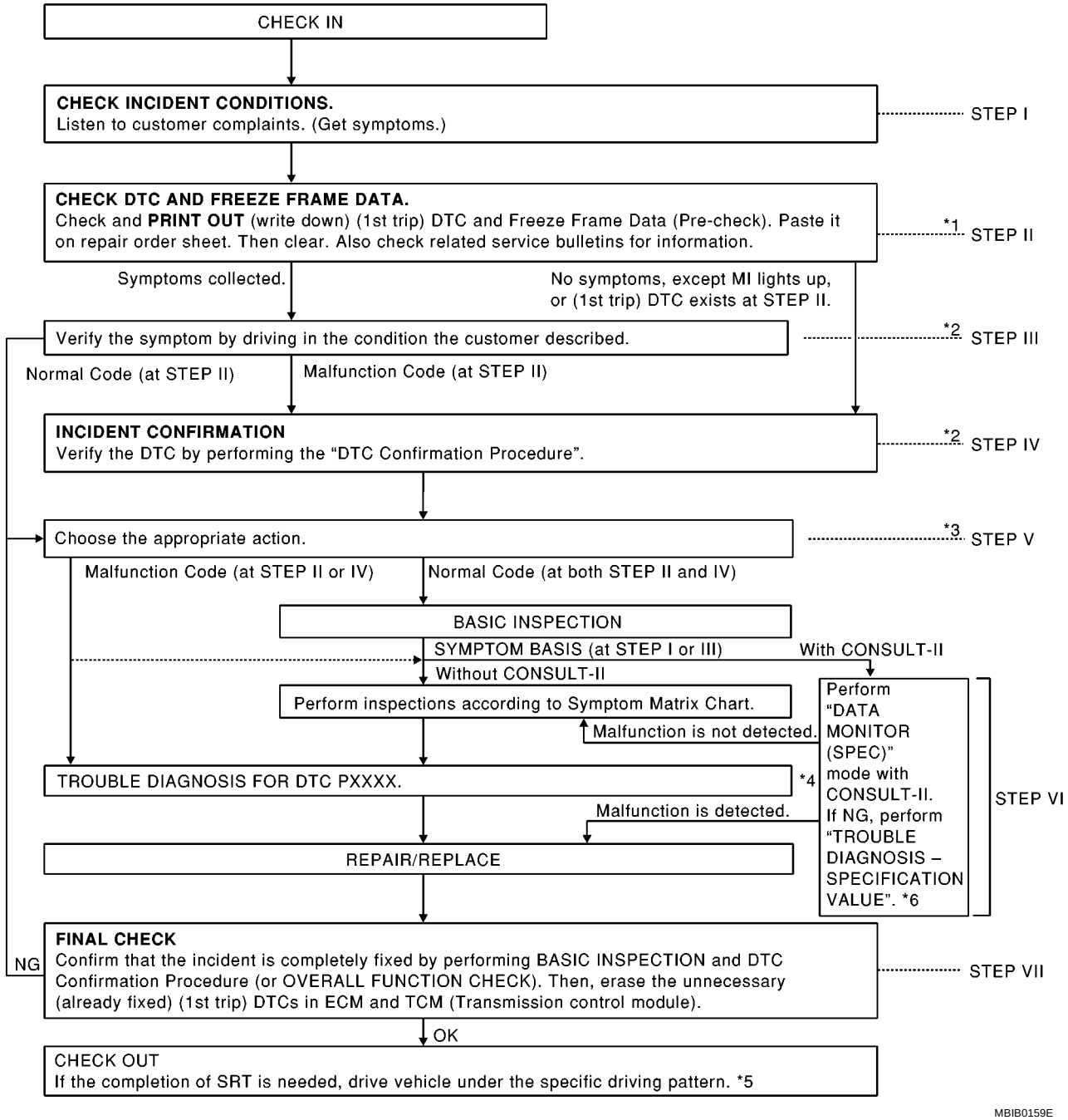
MEF036D



SEF233G


SEF234G

WORK FLOW
Flow Chart



MBIB0159E

*1: If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-139, "POWER SUPPLY CIRCUIT FOR ECM" .

*4: If malfunctioning part cannot be detected, perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5: EC-66, "Driving Pattern"

*6: EC-134, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"

Description for Work Flow

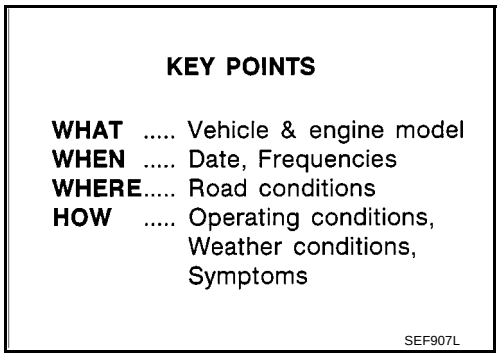
STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-82 .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer toEC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. See EC-92 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall Function Check” is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-87 .) If COSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TOROUBLE DIAGNOSIS – SPECIFICATION VALUE”. (Refer to EC-134 .) (If malfunction is detected, proceed to “PERAIR/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-92 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-102 , EC-128 . The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to “Circuit Inspection” in “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer toEC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORKSHEET

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.



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

DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:

If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

Priority	Detected items (DTC)
1	● U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 P1229 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch
2	● P0031 P0032 Heated oxygen sensor 1 heater ● P0037 P0038 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0550 Power steering pressure sensor ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1211 TCS control unit ● P1212 TCS communication line ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P0444 EVAP canister purge volume control solenoid valve ● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

A/T MODELS

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 P1229 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P0705 Park/Neutral position (PNP) switch ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch
2	● P0031 P0032 P0051 P0052 Heated oxygen sensor 1 heater ● P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P0152 P0153 P0154 P1143 P1144 P1163 P1164 Heated oxygen sensor 1 ● P0138 P0139 P0158 P0159 P1146 P1147 P1166 P1167 Heated oxygen sensor 2 ● P0550 Power steering pressure sensor ● P0710-P0725, P0740-P0755, P1705 P1760 A/T related sensors and solenoid valves ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1211 TCS control unit ● P1212 TCS communication line ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 P0430 Three way catalyst function ● P0444 EVAP canister purge volume control solenoid valve ● P0731-P0734 A/T function ● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

Fail-safe Chart

EBS00QGX

- When the DTC listed below is detected, the ECM enters fail-safe mode and the MI lights up.

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.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0117
P0118</td><td>Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td></td><td></td><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td></td><td></td><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td></td><td></td><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td></td><td></td><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0221
P0222
P0223
P1223
P1224</td><td>Throttle 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>
<tr><td>P0226
P0227
P0228
P1227
P1228</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>
<tr><td>P1121</td><td>Electric throttle control actuator
(ECM detect the throttle valve is stuck open.)</td><td colspan="2">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” position, and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P1122</td><td>Electric throttle control function</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>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>
</table>

- When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.
  The fail-safe function also operate when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

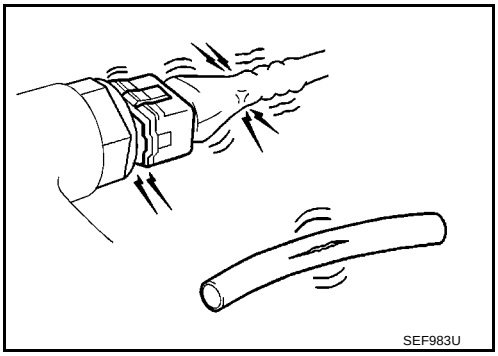
Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

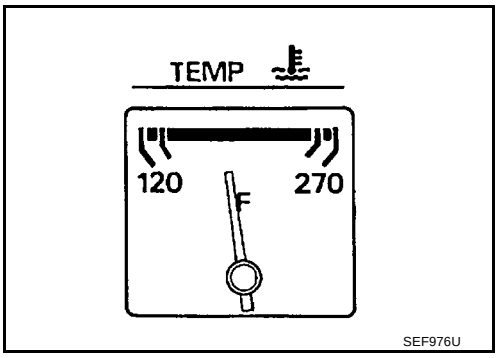
Basic Inspection

EBS00QGY

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

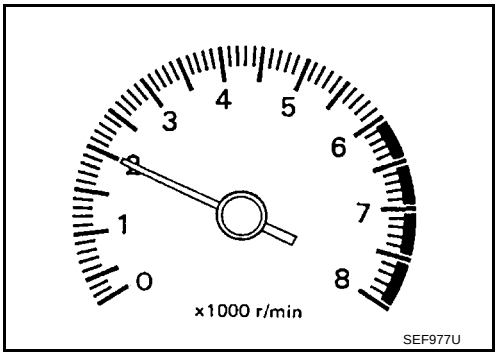


SEF976U

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-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

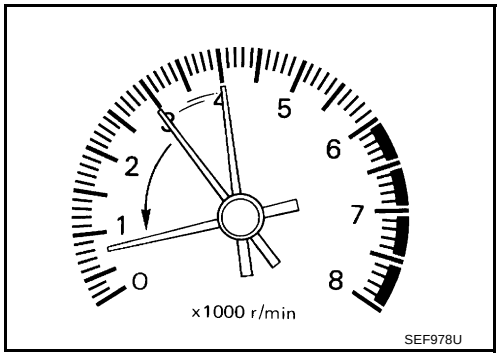
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

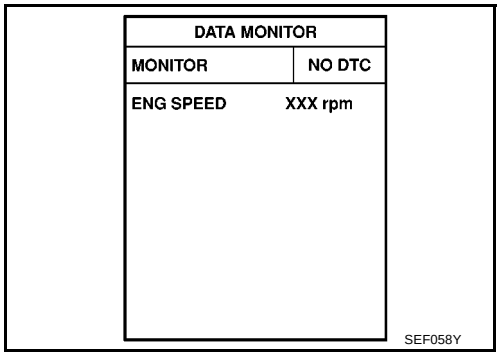
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
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. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in“Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-49, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-49, "Idle Air Volume Learning" .

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-349 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-343 .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a incident, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-70, "NATS (Nissan Anti-theft System)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 8 ± 5° BTDC (in “Neutral” position)
A/T: 10 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-49, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-49, "Idle Air Volume Learning" .

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 8 ± 5° BTDC (in "Neutral" position)
A/T: 10 ± 5° BTDC (in "P" or "N" position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-50, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-349 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-343 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a incident, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-70, "NATS (Nissan Anti-theft System)" .

>> GO TO 4.

Symptom Matrix Chart

EBS00QGZ

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-530
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-52
	Injector circuit	1	1	2	3	2		2	2			2			EC-524
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-365, EC-547
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-550
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-48
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-389, EC-391 , EC-398 , EC-404
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-48
	Ignition circuit	1	1	2	2	2		2	2			2			EC-514
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-139
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-178
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-188
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-310, EC-316 , EC-484 , EC-490 , EC-492 , EC-500
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-322, EC-328 , EC-494
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-193, EC-199 , EC-208 , EC-218 , EC-230 , EC-237 , EC-409 , EC-415 , EC-421 , EC-427
Knock sensor circuit				2	2							3			EC-339

	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-343
Camshaft position sensor (PHASE) circuit	2	2												EC-349
Vehicle speed signal circuit		2	3		3						3			EC-371
Power steering pressure sensor circuit		2				3	3	3	3					EC-373
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-377, EC-380
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-384
PNP switch circuit			3		3	3	3	3	3		3			EC-504
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-535
Electrical load signal circuit						3	3	3	3					EC-540
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-29
ABS actuator and electric unit (control unit)			4											BR-70 or BR-97

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

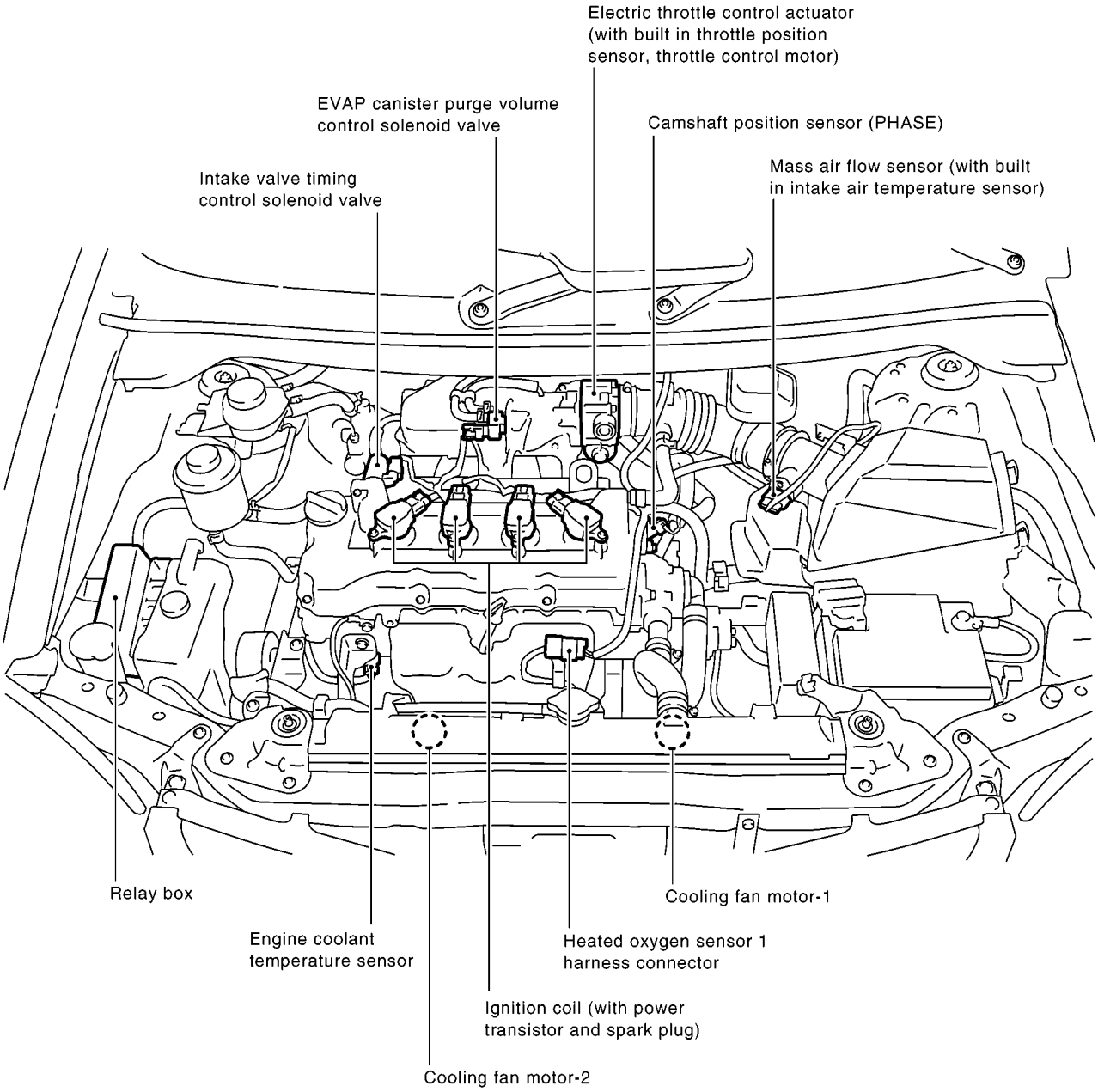
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	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	5												FE-6
	Fuel piping			5	5	5		5	5			5			FE-5
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-16
	Air cleaner														EM-16
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)														EM-16
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														EM-18
Cranking	Battery	1	1	1		1		1	1			1		1	SC-3
	Alternator circuit														SC-24
	Starter circuit	3													SC-13
	Signal plate/Flywheel/Drive plate	6													EM-74
	PNP switch	4													AT-113 or MT-17 (5MT)
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-60
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-74
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		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-50
	Camshaft														EM-35
	Intake valve timing control														EM-50
	Intake valve												3		EM-60
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-21, FE-11
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		LC-3
	Oil level (Low)/Filthy oil														LC-3
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			LC-16
	Thermostat									5					LC-15
	Water pump														LC-14
	Water gallery														LC-11
	Cooling fan									5					LC-17
	Coolant level (low)/Contaminated coolant														LC-11
NATS (Nissan Anti-Theft System)		1	1												EC-70 or EL-352

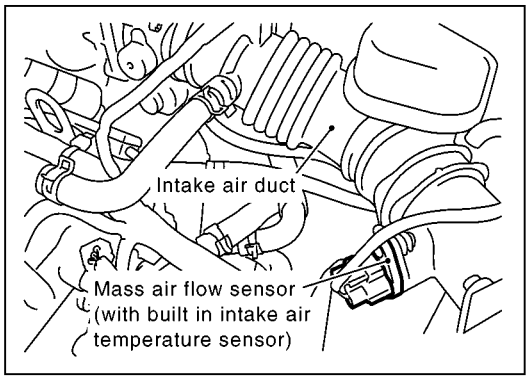
1 - 6: The numbers refer to the order of inspection.

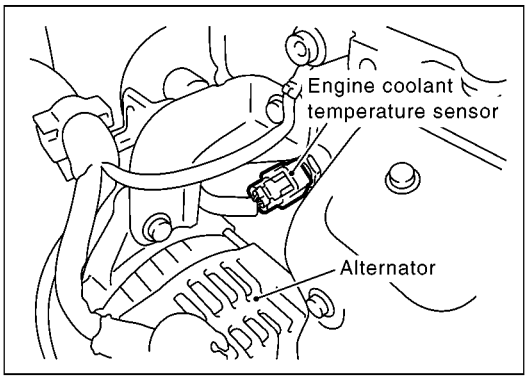
Engine Control Component Parts Location

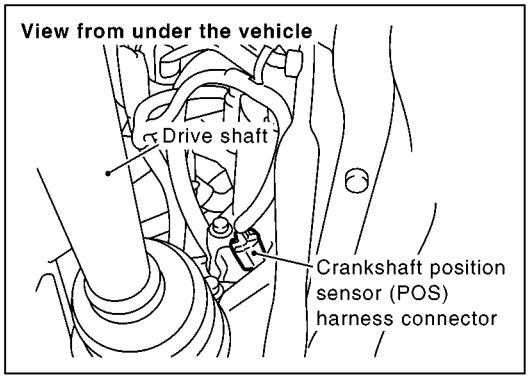
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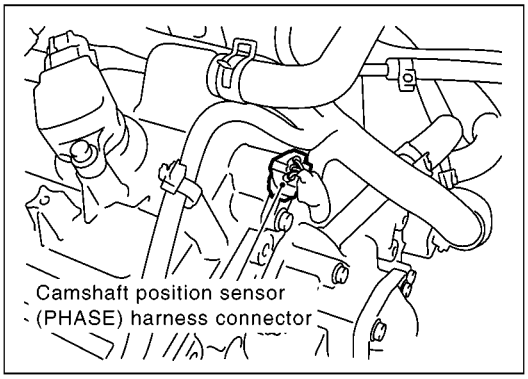


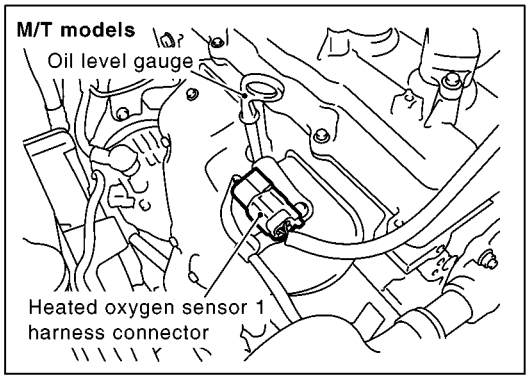
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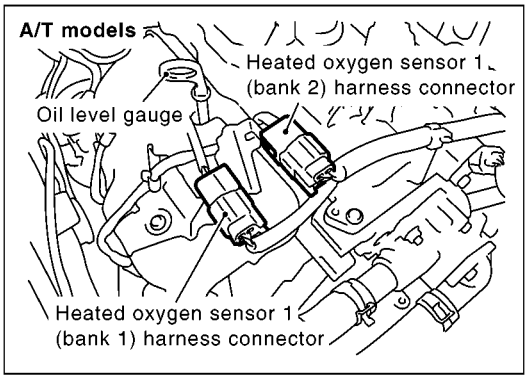

Intake air duct
Mass air flow sensor
(with built in intake air
temperature sensor)

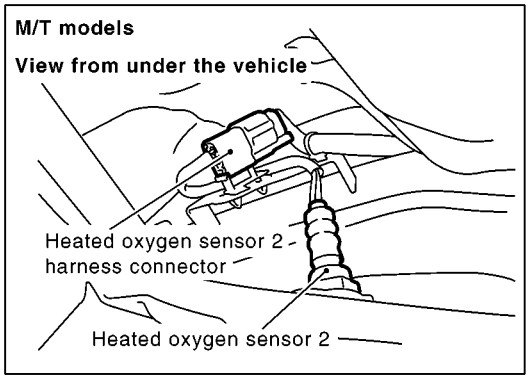

Engine coolant
temperature sensor
Alternator

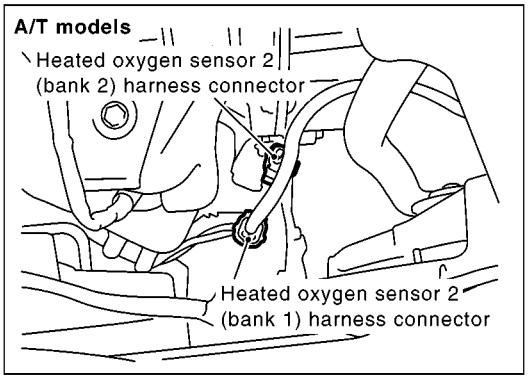

View from under the vehicle
Drive shaft
Crankshaft position
sensor (POS)
harness connector


Camshaft position sensor
(PHASE) harness connector

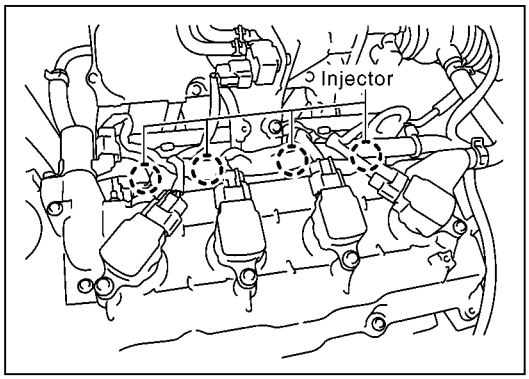

M/T models
Oil level gauge
Heated oxygen sensor 1
harness connector

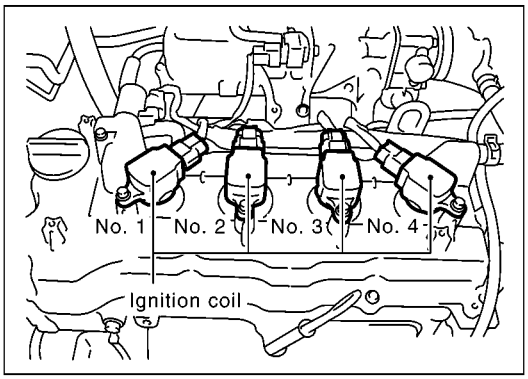

A/T models
Heated oxygen sensor 1
(bank 2) harness connector
Oil level gauge
Heated oxygen sensor 1
(bank 1) harness connector

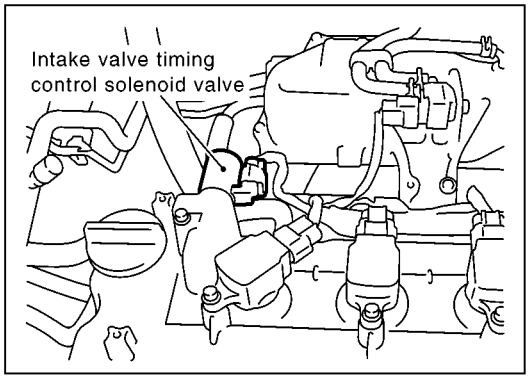

M/T models
View from under the vehicle
Heated oxygen sensor 2
harness connector
Heated oxygen sensor 2

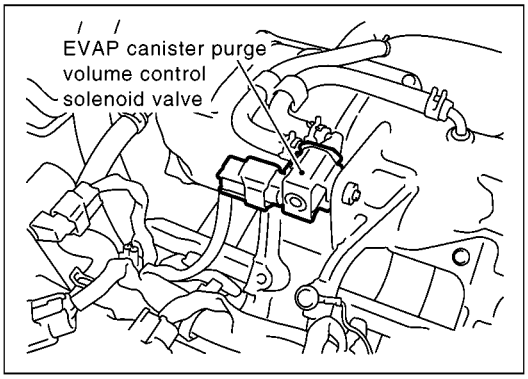

A/T models
Heated oxygen sensor 2
(bank 2) harness connector
Heated oxygen sensor 2
(bank 1) harness connector

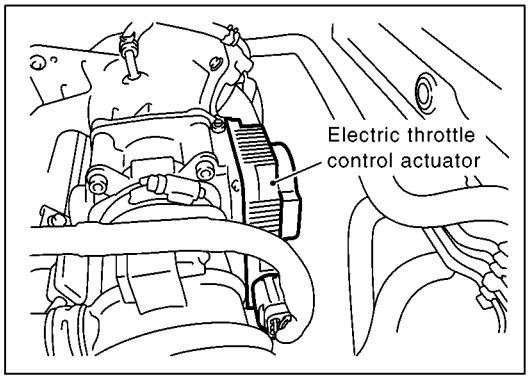
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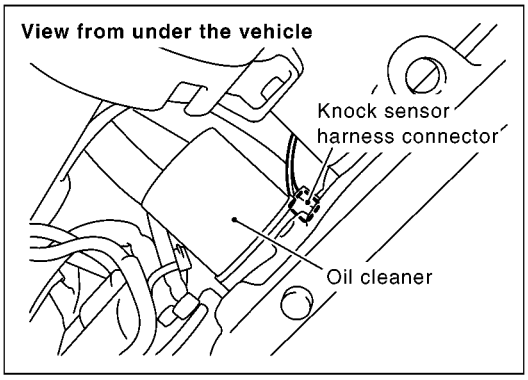

Injector

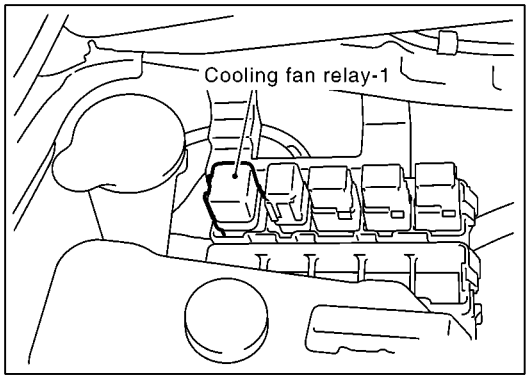

No. 1
No. 2
No. 3
No. 4
Ignition coil

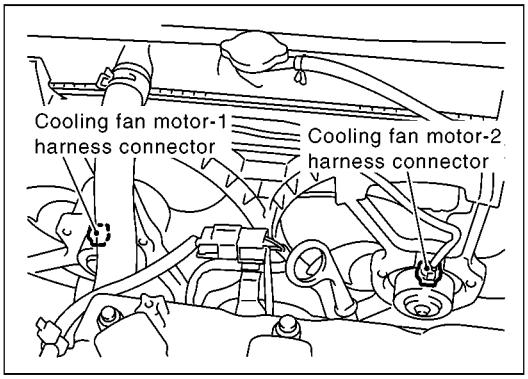

Intake valve timing
control solenoid valve


EVAP canister purge
volume control
solenoid valve

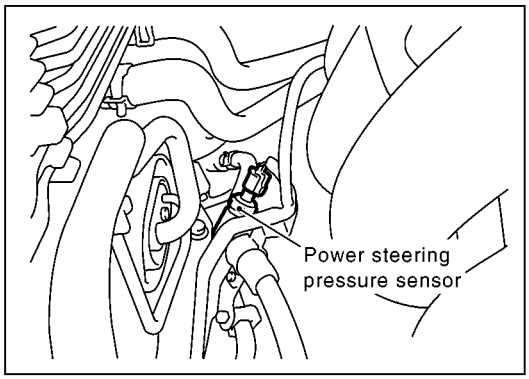

Electric throttle
control actuator

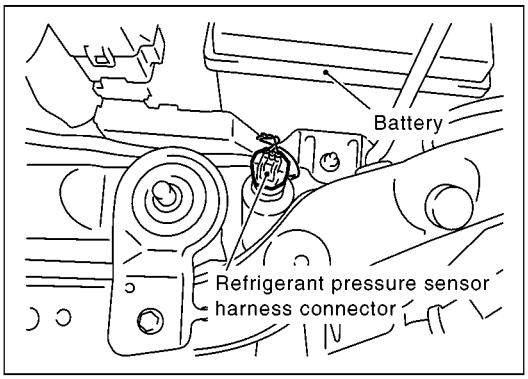

View from under the vehicle
Knock sensor
harness connector
Oil cleaner

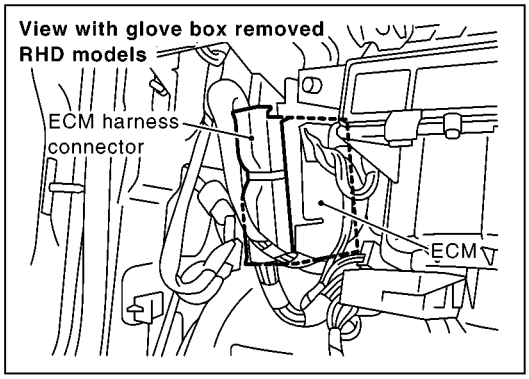

Cooling fan relay-1

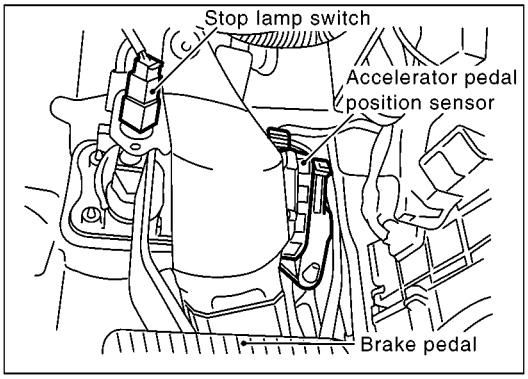

Cooling fan motor-1
harness connector
Cooling fan motor-2
harness connector

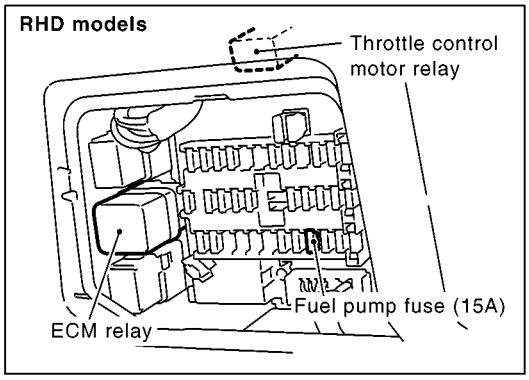
MBIB1004E

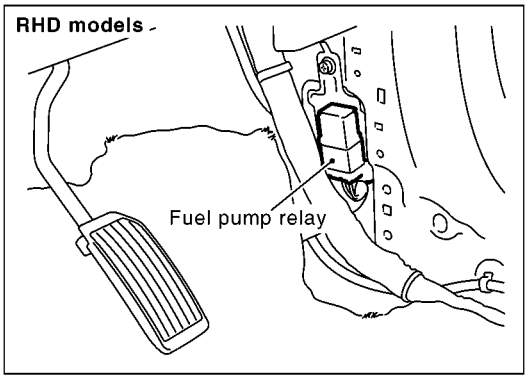

Power steering
pressure sensor

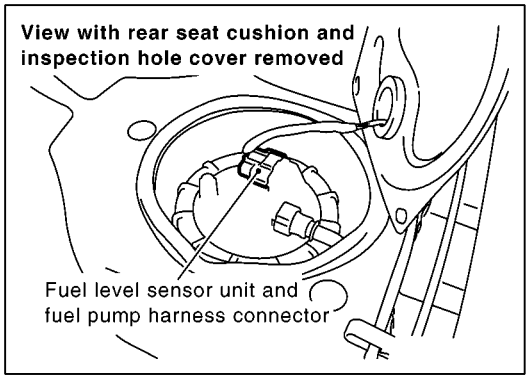

Battery
Refrigerant pressure sensor
harness connector

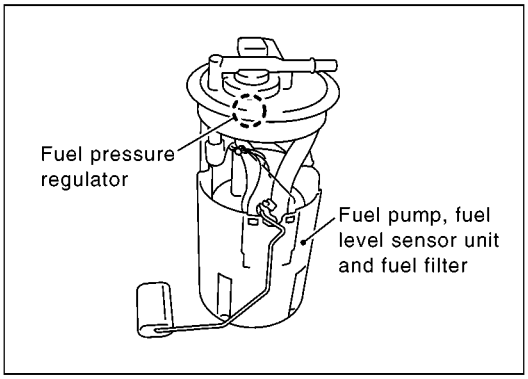

View with glove box removed
RHD models
ECM harness
connector
ECM


Stop lamp switch
Accelerator pedal
position sensor
Brake pedal


RHD models
Throttle control
motor relay
Fuel pump fuse (15A)
ECM relay


RHD models
Fuel pump relay

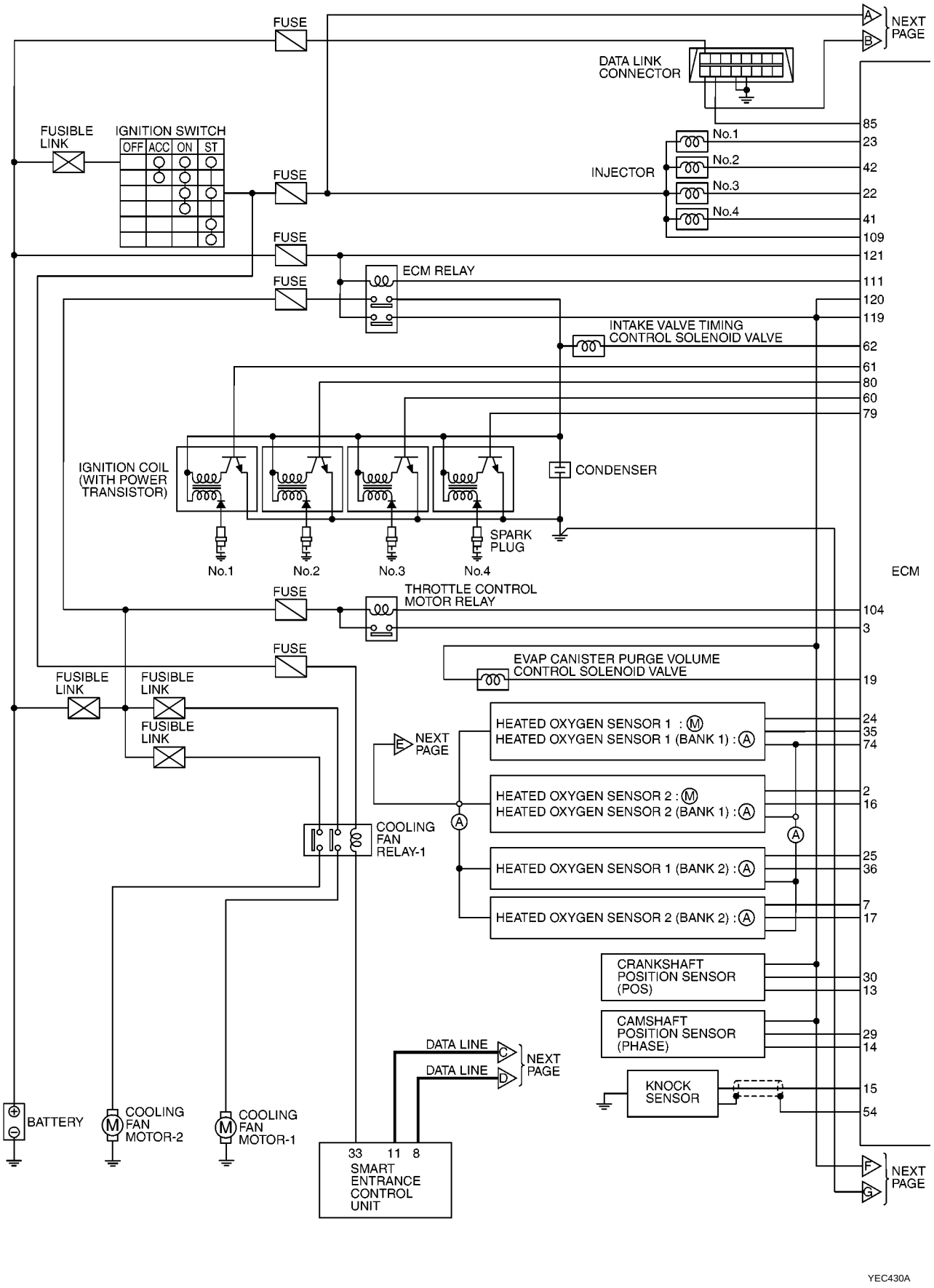

View with rear seat cushion and
inspection hole cover removed
Fuel level sensor unit and
fuel pump harness connector


Fuel pressure
regulator
Fuel pump, fuel
level sensor unit
and fuel filter

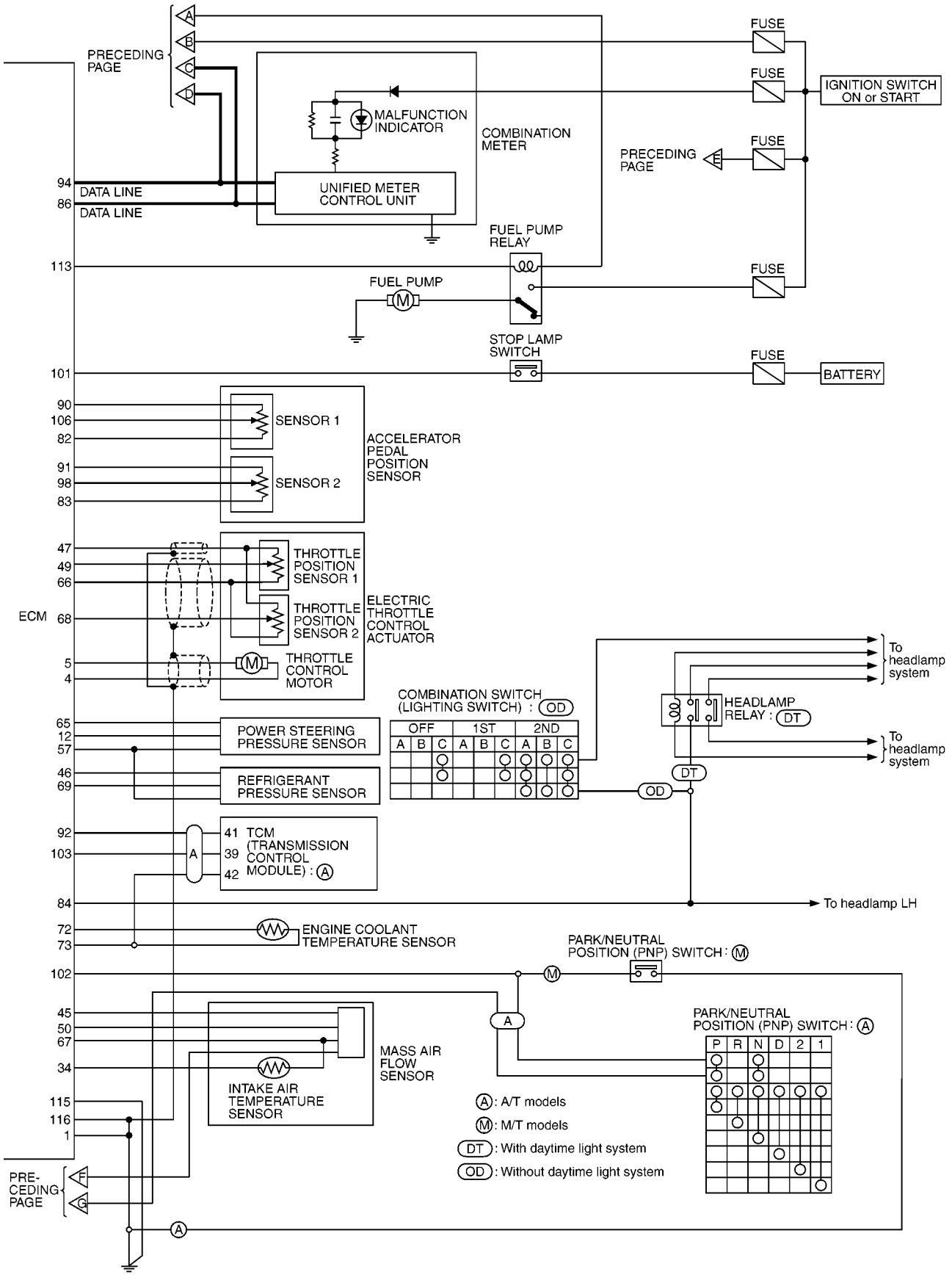
MBIB1005E

Circuit Diagram

EBS00QH1



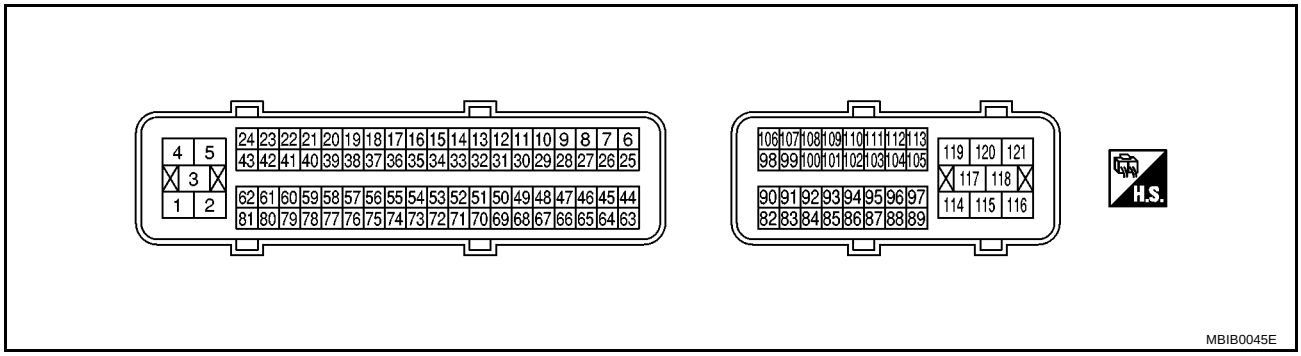
YEC430A


PRECEDING PAGE
A
B
C
D
FUSE
FUSE
IGNITION SWITCH ON or START
MALFUNCTION INDICATOR
COMBINATION METER
FUSE
PRECEDING PAGE
E
94 DATA LINE
86 DATA LINE
UNIFIED METER CONTROL UNIT
FUEL PUMP RELAY
113
FUEL PUMP
M
FUSE
STOP LAMP SWITCH
FUSE
101
BATTERY
90
106
82
SENSOR 1
91
98
83
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
47
49
66
THROTTLE POSITION SENSOR 1
ECM
68
THROTTLE POSITION SENSOR 2
ELECTRIC THROTTLE CONTROL ACTUATOR
5
4
M
THROTTLE CONTROL MOTOR
COMBINATION SWITCH (LIGHTING SWITCH) : OD
OFF 1ST 2ND
A B C A B C A B C
To headlamp system
HEADLAMP RELAY : DT
To headlamp system
DT
OD
65
12
57
POWER STEERING PRESSURE SENSOR
46
69
REFRIGERANT PRESSURE SENSOR
92
103
A
41 TCM
39 (TRANSMISSION CONTROL
42 MODULE) : A
84
To headlamp LH
72
73
ENGINE COOLANT TEMPERATURE SENSOR
PARK/NEUTRAL POSITION (PNP) SWITCH : M
102
M
45
50
67
34
MASS AIR FLOW SENSOR
INTAKE AIR TEMPERATURE SENSOR
A
PARK/NEUTRAL POSITION (PNP) SWITCH : A
P R N D 2 1
115
116
1
A : A/T models
M : M/T models
DT : With daytime light system
OD : Without daytime light system
PRE-CEDING PAGE
F
G
A

YEC431A

ECM Harness Connector Terminal Layout

EBS00QH2

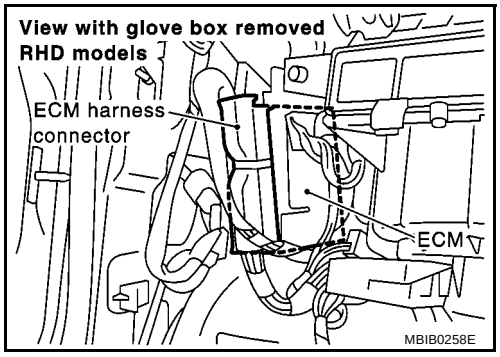


ECM Terminals and Reference Value

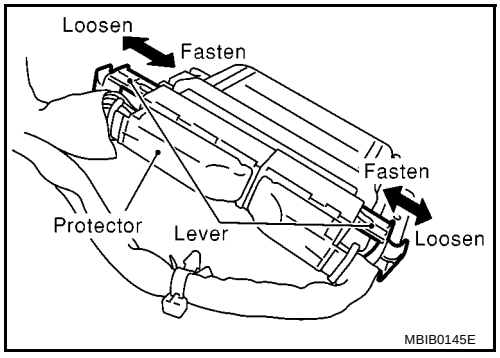
EBS00QH3

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



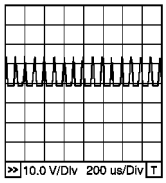
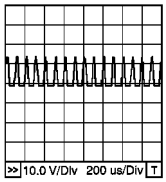
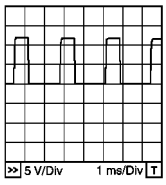
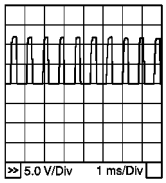
ECM INSPECTION TABLE

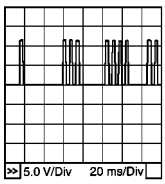
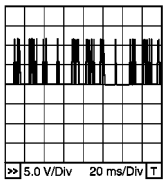
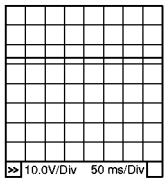
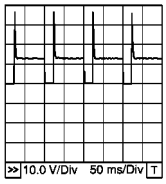
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

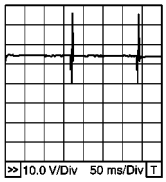
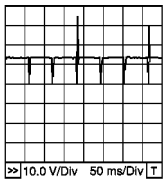
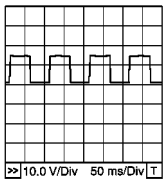
CAUTION:

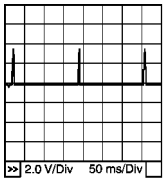
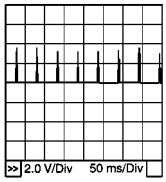
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

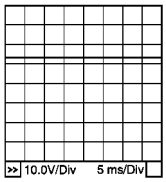
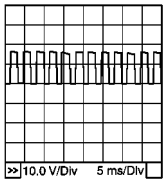
M/T Models

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
2	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,800 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch “ON”] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,800 rpm	BATTERY VOLTAGE (11 - 14V)
3	R	Throttle control motor power supply	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch “ON”]** ● Engine stopped ● Shift lever position is “1st” ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch “ON”]** ● Engine stopped ● Shift lever position is “1st” ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Ignition switch “ON”] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V
30	B	Camshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch “ON”]**	Approximately 5V
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch “ON”]**	Approximately 5V
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch “ON”]**	Approximately 5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully depressed	Less than 4.75V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 2.1V
54	B	Sensor ground (Knock sensor shield circuit)	**[Engine is running]** ● Idle speed	Approximately 0V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

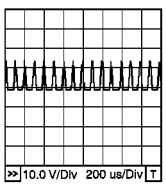
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly.	7 - 10V★  PBIB0532E
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully depressed	More than 0.36V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

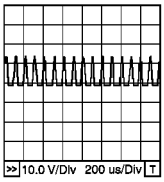
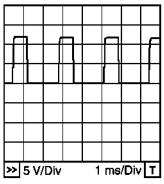
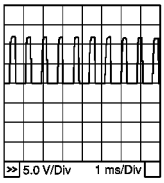
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V
85	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	R	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.3V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.8V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch "ON"]** ● Gear position is neutral	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V
109	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

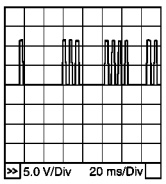
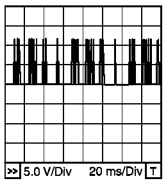
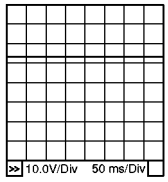
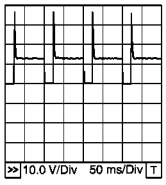
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
113	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 1 second after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

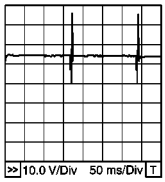
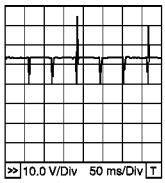
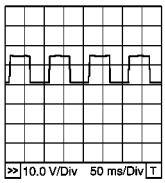
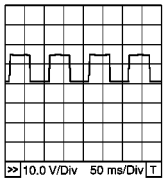
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

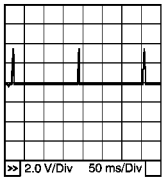
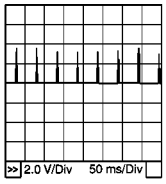
A/T Models

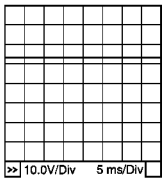
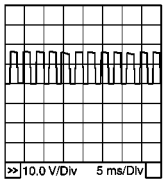
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
2	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
7	W/R	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14)
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
25	R/B	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V
30	B	Camshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch "ON"]**	Approximately 5V
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.5 - 2.1V
54	B	Sensor ground (Knock sensor shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly.	7 - 10V★  PBIB0532E
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	More than 0.36V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V
85	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	R	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.3V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.8V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
102	P	PNP switch	**[Ignition switch "ON"]** ● Gear position is "P" or "N"	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
113	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 1 second after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function

EBS00QH4

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-II 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.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II 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.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1: 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
- Others

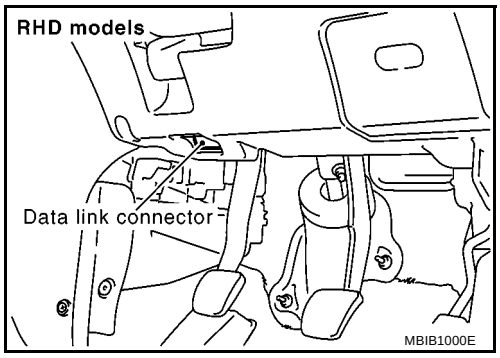
ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		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		×		×	×		×	×
		Vehicle speed signal		×	×	×	×			
		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		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Electrical load signal				×	×			
	OUTPUT	Injectors				×	×	×		
		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			×	×	×			

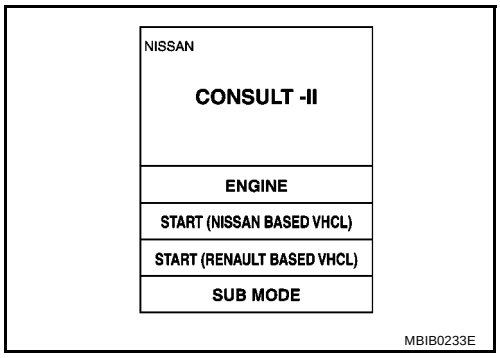
X: Applicable
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-60, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .

CONSULT-II INSPECTION PROCEDURE

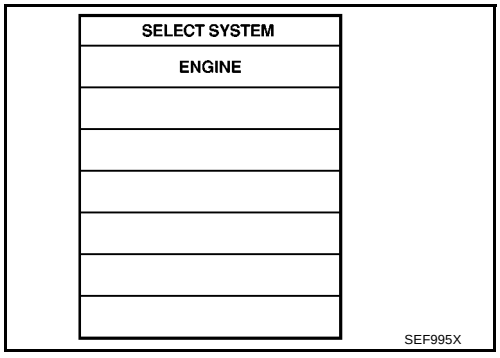
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” and “CONSULT-II CONVERTER” to data link connector, which is located under the drivers side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

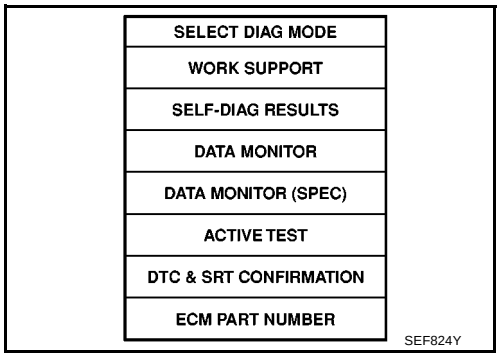


5. Touch “ENGINE”.
   If “ENGINE”, is not indicated, go to “CONSULT-II Data Link Connector (DLC) Circuit”, GI-37.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation 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 the coefficient of self-learning control 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-20, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-20, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2*2	● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: 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 TRIM-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 TRIM-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.
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.

*1: The items are the same as those of 1st trip freeze frame data.
*2: A/T models.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	Description	Remarks
ENG SPEED [rpm]	×	×		● Indicates the engine speed computed from the signals 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.
B/FUEL SCHDL [msec]		×		● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]*		×			
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.
HO2S1 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S1 (B2) [V]*	×				
HO2S2 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]*	×				
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.
HO2S1 MNTR (B2) [RICH/LEAN]*	×				
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.
HO2S2 MNTR (B2) [RICH/LEAN]*	×				
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.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
ACCEL SEN 1 [V]	×	×		● The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×				
THRTL SEN 1 [V]	×	×		● The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×				
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 [ON/OFF] condition of the starter signal computed from the signals of the crankshaft position sensor (POS), camshaft position sensor (PHASE) 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 oil pressure switch as determined by the power steering oil pressure signal 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.	
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.
INJ PULSE-B2 [msec]*					
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 airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]				● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
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 advanced angle.	
INT/V SOL (B1) [%]				● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... intake valve timing control is operating. OFF ... Intake valve timing control is not operating.	
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 [ON/OFF]				● Indicates the condition of the cooling fan (determined by ECM according to the input signals). ON ... 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.	
HO2S1 HTR (B2) [ON/OFF]*					
HO2S2 HTR (B1) [ON/OFF]				● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]*					
VEHICLE SPEED [km/h] or [mph]	×			● The vehicle speed computed from the vehicle speed signal sent from TCM or combination meter 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.	
TRVL AFTER MIL [km] or [mile]				● Distance traveled while MI is activated.	
O2SEN HTR DTY [%]				● Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
AC PRESS SEN [V]	×			● The signal voltage from the refrigerant pressure sensor is displayed.	
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					
CAN COMM [OK/NG]			×	● Indicates the communication condition of CAN communication line.	● These items are not displayed in "SELECTION FROM MENU" mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		

*: For A/T models.

NOTE:

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

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
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.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]*		×		

*: For A/T models

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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	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: N (A/T models) Neutral (M/T models) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN*	● Ignition switch: ON ● Turn the cooling fan “ON” and “OFF” with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II 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-II.	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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-61, "SYSTEM READINESS TEST (SRT) CODE" .

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

M/T models

Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-208
	HO2S1 (B1) P0134		EC-230
	HO2S1 (B1) P1143		EC-409
	HO2S1 (B1) P1144		EC-421
H02S2	HO2S2 (B1) P0139		EC-262
	HO2S2 (B1) P1146		EC-433
	HO2S2 (B1) P1147		EC-452

A/T models

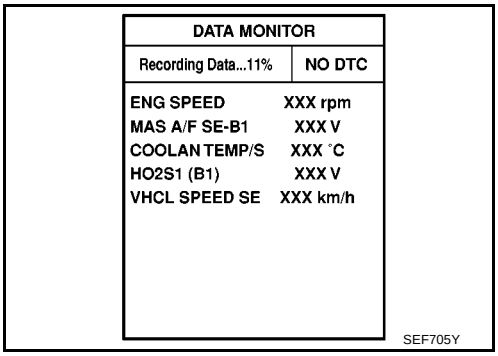
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-218
	HO2S1 (B1) P0134		EC-237
	HO2S1 (B1) P1143		EC-415
	HO2S1 (B1) P1144		EC-427
	HO2S1 (B2) P0153		EC-218
	HO2S1 (B2) P0154		EC-237
	HO2S1 (B2) P1163		EC-415
	HO2S1 (B2 P1164		EC-427
H02S2	HO2S2 (B1) P0139		EC-270
	HO2S2 (B1) P1146		EC-441
	HO2S2 (B1) P1147		EC-460
	HO2S2 (B2 P0159		EC-270
	HO2S2 (B2) P1166		EC-441
	HO2S2 (B2) P1167		EC-460

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

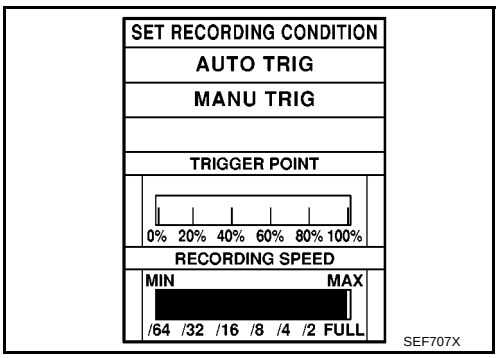
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the



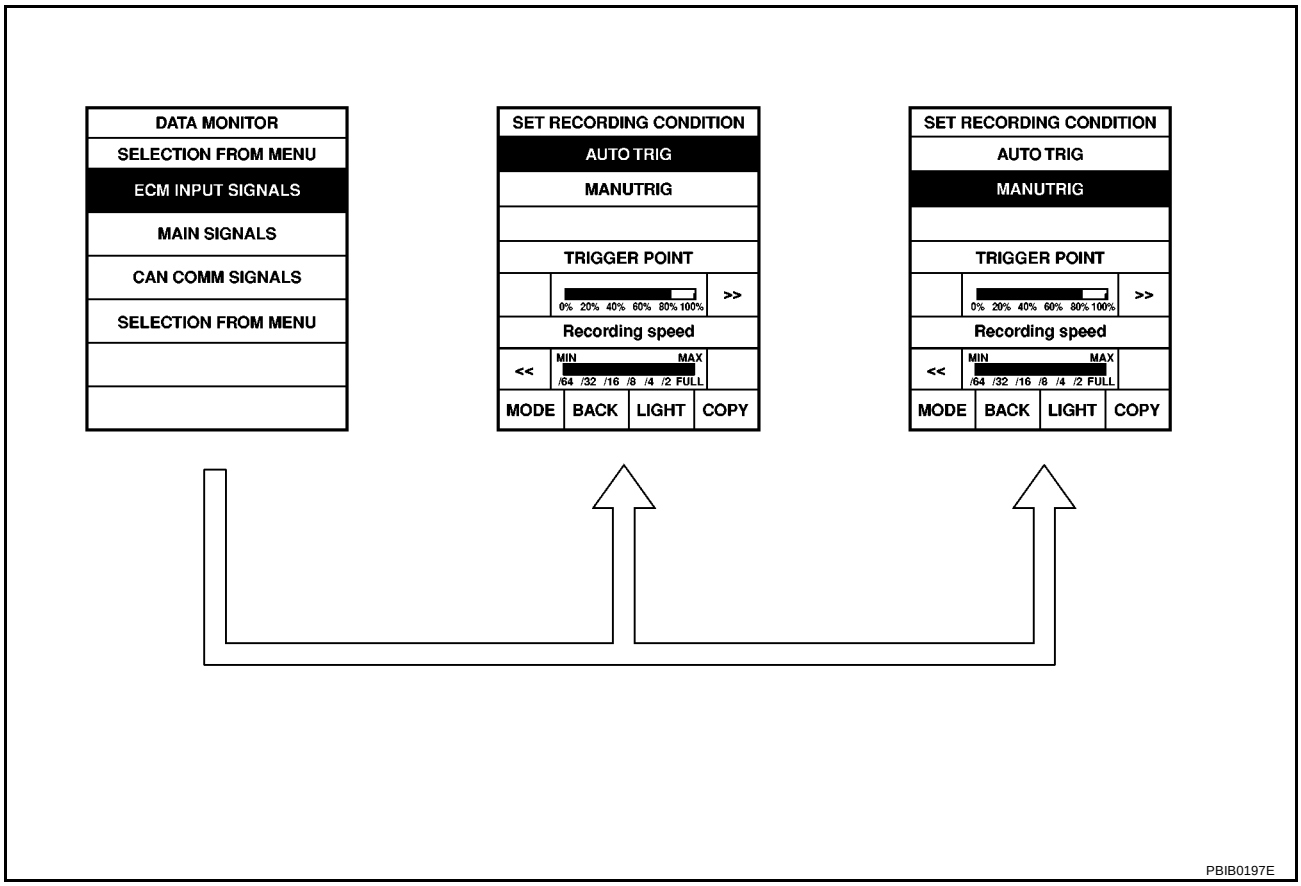
recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.



Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in “HOW TO PERPERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21.)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

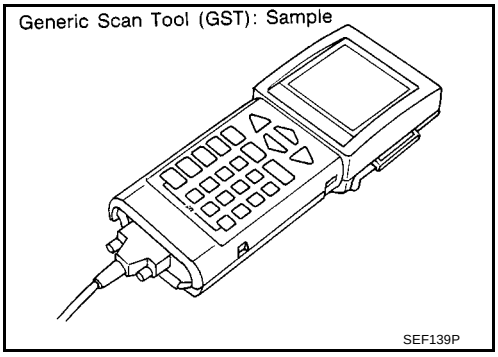


Generic Scan Tool (GST) Function

EBS00QH5

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 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.

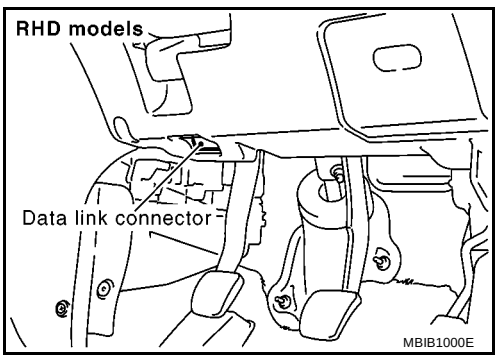


FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-60, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode is not applicable on this vehicle.
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

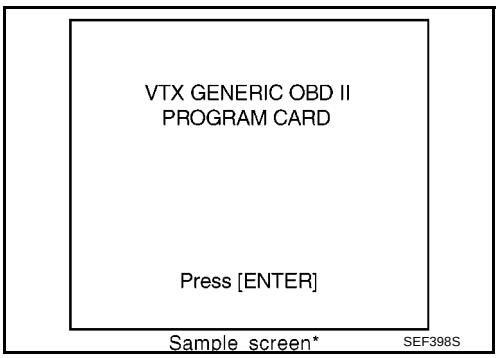
GST INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under the driver side dash panel near the fuse box cover.
3. Turn ignition switch ON.



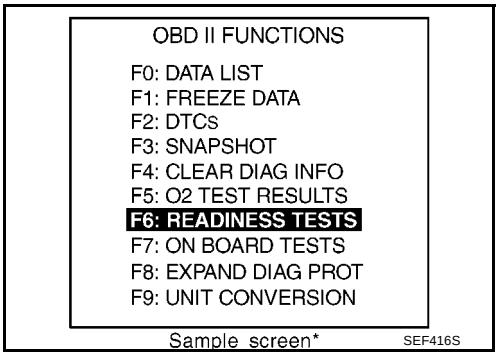
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QH6

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		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T models) Neutral (M/T models) ● No-load	Idle	Approx. 1.0 - 1.7V
		2,500 rpm	Approx. 1.5 - 2.1V
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.5 - 3.0 msec
		2,000 rpm	1.2 - 3.0 msec
A/F ALPHA-B1 A/F ALPHA-B2*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	75% - 125%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1) HO2S2 (B2)*2	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 MNTR (B1) HO2S1 MNTR (B2)*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1) HO2S2 MNTR (B2)*2	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1 ACCEL SEN2*1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
THRTL SEN1 THRTL SEN2*1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	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	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
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 (A/T models) Neutral (M/T models)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2*2	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.5 msec
		2,000 rpm	1.5 - 3.5 msec

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	M/T: 8°±5° BTDC A/T: 10°±5° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	15 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	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 conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 99°C (210°F) or less	OFF
		Engine coolant temperature is 100°C (212°F) or more	ON

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)*2	● Engine: After warming up ● Engine speed: Below 3,200 rpm (A/T models) Below 3,600 rpm (M/T models)		ON
	● Engine speed: Above 3,200 rpm (A/T models) Above 3,600 rpm (M/T models)		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)*2	● Engine speed: Below 3,600 rpm after the following conditions are met (A/T models). Below 3,800 rpm after the following conditions are met (M/T models). – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load		ON
	● Engine speed: Above 3,600 rpm (A/T models) Above 3,800 rpm (M/T models)		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,280 km (0 - 40,565 mile)
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80° (176°F) ● Engine speed: Below 3,200 rpm (A/T models) Below 3,600 rpm (M/T models)		Approx. 50%
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● Air conditioner switch: OFF		1.0 - 4.0V
VEH SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
CAN COMM	● Ignition switch: ON		OK
CAN CIRC 1			OK
CAN CIRC 2			OK or UNKWN
CAN CIRC 3			OK or UNKWN
CAN CIRC 4			OK
CAN CIRC 5			UNKWN
CAN CIRC 6			OK
CAN CIRC 7			UNKWN

*1: 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.
*2: These items are displayed with A/T models

Major Sensor Reference Graph in Data Monitor Mode

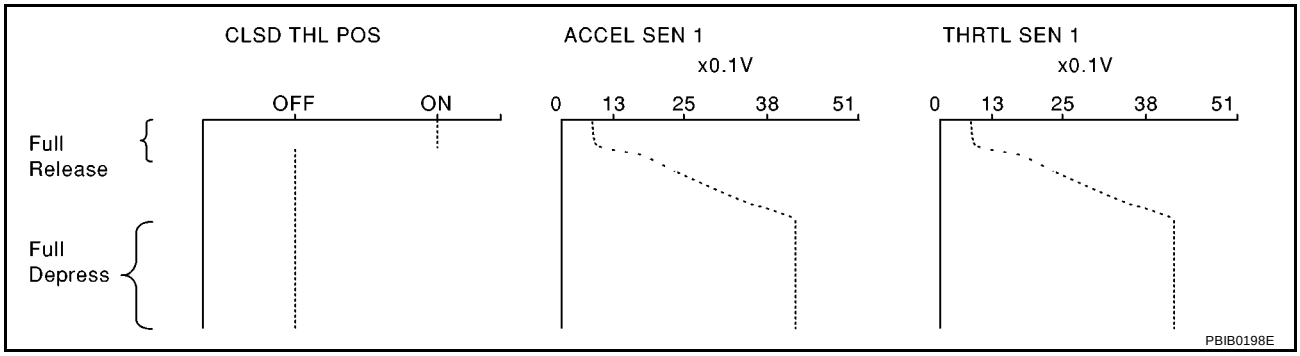
EBS00QH7

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

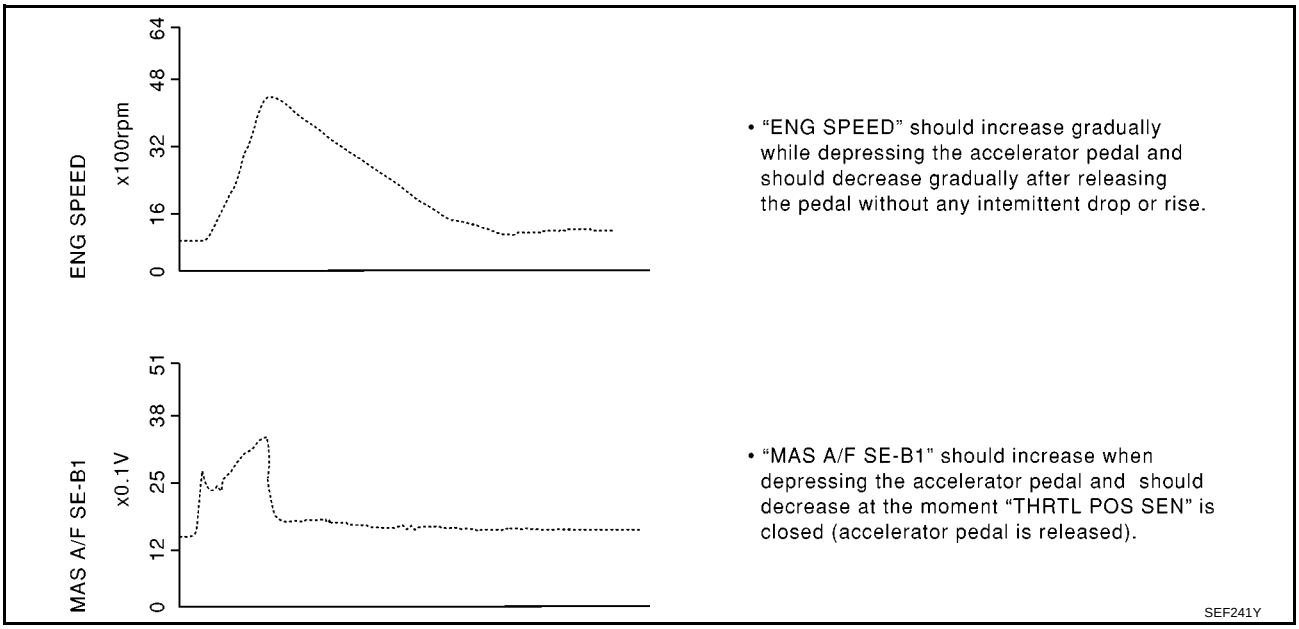
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch “ON” and with selector lever in “D” position (A/T models) or with shift lever in “1st” position (M/T models).

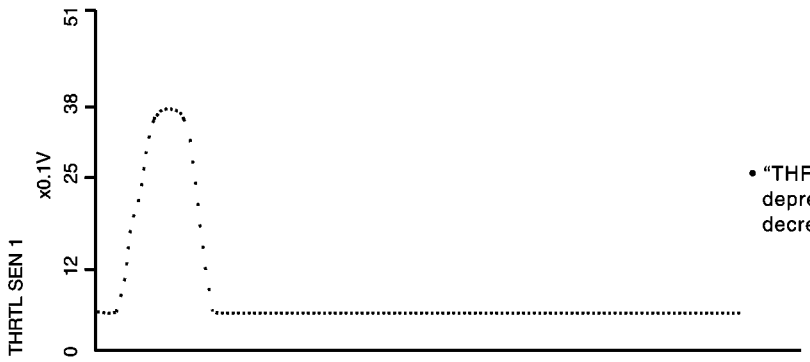
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



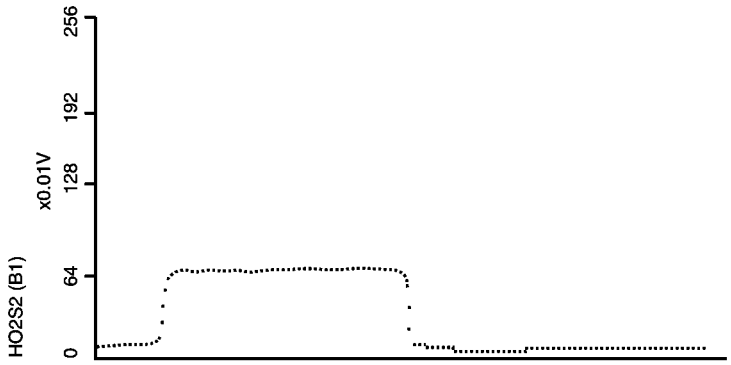
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

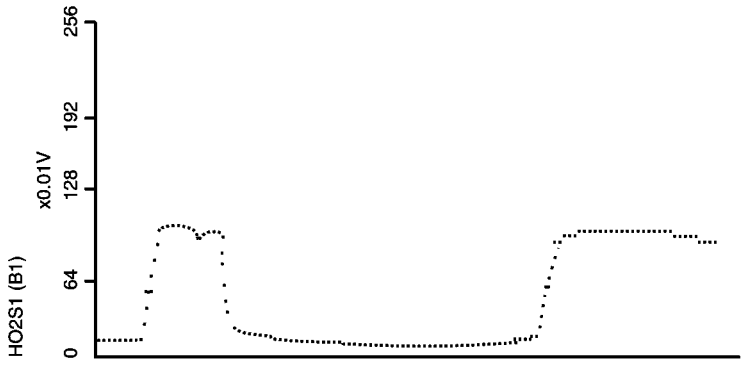




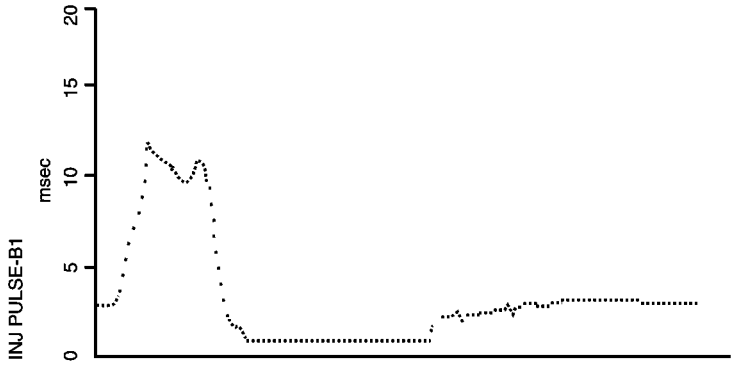
• "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



• "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



• "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



• "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB0668E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

EBS00QH8

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” 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 MIL.
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/B2 (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)

Testing Condition

EBS00QH9

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (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*1
- Electrical load: Not applied*2
- Engine speed: Idle

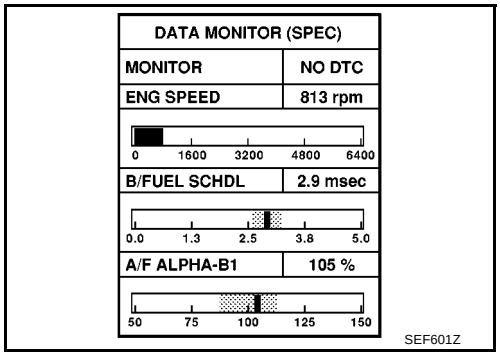
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Steering wheel is straight ahead.

Inspection Procedure

EBS00QHA

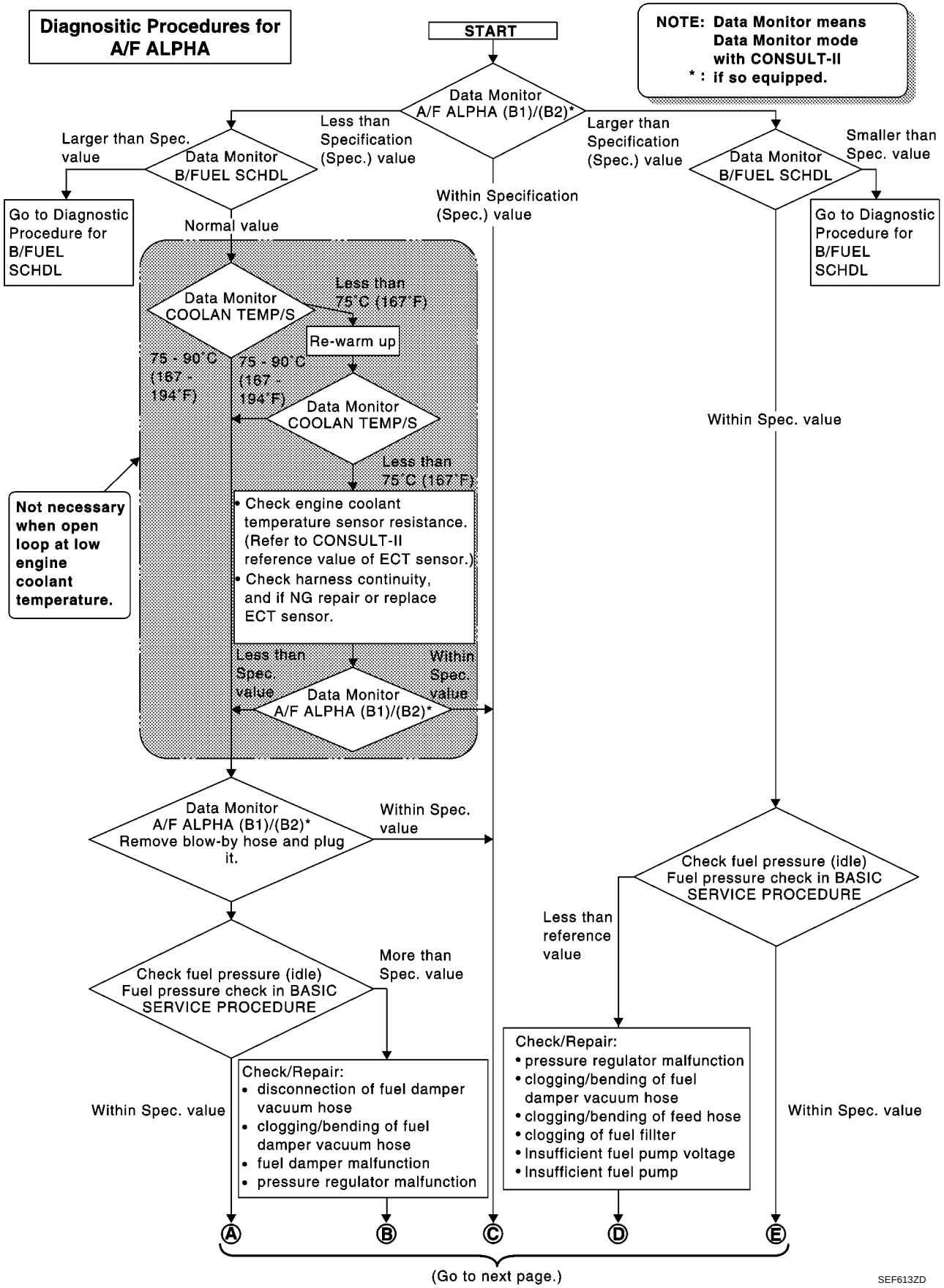
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

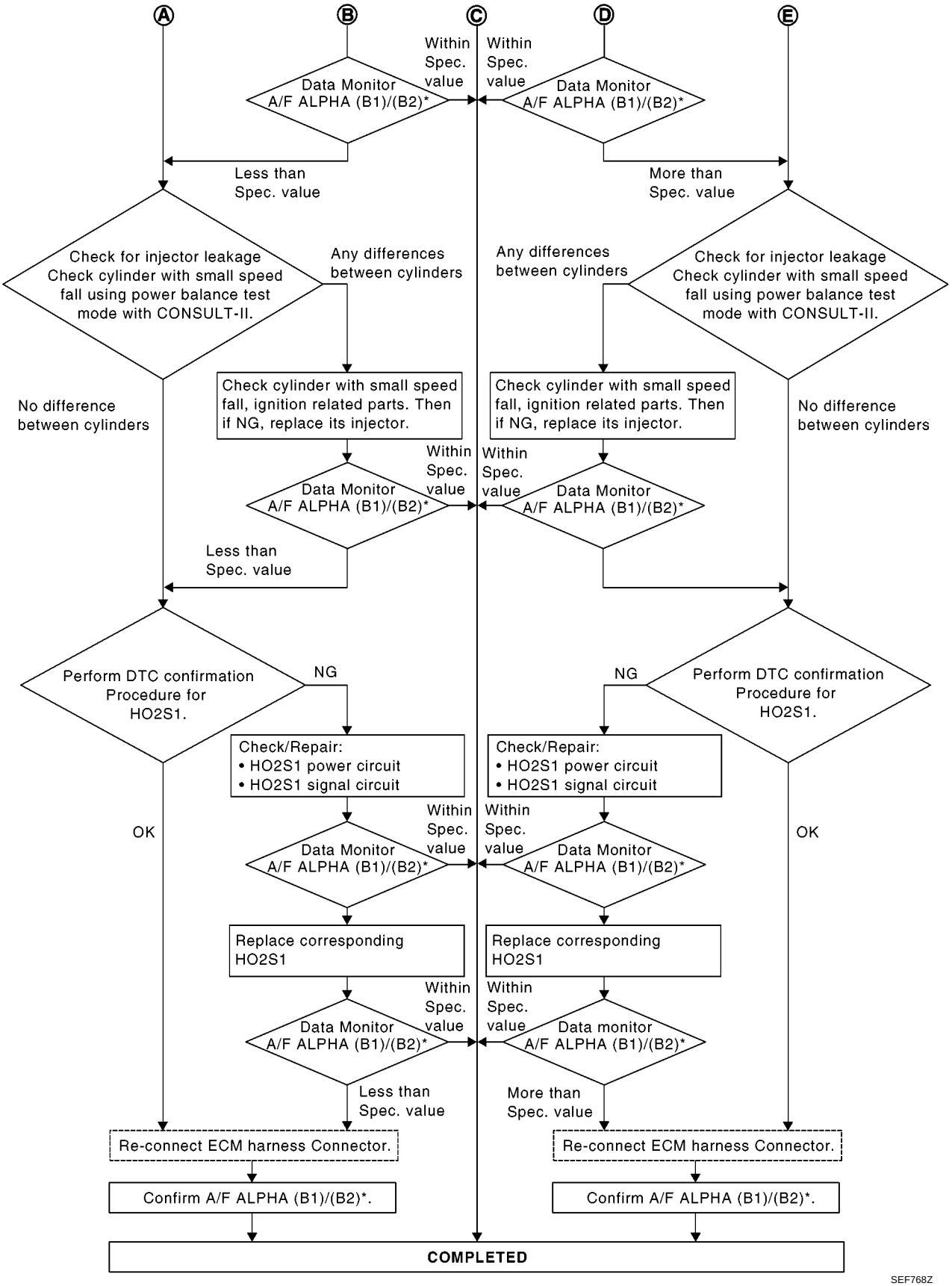
1. Perform EC-87, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1/B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-135, "Diagnostic Procedure" .



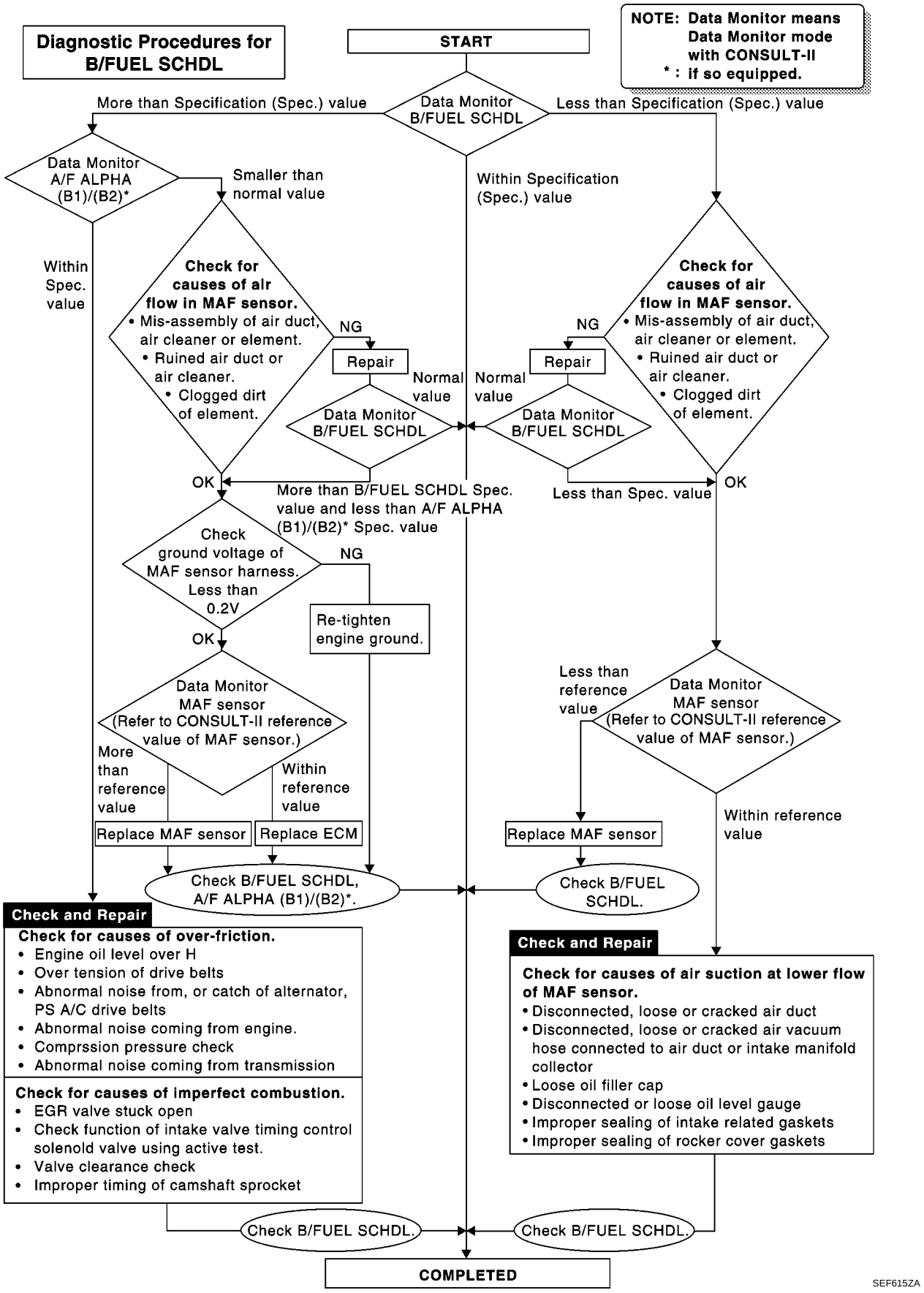
Diagnostic Procedure

EBS00QHB




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
NG
Re-tighten engine ground.
OK
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check B/FUEL SCHDL.
Less than Spec. value
Less than reference value
Replace MAF sensor
Check B/FUEL SCHDL.
Within reference value
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS00QHC

Intermittent incidents (I/I) may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common I/I Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “[1t]”.
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

EBS00QHD

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21, “Incident Simulation Tests”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21, “Incident Simulation Tests”.

OK or NG

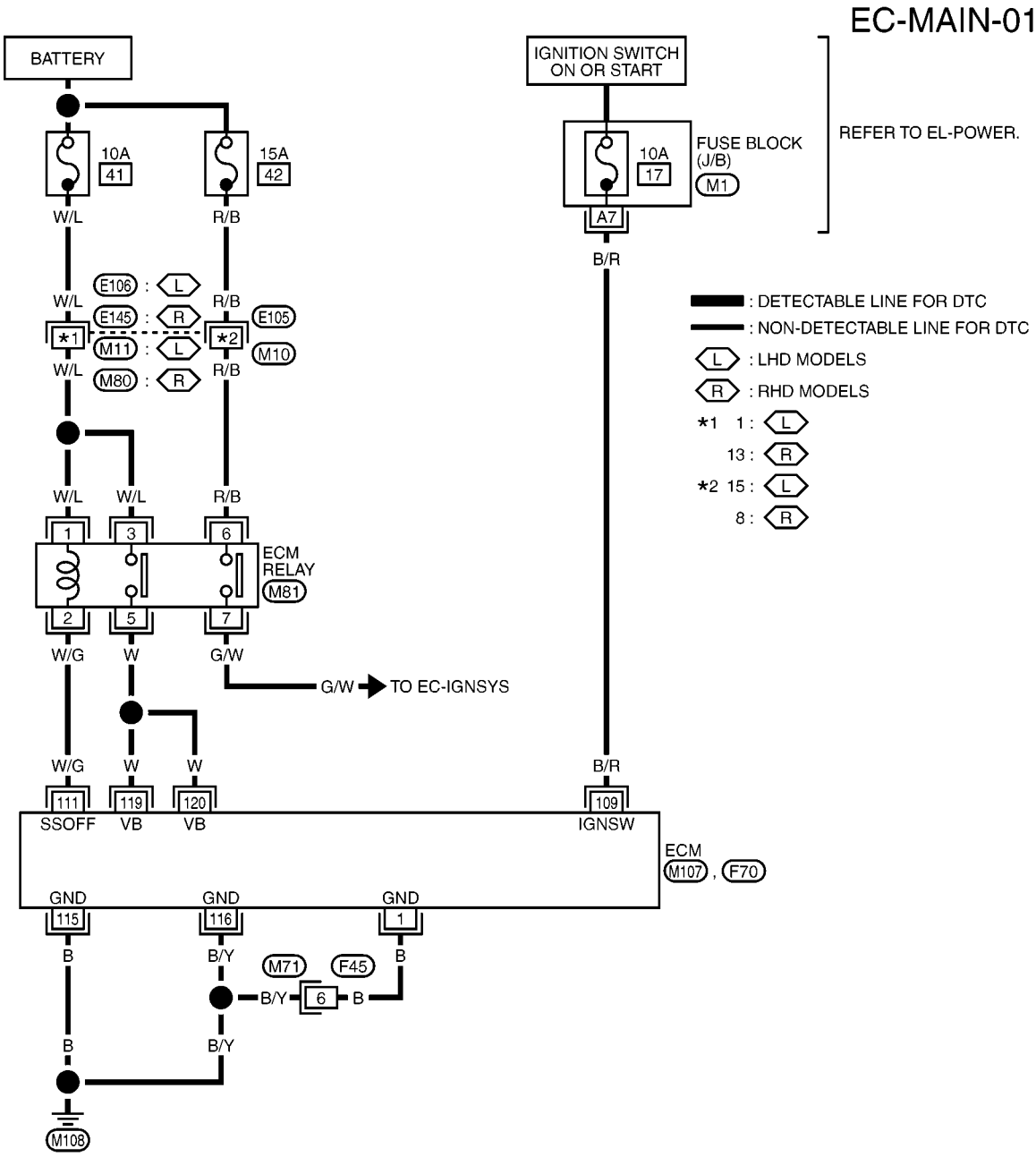
OK >> **INSPECTION END**
NG >> Repair or replace.

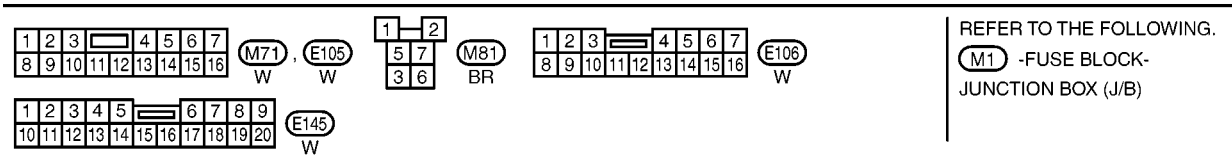
POWER SUPPLY CIRCUIT FOR ECM

PFP:24110

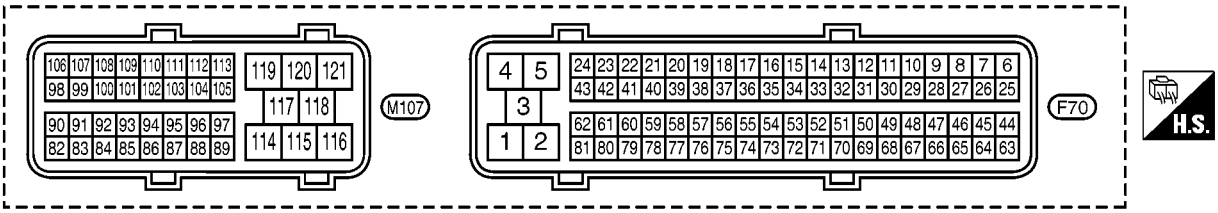
Wiring Diagram

EBS00QHE





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)



YEC432A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
109	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For 3 seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● 3 seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QHF

1. INSPECTION START

Start engine.

Is engine running?

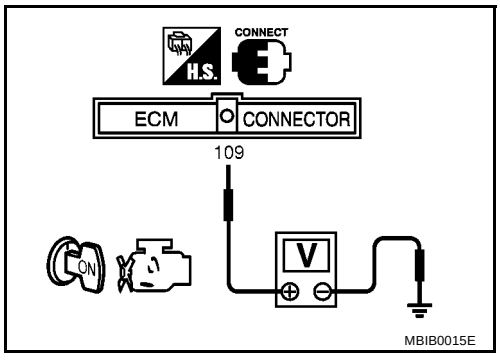
Yes or No

Yes >> GO TO 10.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- 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 ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

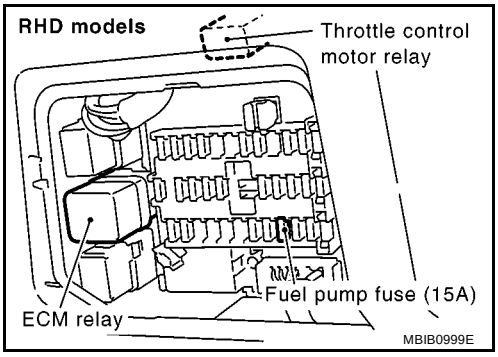
Check the following.

- Harness connectors M71, F45
- Harness for open or short between ECM and engine ground

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

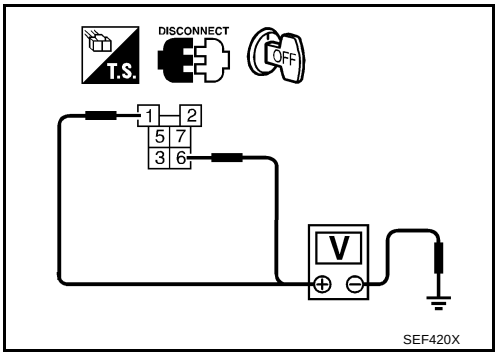
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminals 1 and 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- 15A fuse
- Harness for open or short between ECM relay and battery

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

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM RELAY

Refer to EC-144, "Component Inspection" .

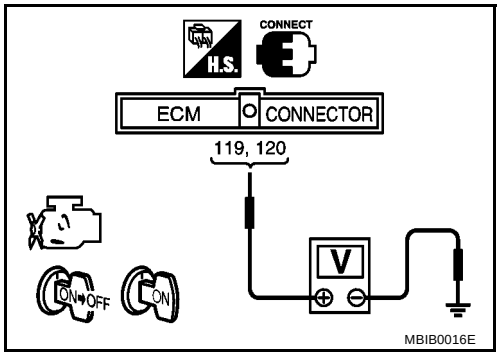
OK or NG

OK >> GO TO EC-514, "IGNITION SIGNAL" .
NG >> Replace ECM relay.

10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Stop engine and wait at least 10 seconds.
2. Turn ignition switch “ON” and then “OFF”.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

   Voltage: After turning ignition switch “OFF”, battery voltage will exist for a few seconds, then drop approximately 0V.

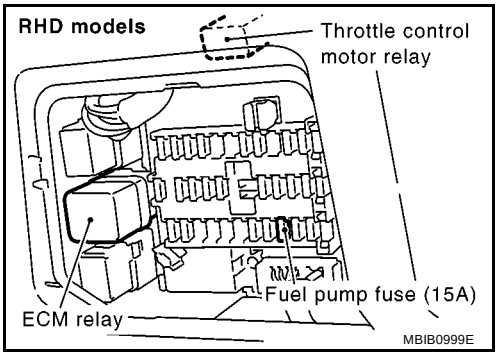


OK or NG

OK >> GO TO 15.
NG (Battery voltage does not exist.)>>GO TO 11.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.

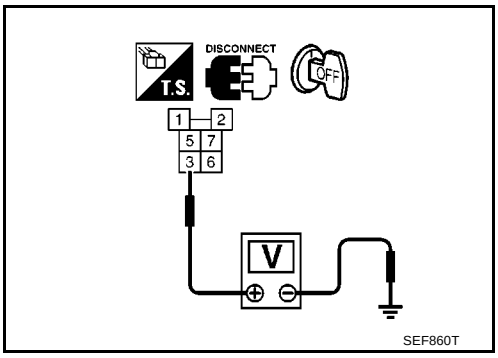


2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.



12. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and M11 (LHD models)
- Harness for open or short between ECM relay and M80 (RHD models)

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

13. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK ECM RELAY

Refer to EC-144, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace ECM relay.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between ECM and engine ground

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

17. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> **INSPECTION END**

Component Inspection

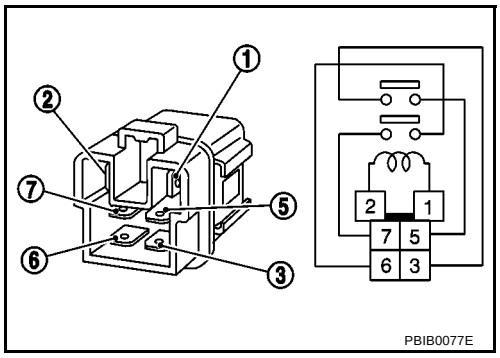
EBS00QHG

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

EBS00QHH

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.

On Board Diagnosis Logic

EBS00QHI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM can not communicate to other control units. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted).
U1001*2 1001*2			

***1: This self-diagnosis has the one trip detection logic.**
***2: The MI will not light up for this diagnosis.**

DTC Confirmation Procedure

EBS00QHJ

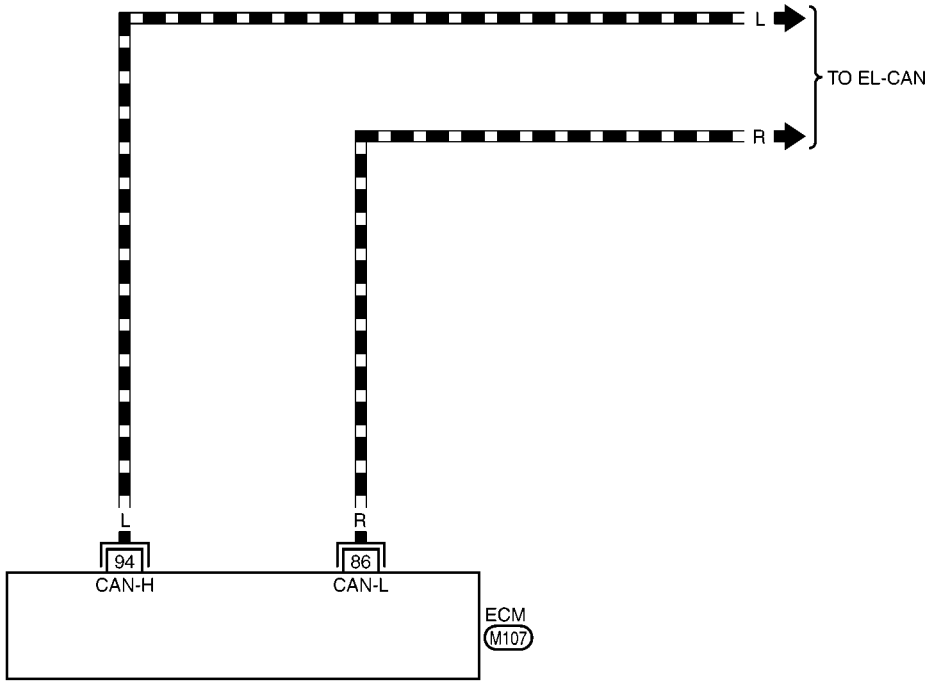
1. Turn ignition switch “ON” and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-147, "Diagnostic Procedure" .

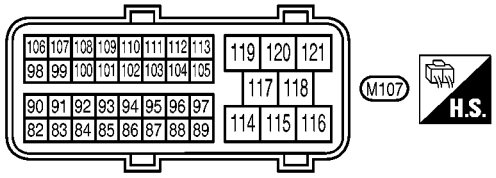
Wiring Diagram

EBS00QHK

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





YEC433A

Diagnostic Procedure

EBS00QHL

1. INSPECTION START

1. Turn ignition switch “ON”.
2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II.
3. Print out the CONSULT-II screen.

A/T models with ESP

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	OK
CAN CIRC 3	OK
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0122E

A/T models without ESP

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	OK
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0180E

M/T models with ESP

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	OK
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0123E

M/T models without ESP

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0179E

>> Go to “CAN COMMUNICATION”, EL-459.

DTC P0011 IVT CONTROL

PFP:23796

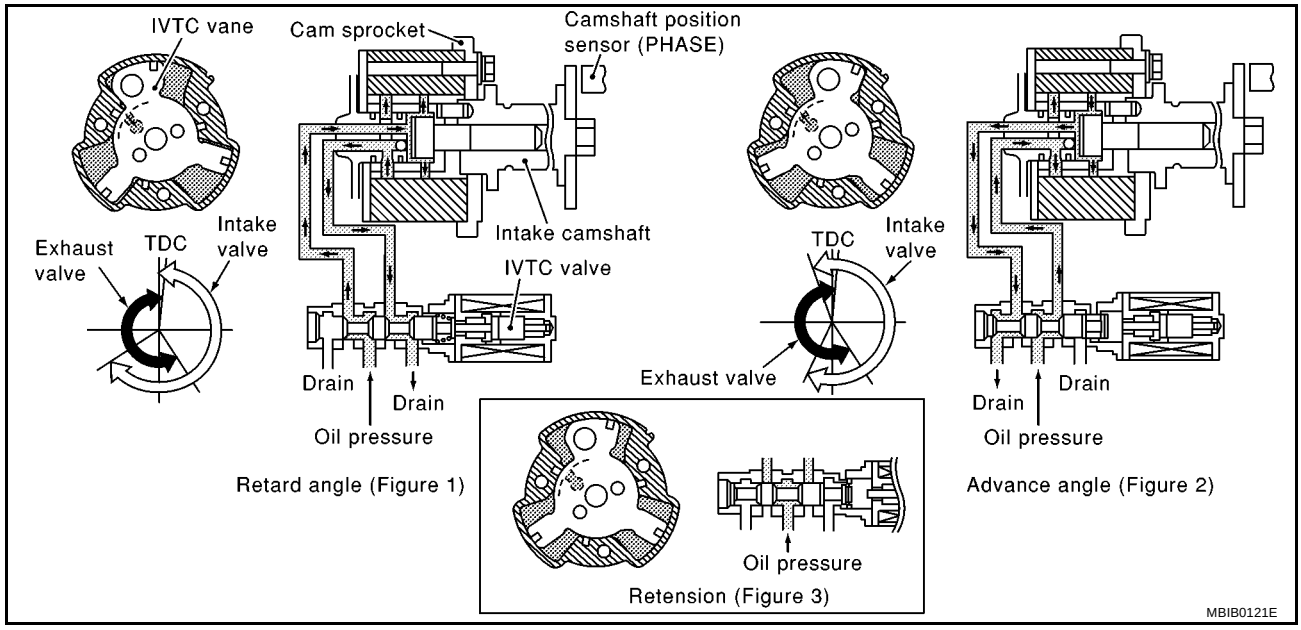
Description

EBS00QHM

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed signal*	Vehicle speed		

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



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 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.

CONSULT-II Reference Value in Data Monitor Mode

EBS00QHN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 60%

On Board Diagnosis Logic

EBS00QHO

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	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) ● Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

EBS00QHP

CAUTION:
Always drive at a safe speed.

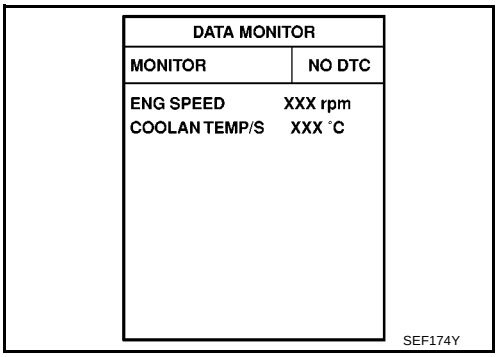
NOTE:

- **If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for "DTC P1111". See EC-384, "DTC P1111 IVT CONTROL SOLENOID VALVE" .**
- 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.

WITH CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 20 consecutive seconds.



ENG SPEED	1,200 - 2,000 rpm
COOLANT TEMPS	60 - 120 °C (140 - 248 °F)
Selector lever	A/T models: P or N position M/T models: Neutral position

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. If 1st trip DTC is detected, go to EC-150, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105 °C (176 - 194 °F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to EC-150, "Diagnostic Procedure" .

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

EBS00QHQ

1. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-347, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace crankshaft position sensor (POS).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-353, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace camshaft position sensor (PHASE).

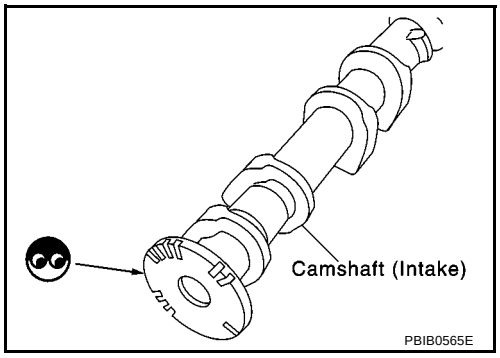
3. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 4.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



4. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram refer to EC-344, "Wiring Diagram" for CKP sensor (POS) and EC-350, "Wiring Diagram" for CMP sensor (PHASE).

>> **INSPECTION END**

DTC P0031, P0032 HO2S1 HEATER (M/T MODELS)

PFP:22690

Description

EBS00QHR

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
Engine coolant temperature sensor	Engine coolant temperature		

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.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 after warning up.	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00QHS

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

EBS00QHT

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	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.) ● Heater oxygen sensor 1 heater
P0032 0032	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

EBS00QHU

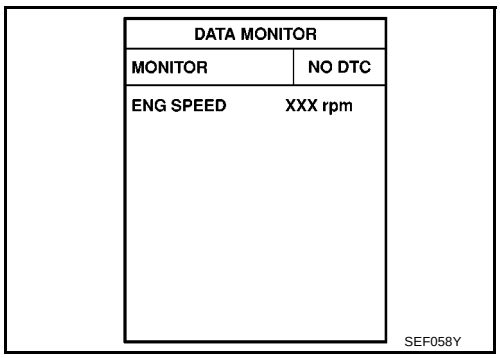
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

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” and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-154, "Diagnostic Procedure" .



WITH GST

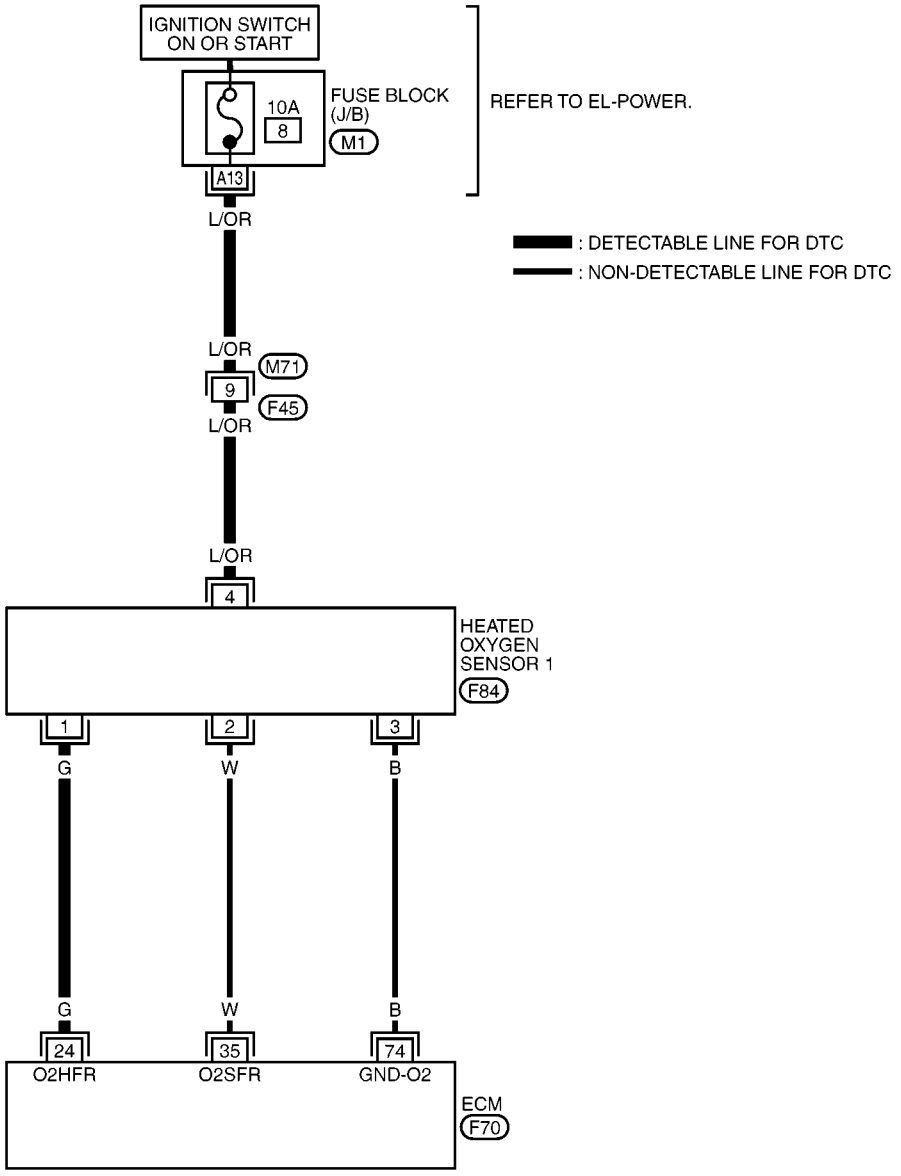
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and run it for at least 6 seconds at idle speed.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-154, "Diagnostic Procedure" .

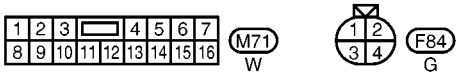
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

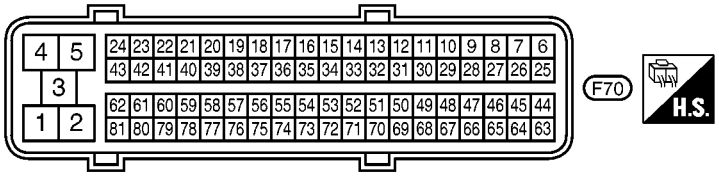
Wiring Diagram

EBS00QHV

EC-HO2S1H-01







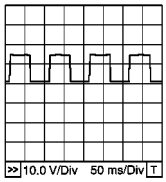
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC434A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

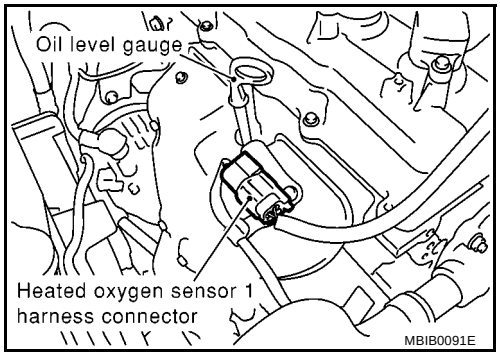
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QHW

1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch "ON".

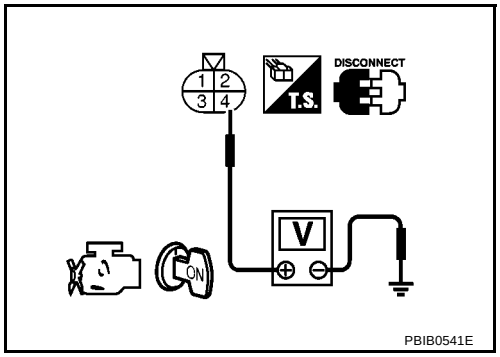


4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

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

3. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 24 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-156, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

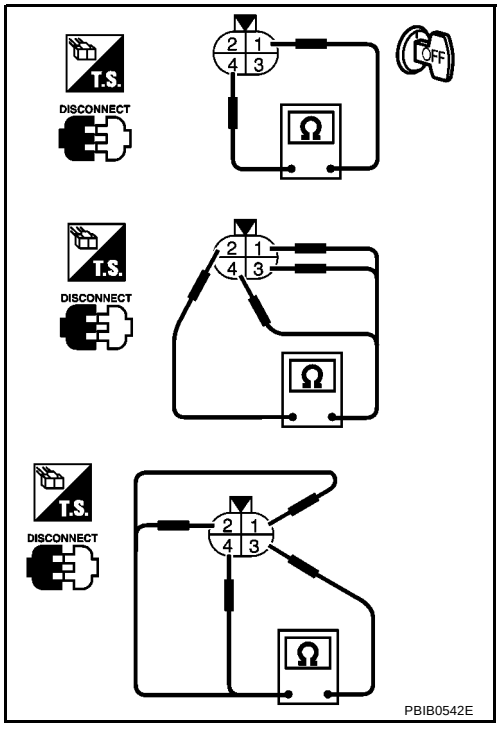
Component Inspection

EBS00QHX

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	8 - 10 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QHY

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

DTC P0031, P0032, P0051, P0052 HO2S1 HEATER (A/T MODELS)

PFP:22690

Description

EBS00QHZ

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
Engine coolant temperature sensor	Engine coolant temperature		

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.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,200	OFF
Below 3,200 after warning up.	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00QI0

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 3,200 rpm	ON
	● Engine speed: Above 3,200 rpm	OFF

On Board Diagnosis Logic

EBS00QI1

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031 (Bank 1) P0051 0051 (Bank 2)	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.) ● Heater oxygen sensor 1 heater
P0032 0032 (Bank 1) P0052 0052 (Bank 2)	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

EBS00QI2

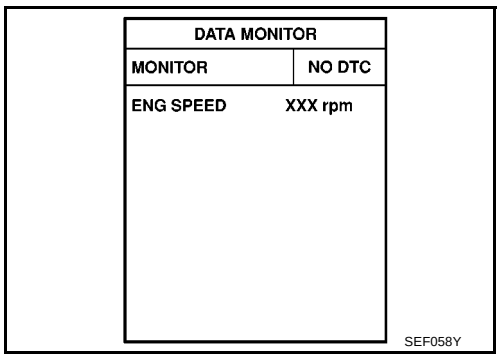
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

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” and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-162, "Diagnostic Procedure" .



WITH GST

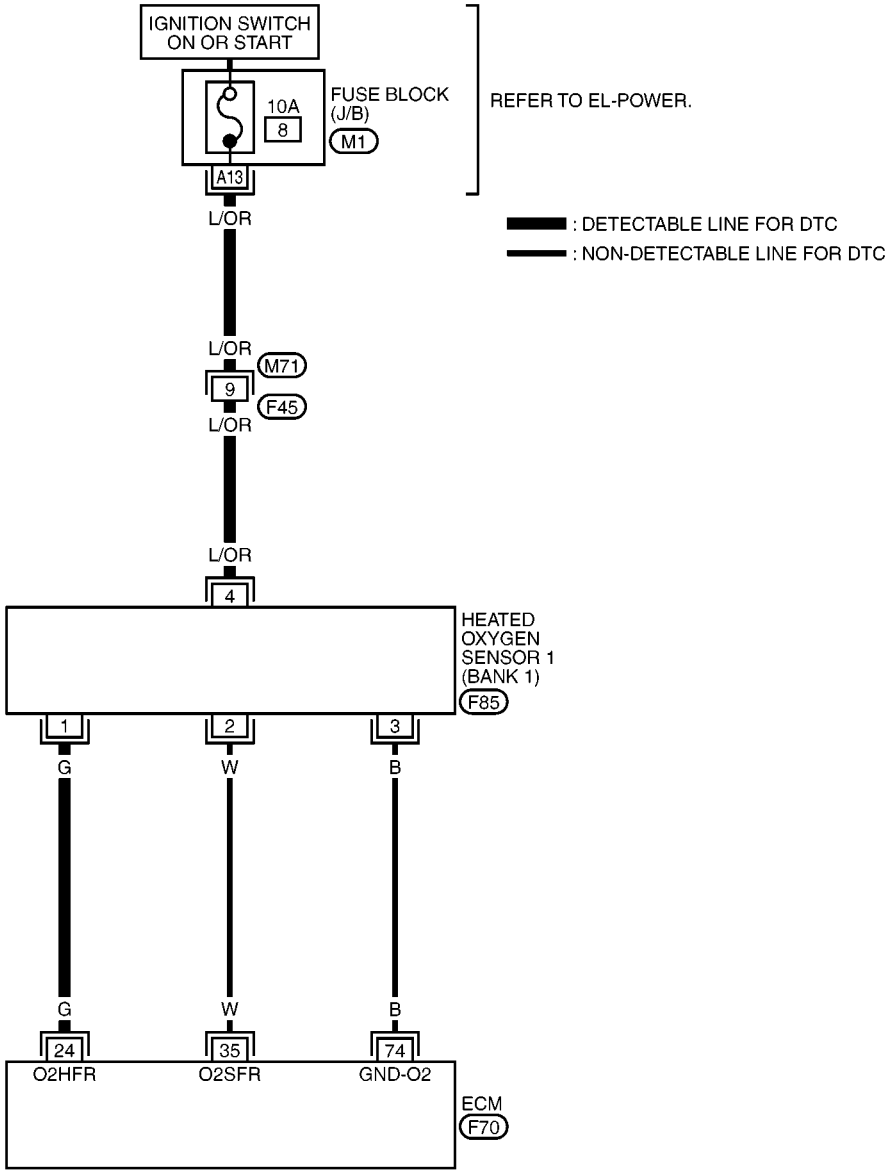
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Start engine and run it for at least 6 seconds at idle speed.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-162, "Diagnostic Procedure" .

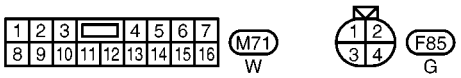
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

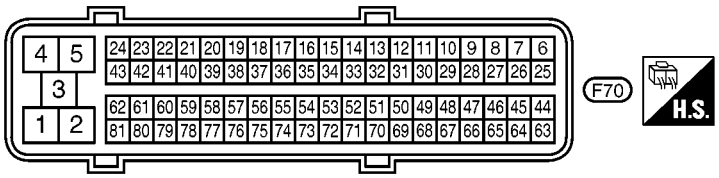
Wiring Diagram
BANK 1

EBS00QI3

EC-O2H1B1-01







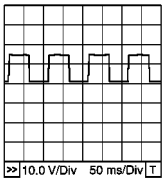
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC435A

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

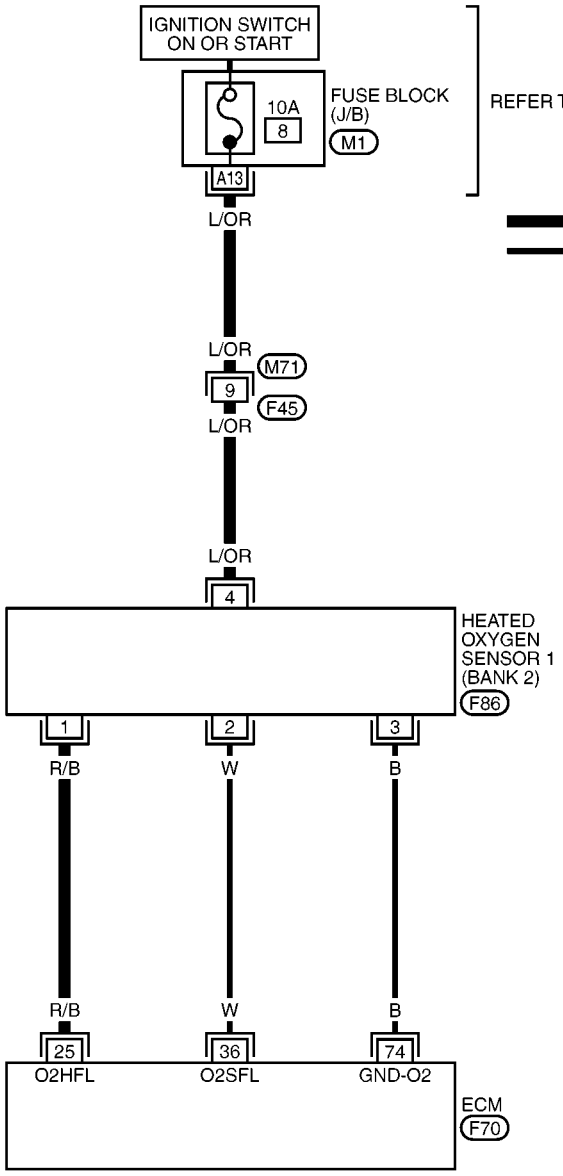
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

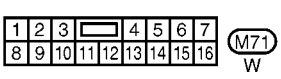
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

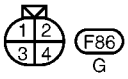
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

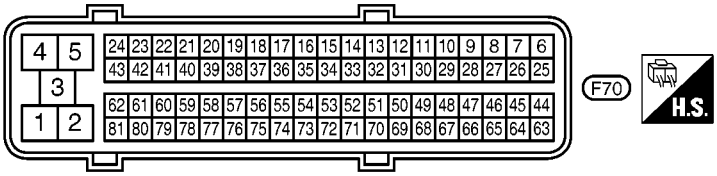
BANK 2

EC-O2H1B2-01









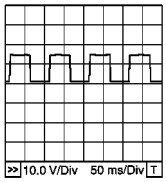
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC436A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	R/B	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

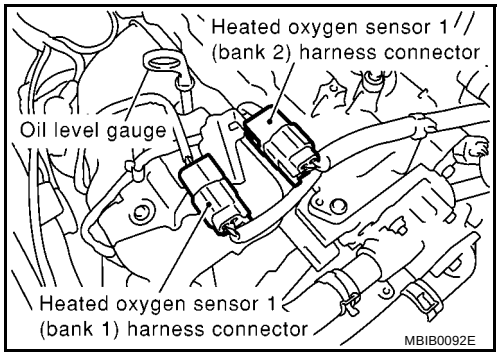
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QI4

1. CHECK HO2S1 POWER SUPPLY CIRCUIT

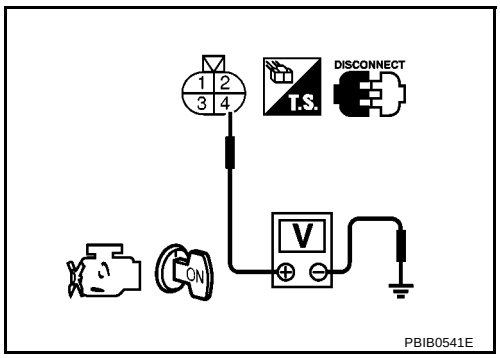
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch "ON".



MBIB0092E

4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



PBIB0541E

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

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

3. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0031, P0032	24	1	1
P0051, P0052	25	1	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-164, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

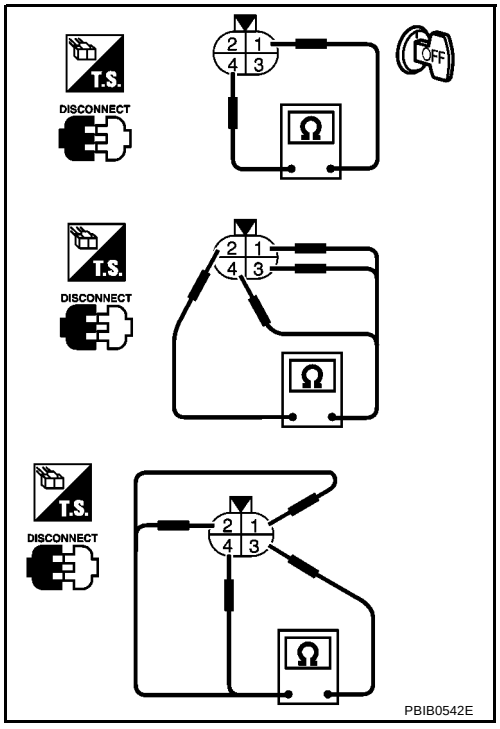
Component Inspection

EBS00QI5

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	8 - 10 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QI6

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

DTC P0037, P0038 HO2S2 HEATER (M/T MODELS)

PFP:226A0

Description

EBS00QI7

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
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 3,800	OFF
● Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00QI8

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON
	● Engine speed: Above 3,800 rpm	OFF

On Board Diagnosis Logic

EBS00QI9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	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.) ● Heater oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

EBS00QIA

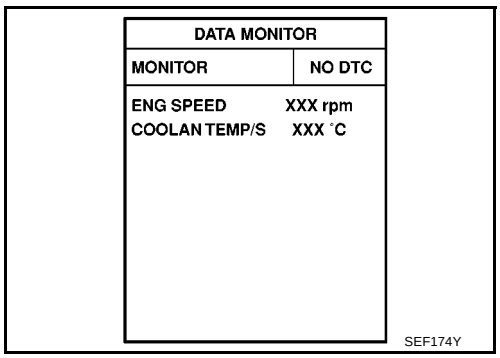
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to EC-168, "Diagnostic Procedure" .



WITH GST

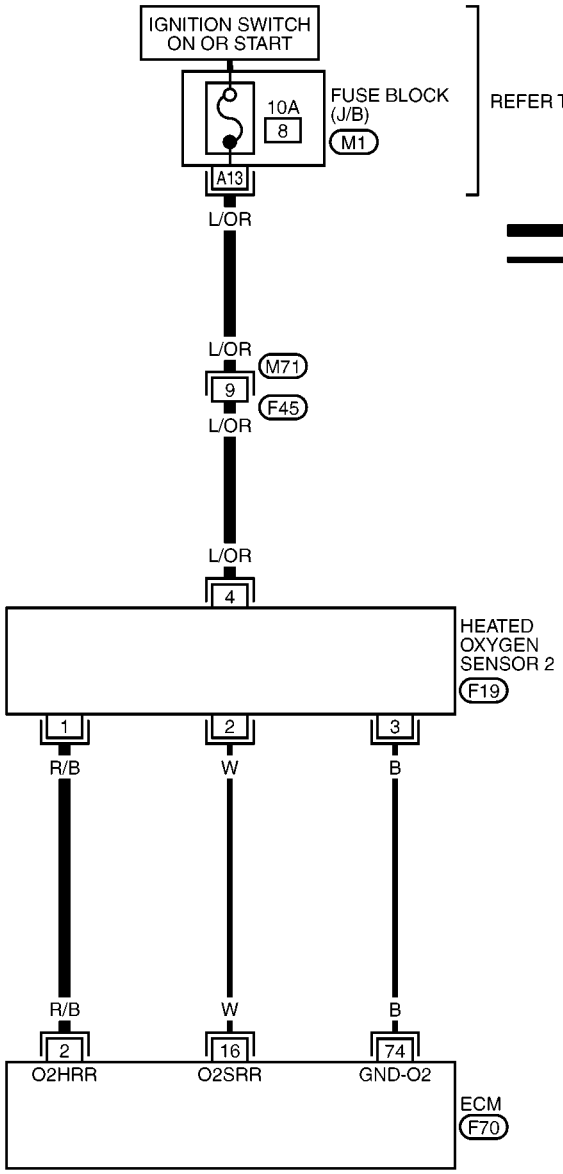
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for one minute.
8. Select “MODE 3” with GST.
9. If DTC is detected, go to EC-168, "Diagnostic Procedure" .

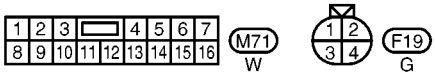
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

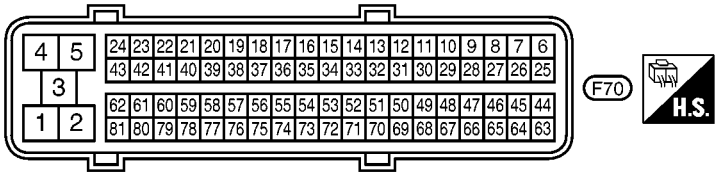
Wiring Diagram

EBS00QIB

EC-HO2S2H-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC437A

Specification data are reference values and are measured between each terminal 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.

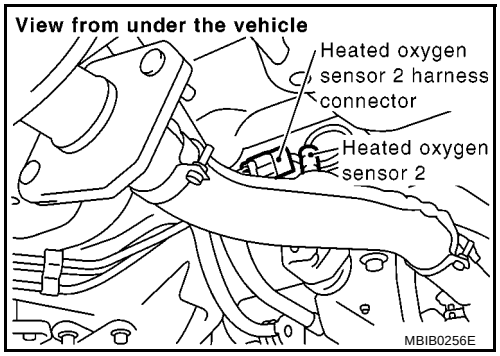
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,800 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,800 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QIC

1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch "ON".

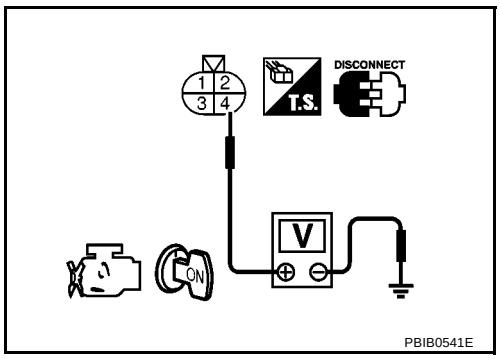


4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- 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.

3. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and HO2S2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-169, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QID

HEATED OXYGEN SENSOR 2 HEATER

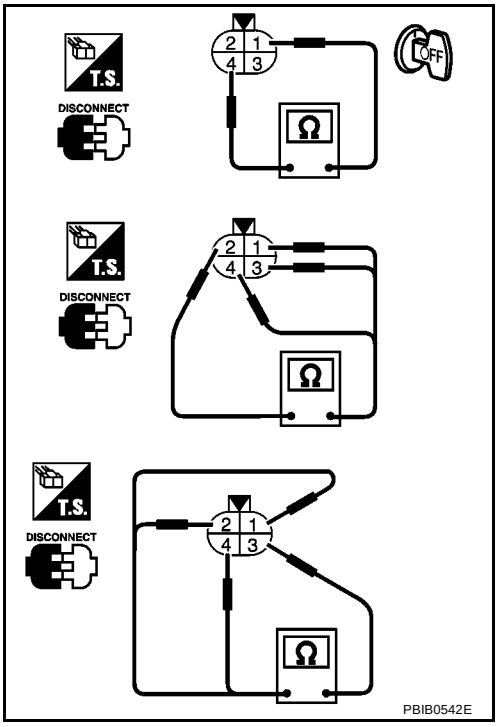
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	5.0 - 7.0 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

EBS00QIE

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER (A/T MODELS)

PFP:226A0

Description

EBS00QIF

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
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 one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00QIG

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● 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 one minute and at idle for one minute under no load	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

EBS00QIH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037 (Bank 1) P0057 0057 (Bank 2)	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.) ● Heater oxygen sensor 2 heater
P0038 0038 (Bank 1) P0058 0058 (Bank 2)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

EBS00QII

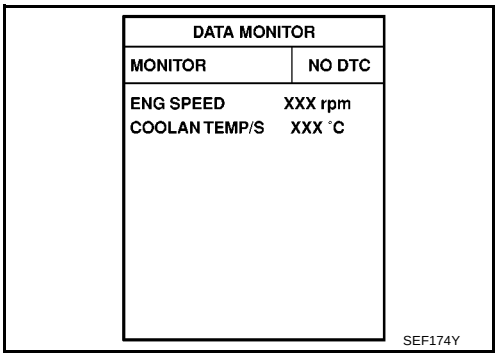
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.

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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to EC-175, "Diagnostic Procedure" .



WITH GST

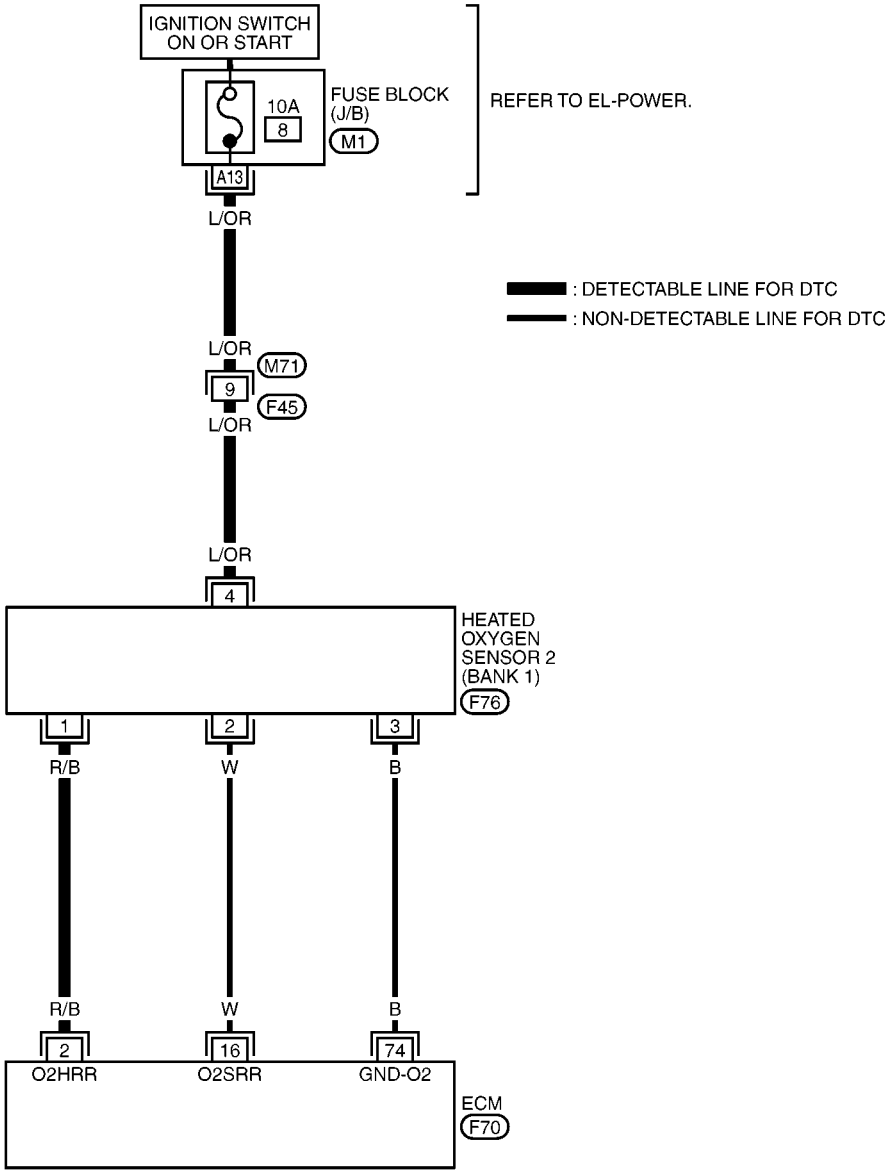
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF”and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Turn ignition switch “OFF”and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for one minute.
8. Select “MODE 3” with GST.
9. If DTC is detected, go to EC-175, "Diagnostic Procedure" .

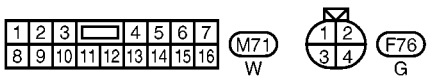
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

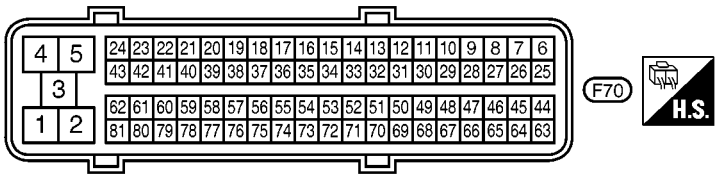
Wiring Diagram
BANK 1

EBS00QIJ

EC-O2H2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC438A

Specification data are reference values and are measured between each terminal and ground.

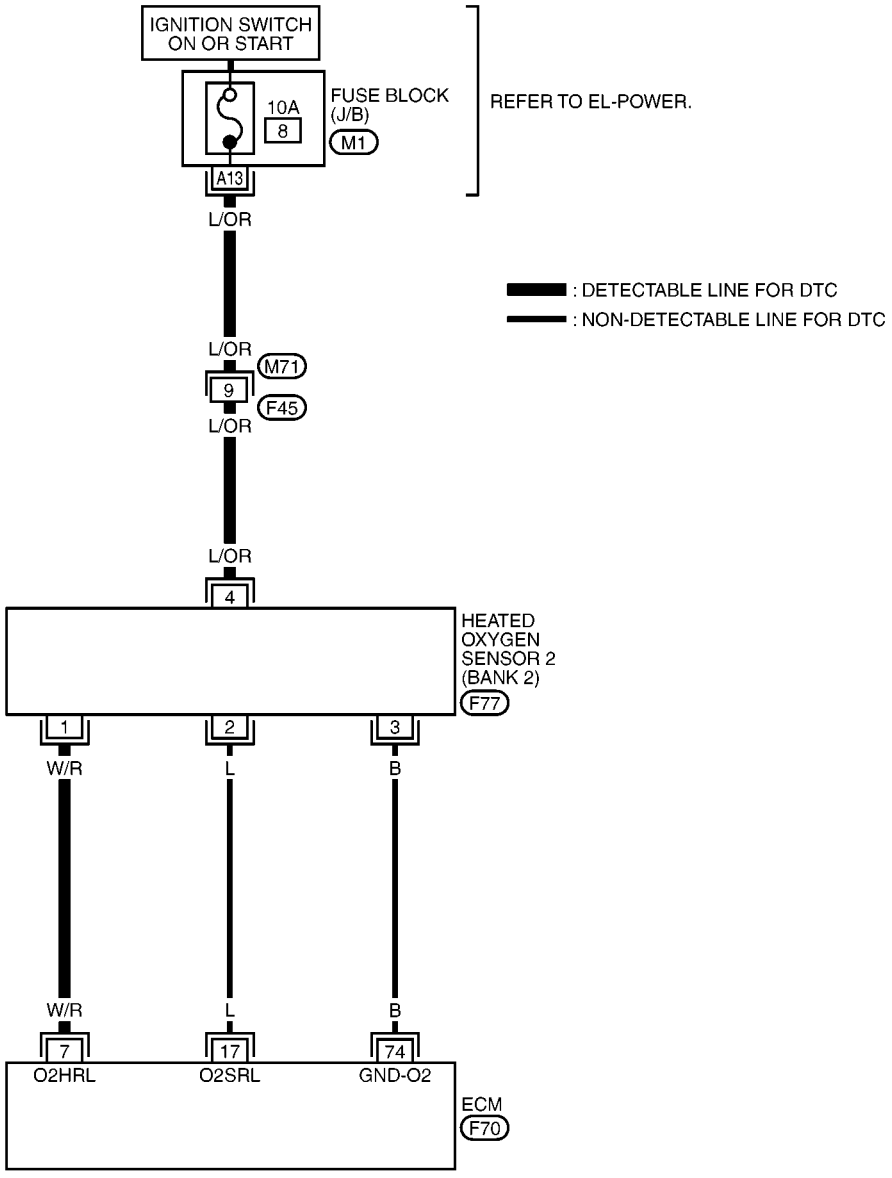
CAUTION:

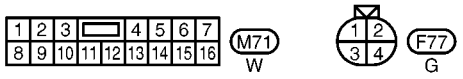
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

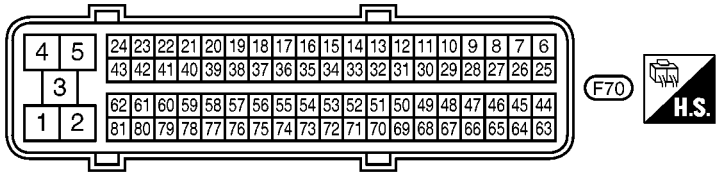
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H2B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC439A

Specification data are reference values and are measured between each terminal 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.

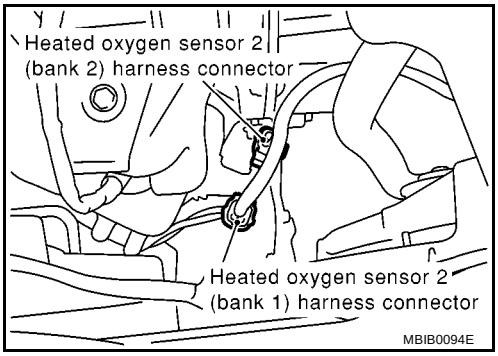
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	W/R	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QIK

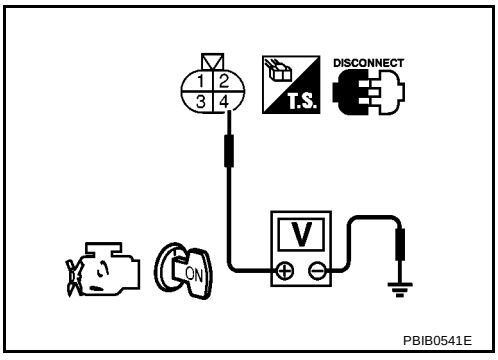
1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch "ON".



4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- 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.

3. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	2	1	1
P0057, P0058	7	1	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-176, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QIL

HEATED OXYGEN SENSOR 2 HEATER

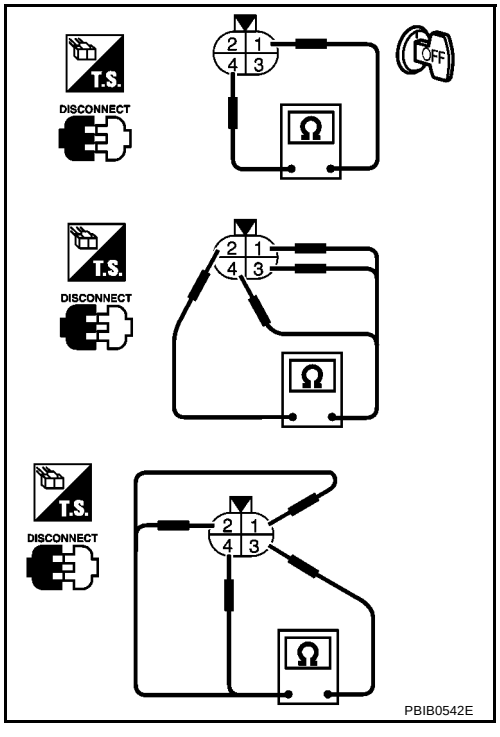
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	5.0 - 7.0 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

EBS00QIM

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

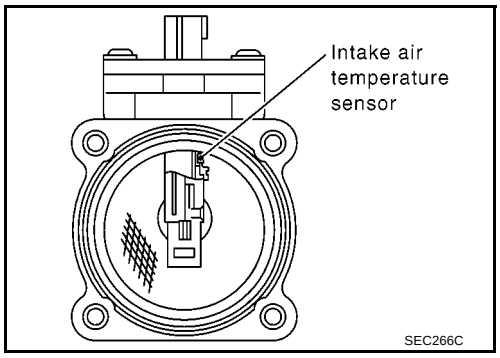
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

EBS00QIN

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QIO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T models) Neutral (M/T models) ● No-load	Idle	Approx. 1.0 - 1.7V
		2,500 rpm	Approx. 1.5 - 2.1V
CAL/LD VALUE	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

EBS00QIP

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	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

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

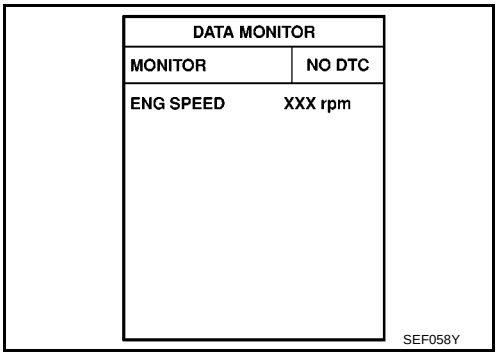
EBS00QIQ

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-181, "Diagnostic Procedure" .



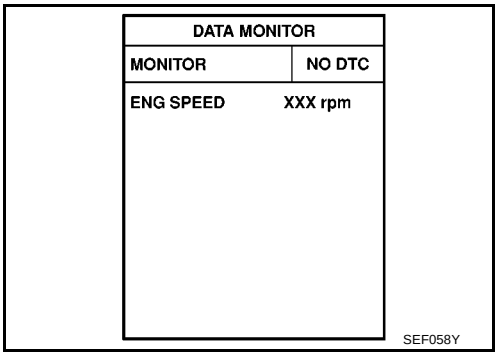
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-181, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-181, "Diagnostic Procedure" .



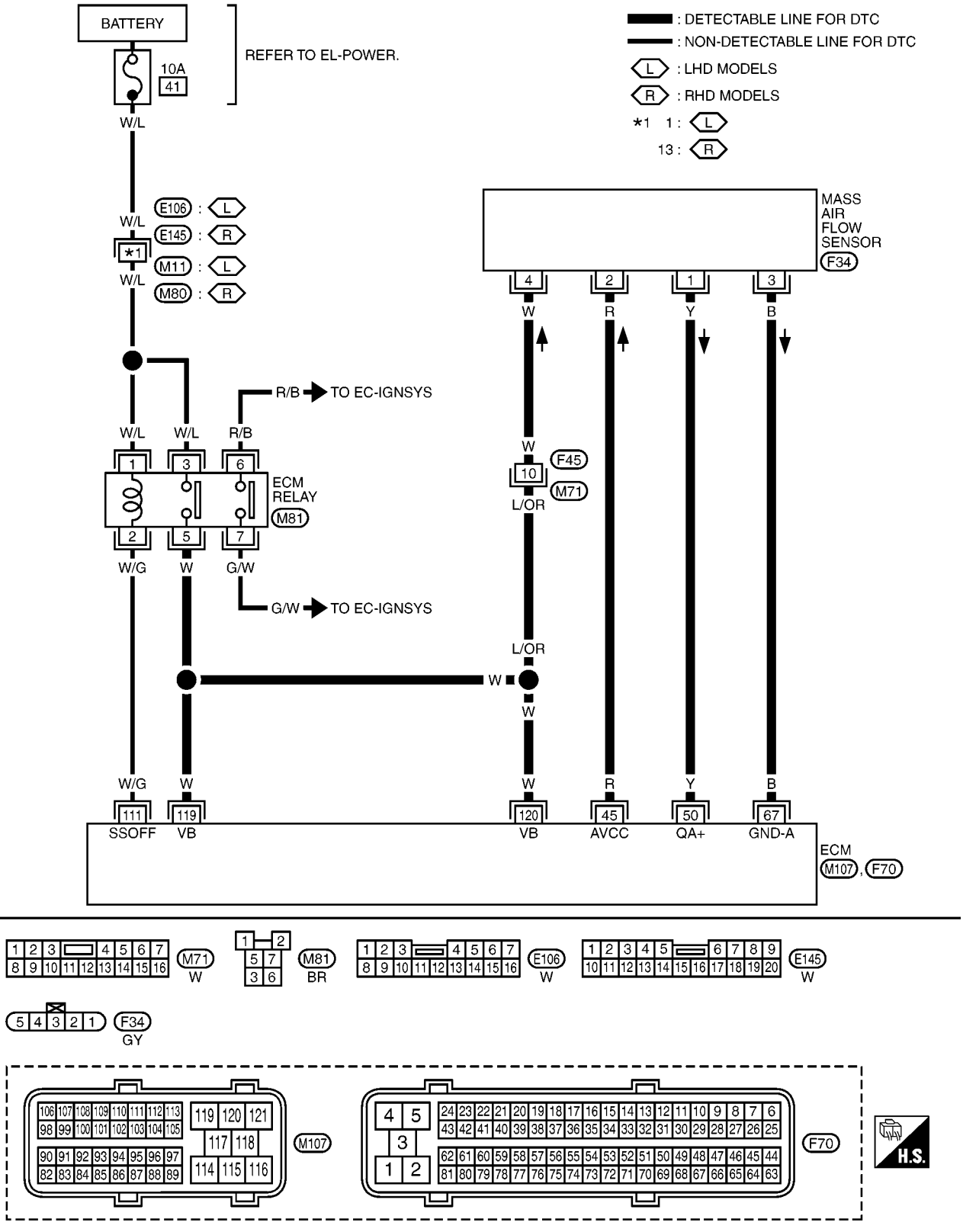
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

EBS00QIR

EC-MAFS-01



YEC440A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch "ON"]**	Approximately 5V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 2.1V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00QIS

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

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

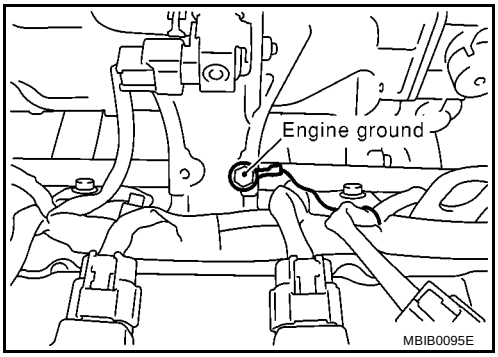
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

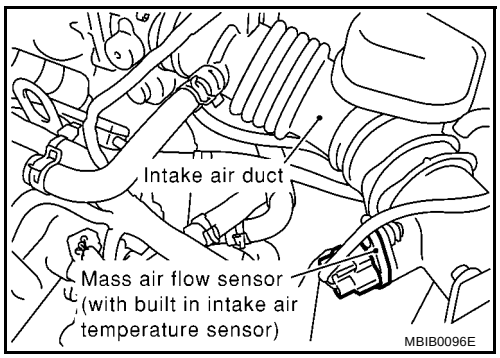
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



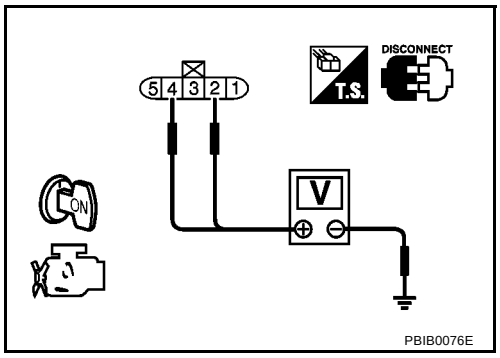
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

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

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> 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 harness continuity between MAF sensor terminal 1 and ECM terminal 50. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-183, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

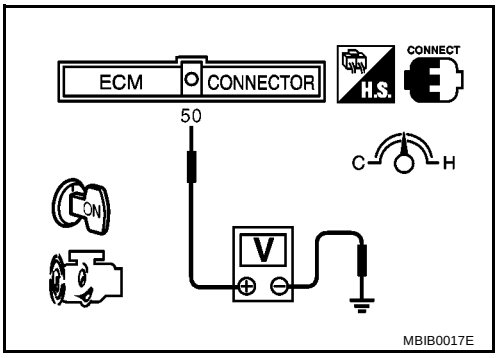
EBS00QIT

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 50 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for liner voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Turn ignition switch “OFF”.
b. Disconnect mass air flow sensor harness connector and reconnect it again.
c. Perform steps 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

EBS00QIU

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

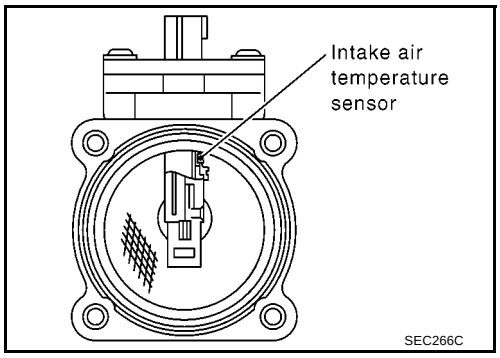
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

EBS00QIV

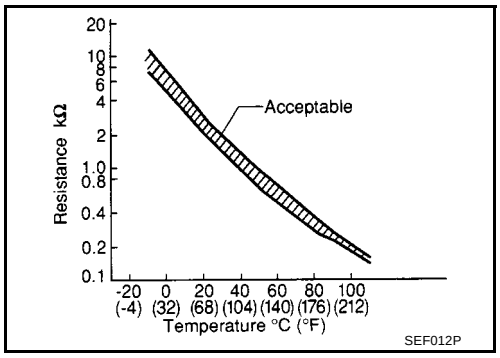
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 34 (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.

On Board Diagnosis Logic

EBS00QIW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	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 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

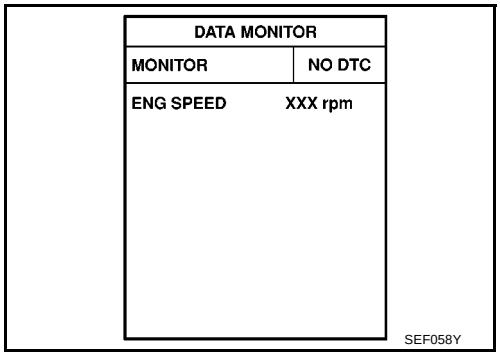
DTC Confirmation Procedure

EBS00QIX

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-186, "Diagnostic Procedure" .



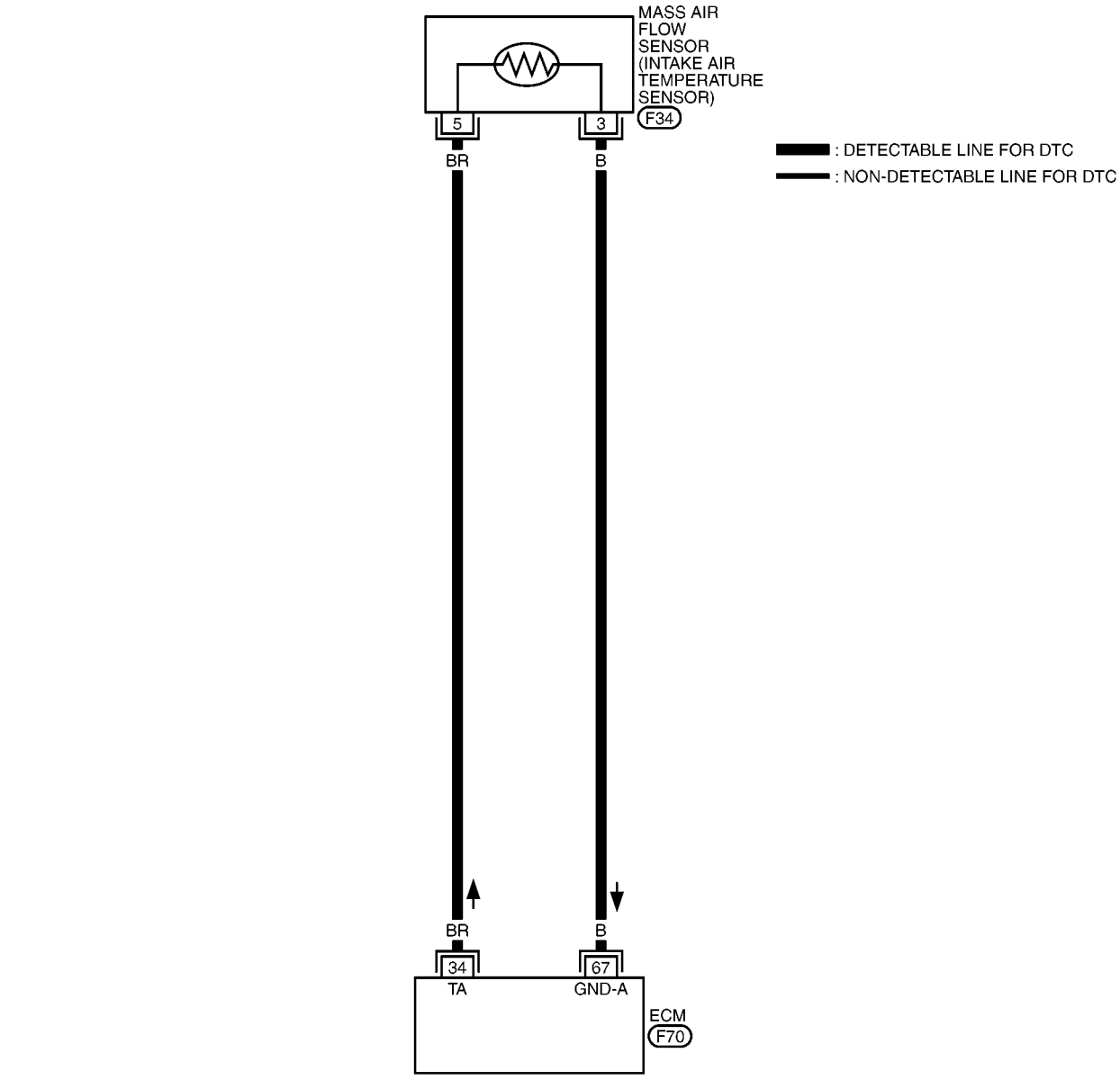
WITH GST

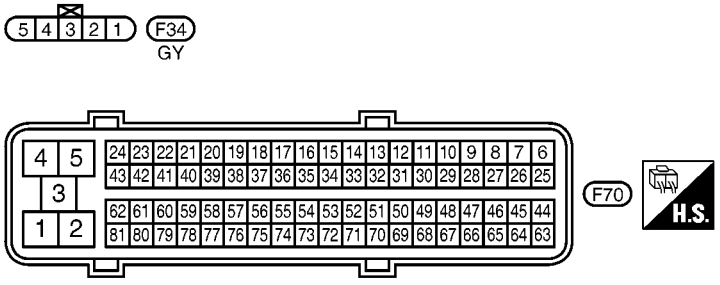
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QIY

EC-IATS-01





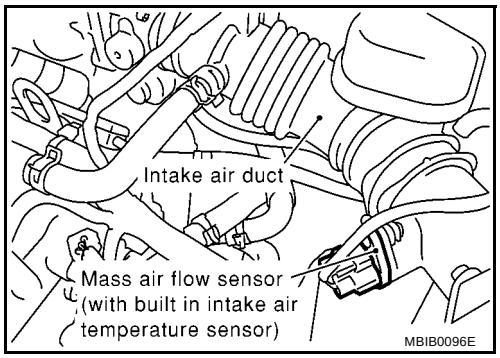
YEC441A

Diagnostic Procedure

EBS00QIZ

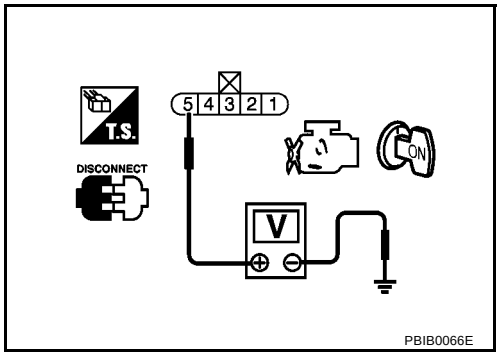
1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between MAF sensor terminal 5 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-187, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

4. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

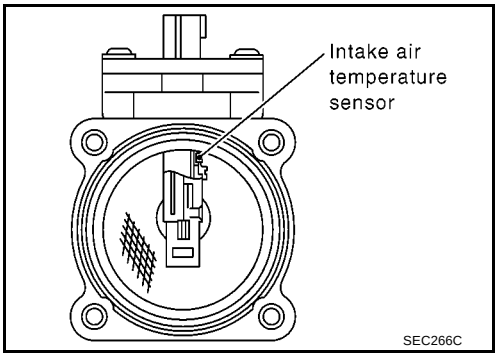
EBS00QJ0

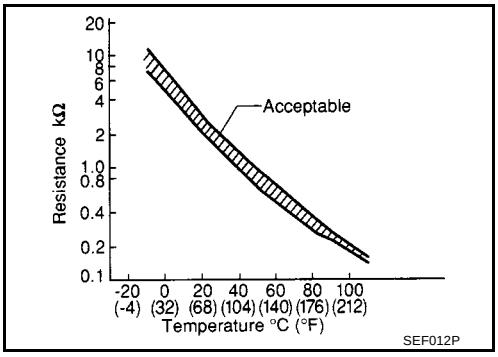
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 3 and 5 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

EBS00QJ1

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

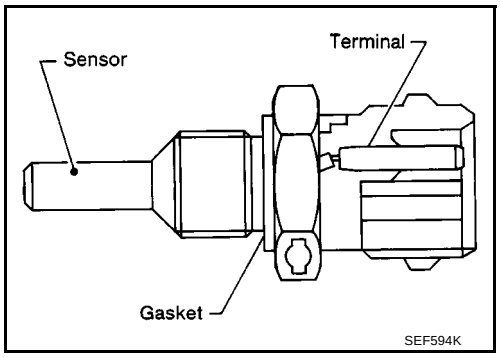
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

EBS00QJ2

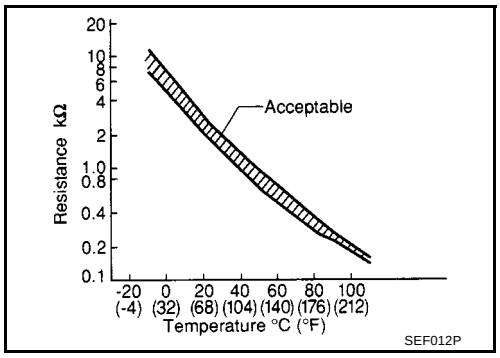
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 72 (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.

On Board Diagnosis Logic

EBS00QJ3

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	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 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode	
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-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II 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.	

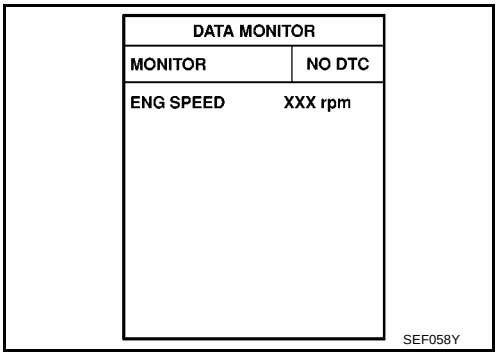
DTC Confirmation Procedure

EBS00QJ4

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-191, "Diagnostic Procedure" .



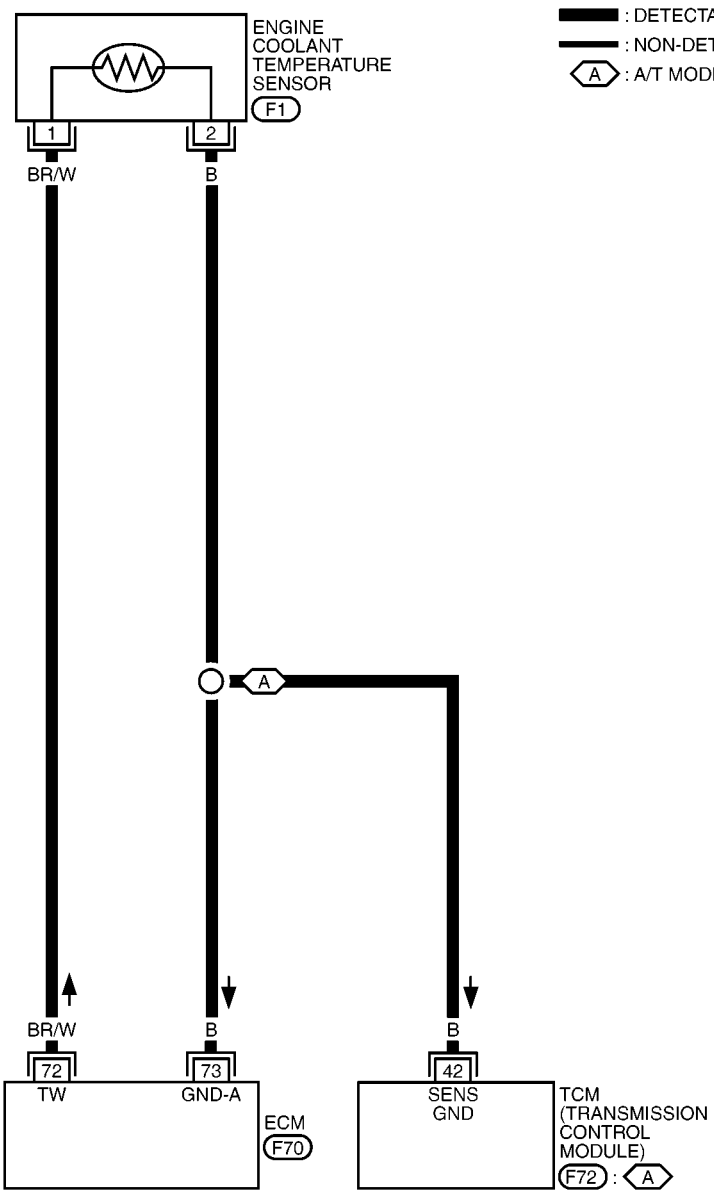
WITH GST

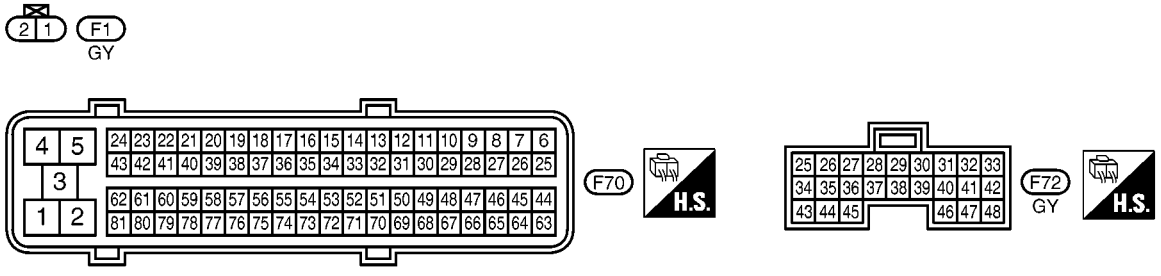
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QJ5

EC-ECTS-01





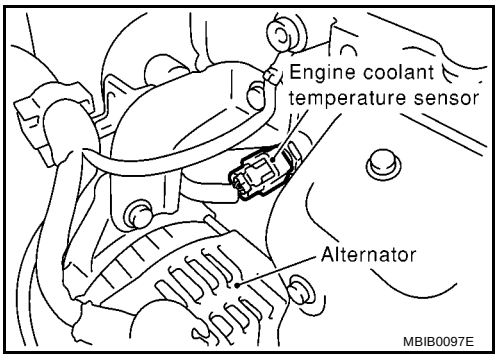
YEC442A

Diagnostic Procedure

EBS00QJ6

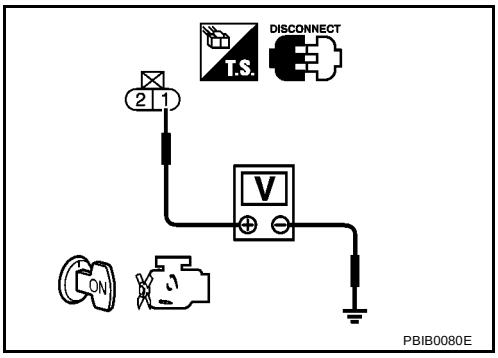
1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECT sensor terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM (A/T models only)

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

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-192, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

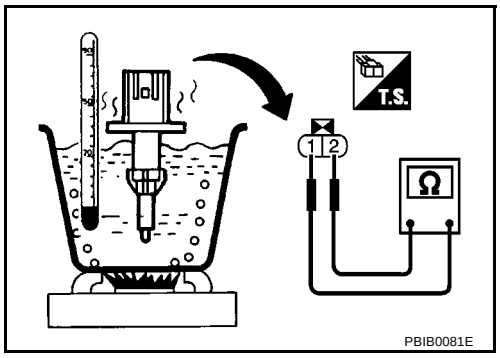
>> **INSPECTION END**

Component Inspection

EBS00QJ7

ENGINE COOLANT TEMPERATURE SENSOR

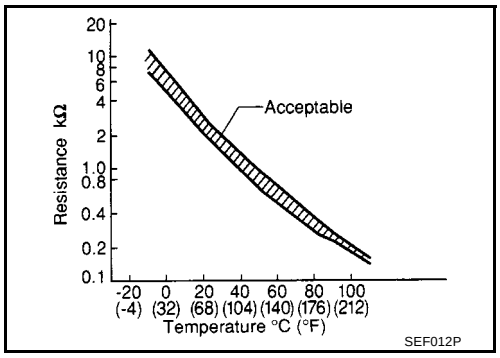
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<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 72 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS00QJ8

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-60, "CYLINDER HEAD" .

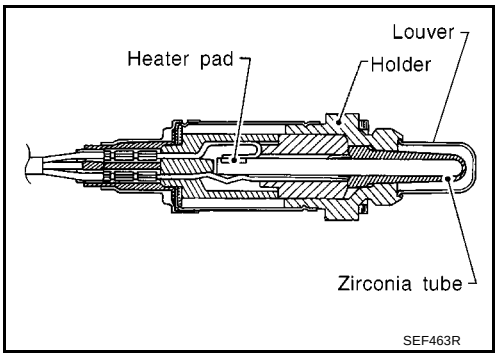
DTC P0132 HO2S1 (M/T MODELS)

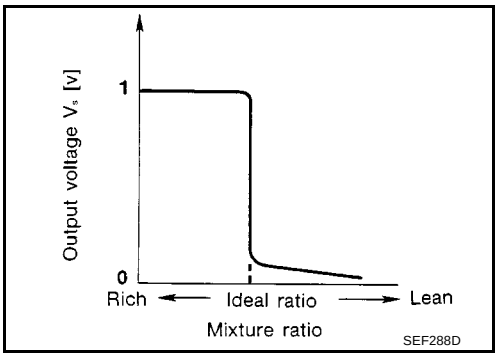
PFP:22690

Component Description

EBS00QJ9

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QJA

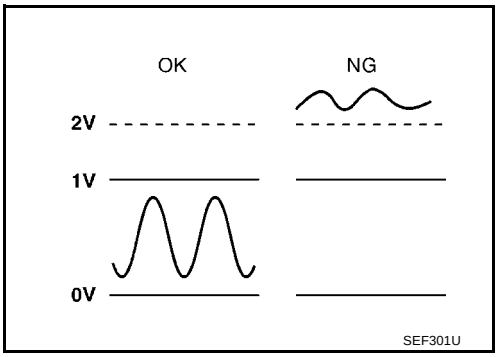
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QJB

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	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

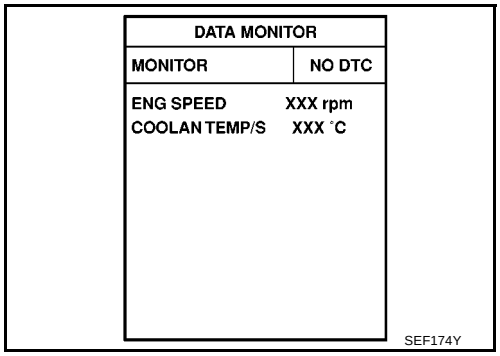
DTC Confirmation Procedure

EBS00QJC

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

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-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-196, "Diagnostic Procedure" .



WITH GST

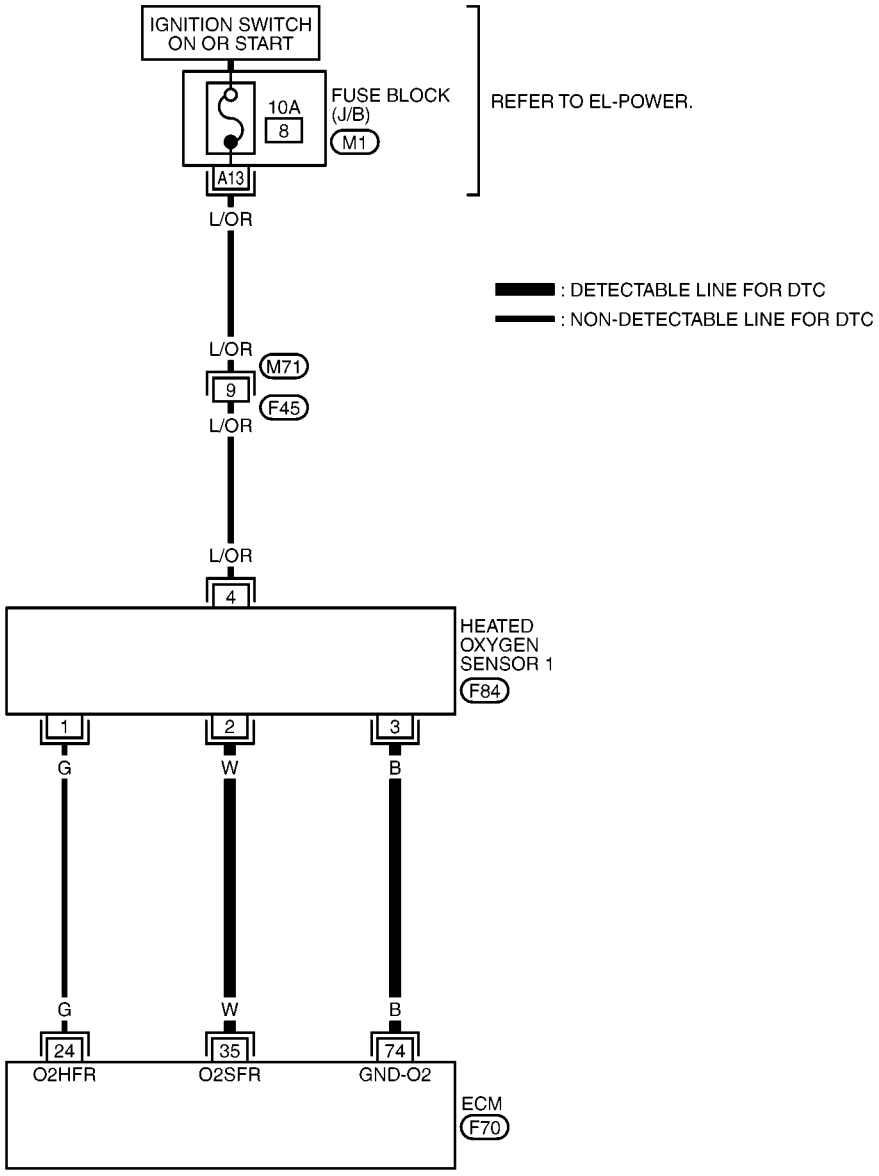
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-196, "Diagnostic Procedure" .

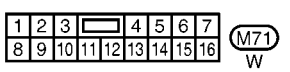
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

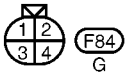
Wiring Diagram

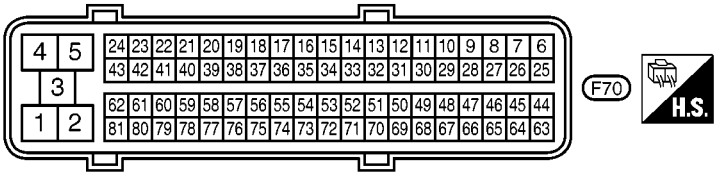
EBS00QJD

EC-HO2S1-01









REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC443A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

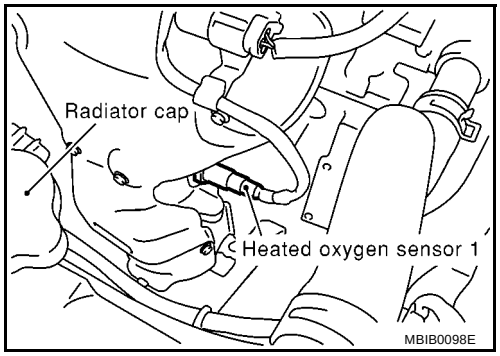
EBS00QJE

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

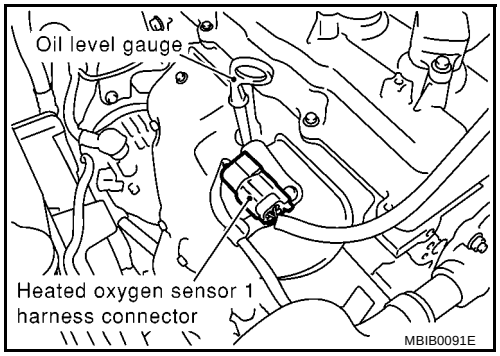
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-197, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

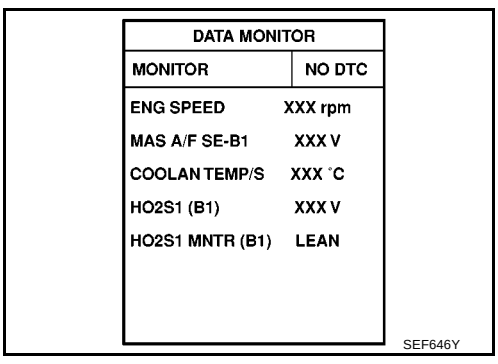
Component Inspection

EBS00QJF

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.



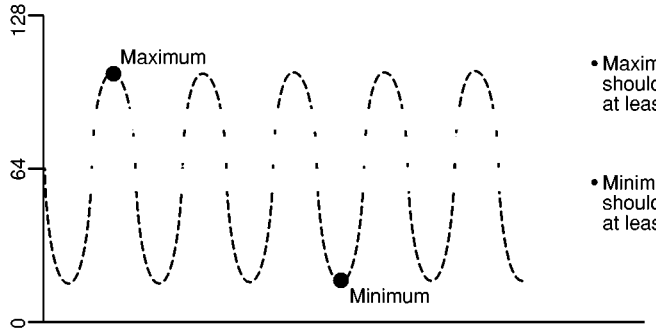
6. Check the following.
   - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - "HO2S1 (B1)" voltage goes above 0.6V at least once.
   - "HO2S1 (B1)" voltage goes below 0.3V at least 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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



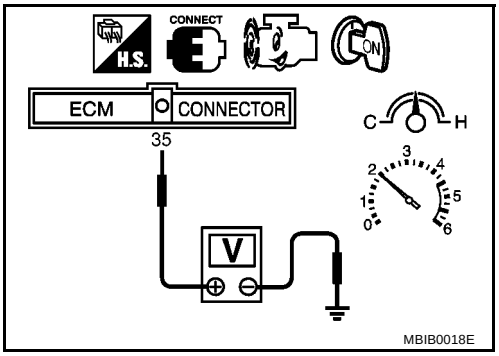
SEF648Y

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0018E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QJG

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

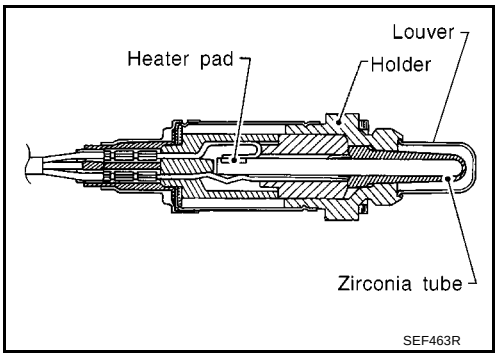
DTC P0132, P0152 HO2S1 (A/T MODELS)

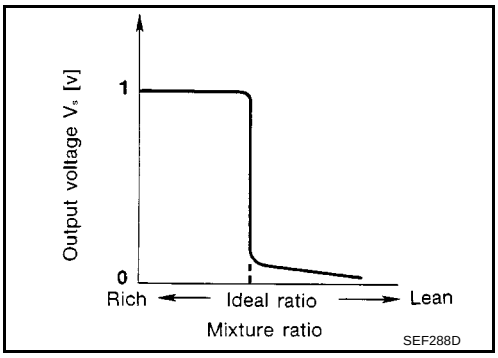
PFP:22690

Component Description

EBS00QJH

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QJI

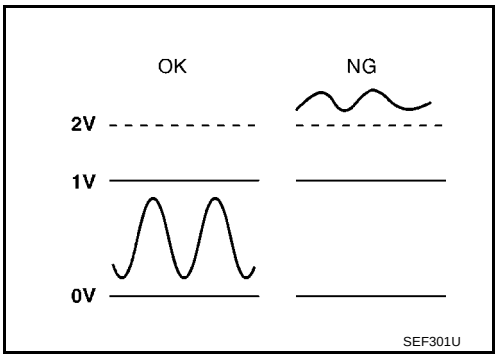
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QJJ

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132 (Bank 1)	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
P0152 0152 (Bank 2)			

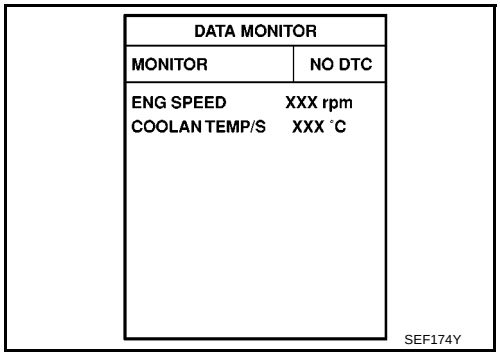
DTC Confirmation Procedure

EBS00QJK

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

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-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-204, "Diagnostic Procedure" .



WITH GST

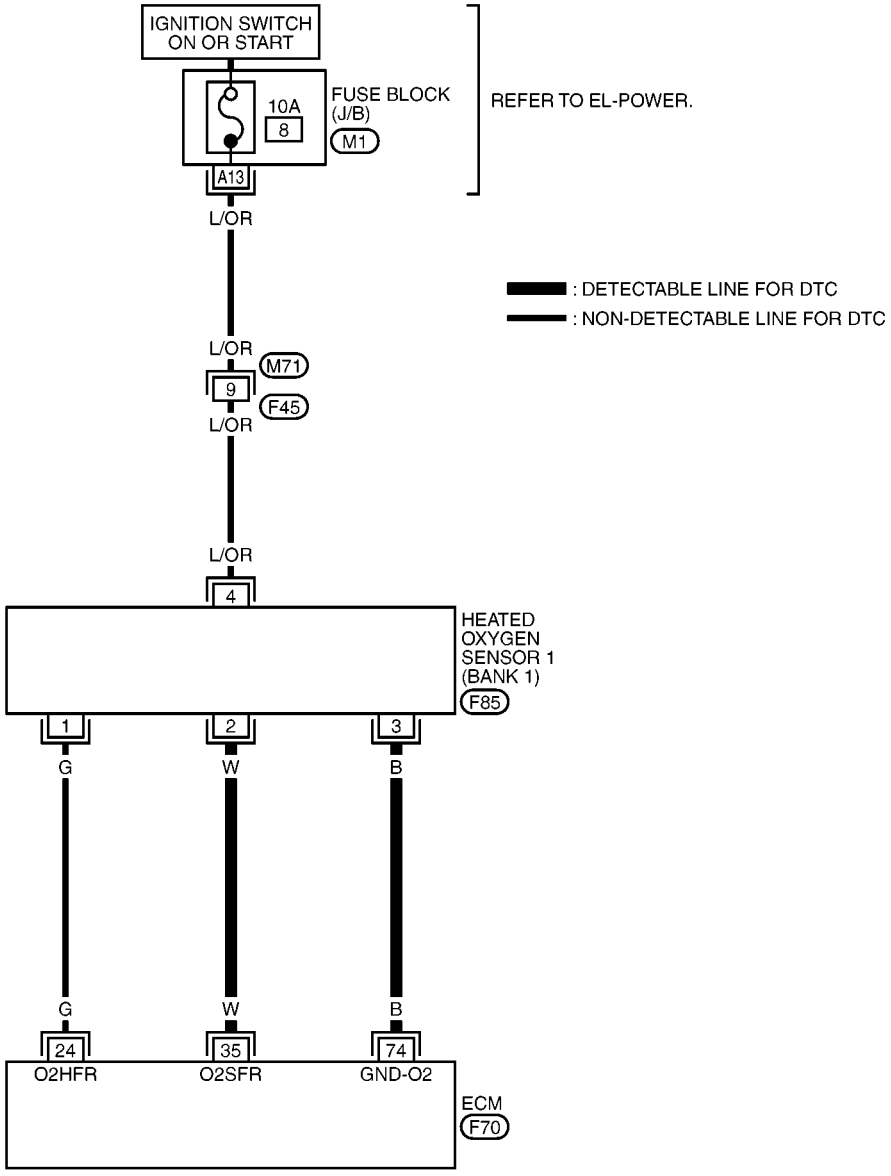
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-204, "Diagnostic Procedure" .

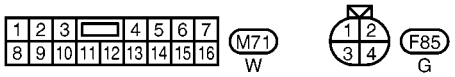
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

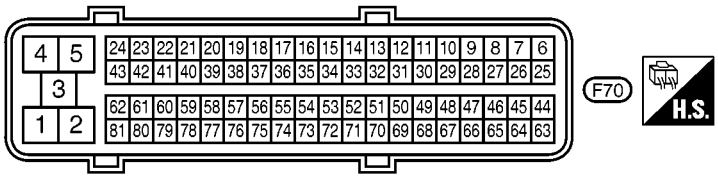
Wiring Diagram
BANK 1

EBS00QJL

EC-O2S1B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC444A

Specification data are reference values and are measured between each terminal and ground.

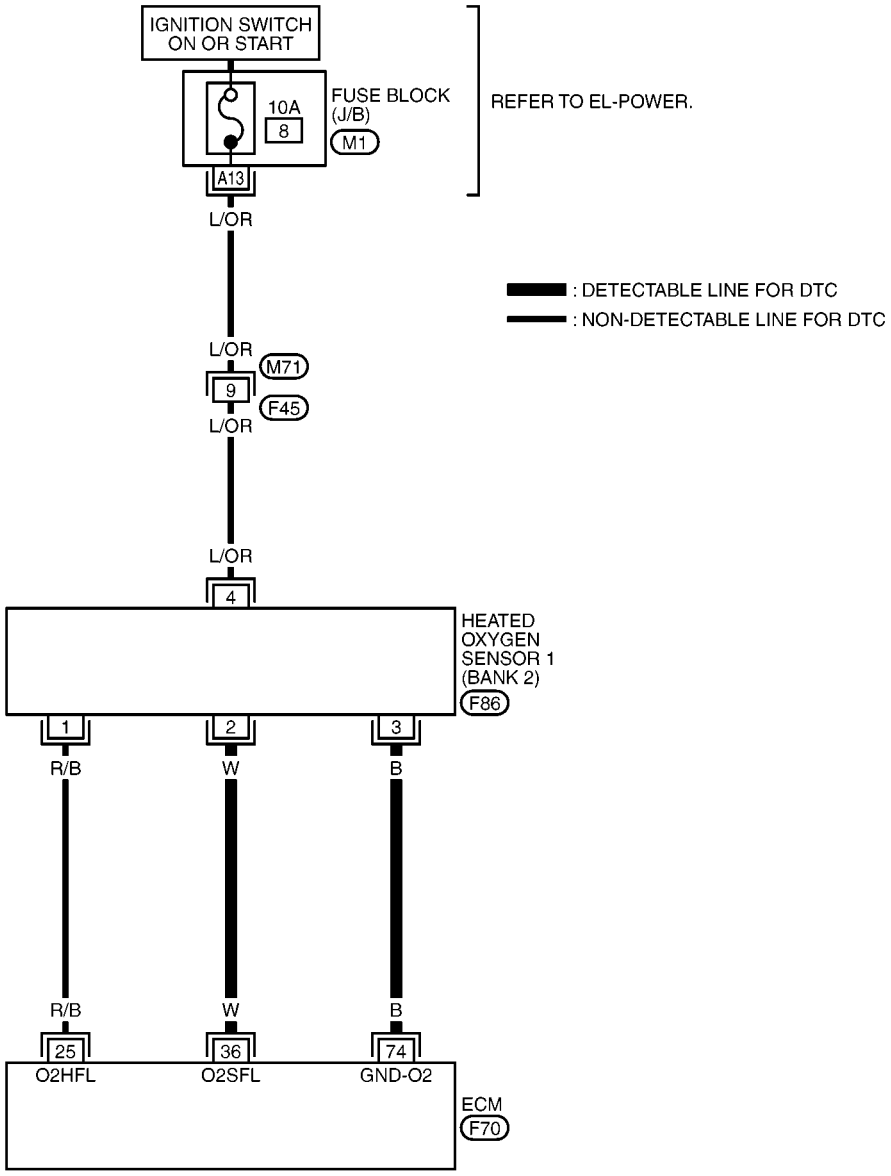
CAUTION:

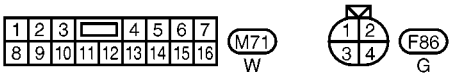
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

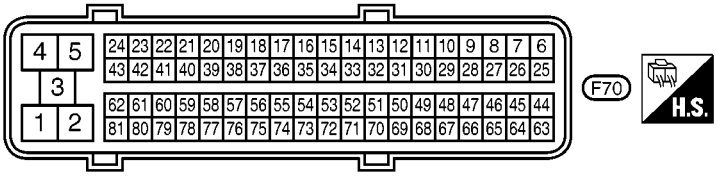
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S1B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC445A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

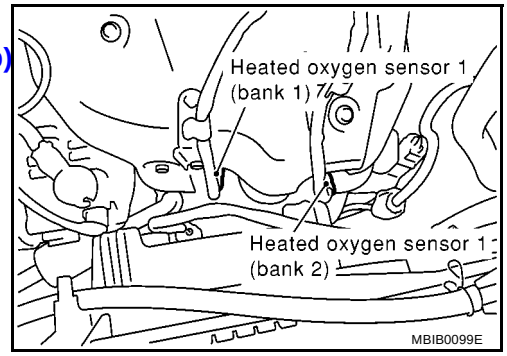
EBS00QJM

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

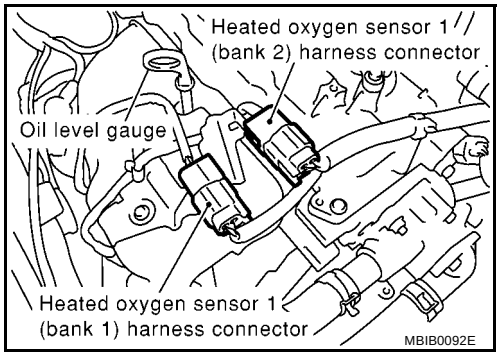
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	2	1
P0152	36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	2	1
P0152	36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-205, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QJN

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.

5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1						
cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L	R

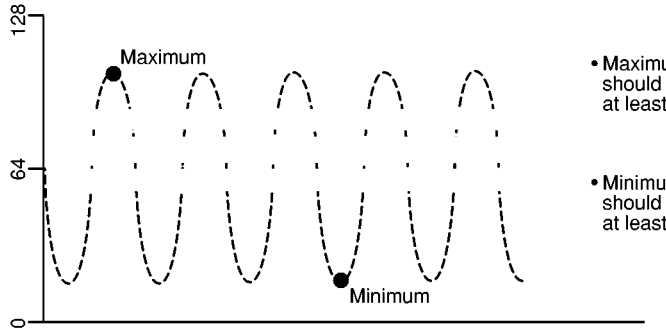
Bank 2						
cycle	1	2	3	4	5	
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L	R

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



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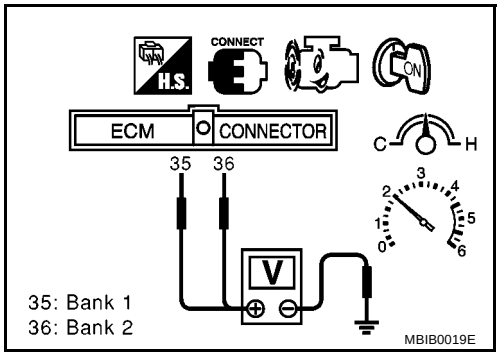
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QJO

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

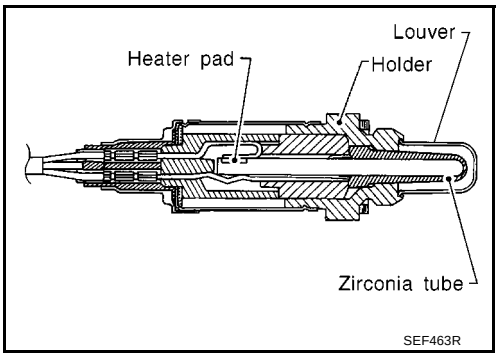
DTC P0133 HO2S1 (M/T MODELS)

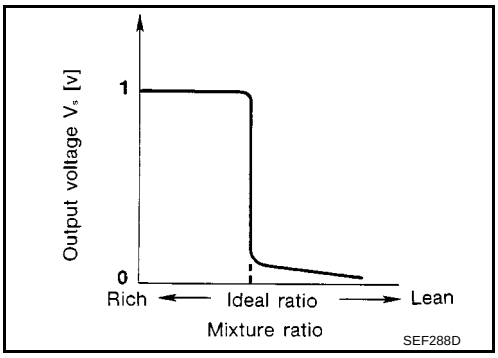
PFP:22690

Component Description

EBS00QJP

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QJQ

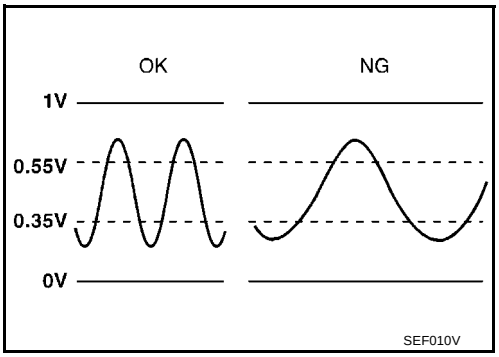
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QJR

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 0133	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 ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor

DTC Confirmation Procedure

EBS00QJS

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
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.**

WITH CONSULT-II

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-II.
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.

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 20 to 50 seconds.)

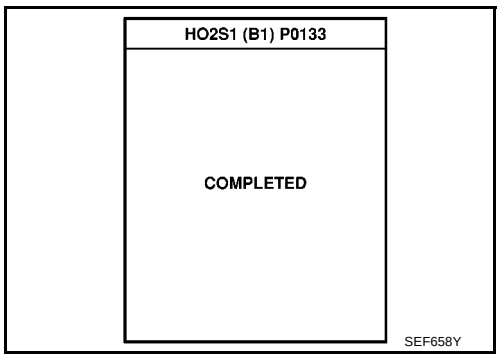
ENG SPEED	2,100 - 3,100 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.8 - 7.6 msec
Selector lever	Suitable position

HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-212, "Diagnostic Procedure" .



Overall Function Check

EBS00QJT

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

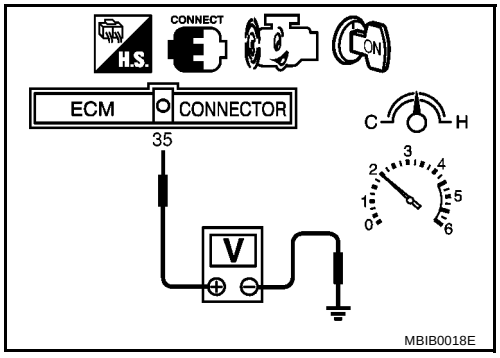
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

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

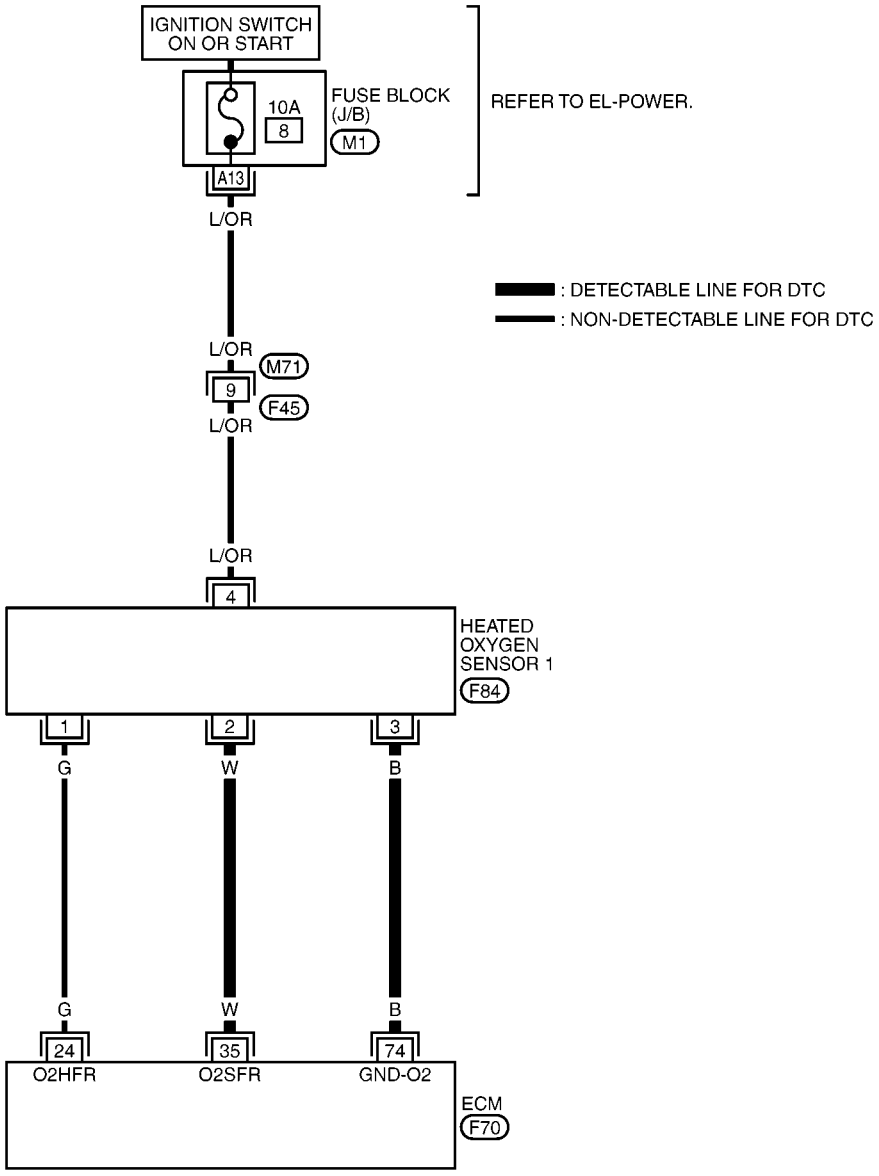
4. If NG, go to EC-212, "Diagnostic Procedure" .

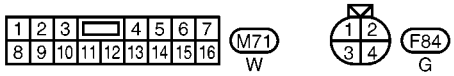


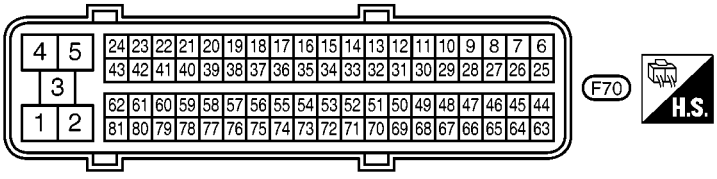
Wiring Diagram

EBS00QJU

EC-HO2S1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC443A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

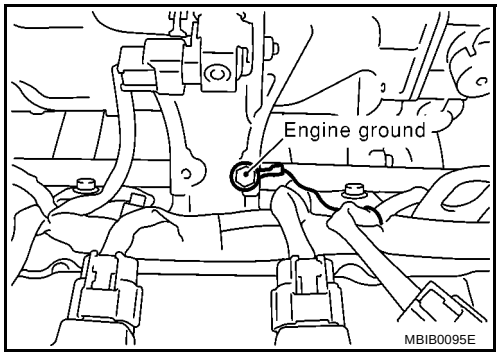
Diagnostic Procedure

EBS00QJV

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

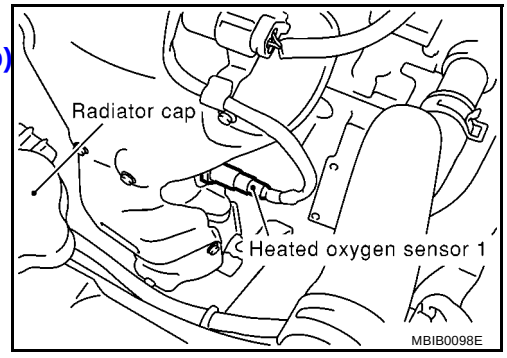


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

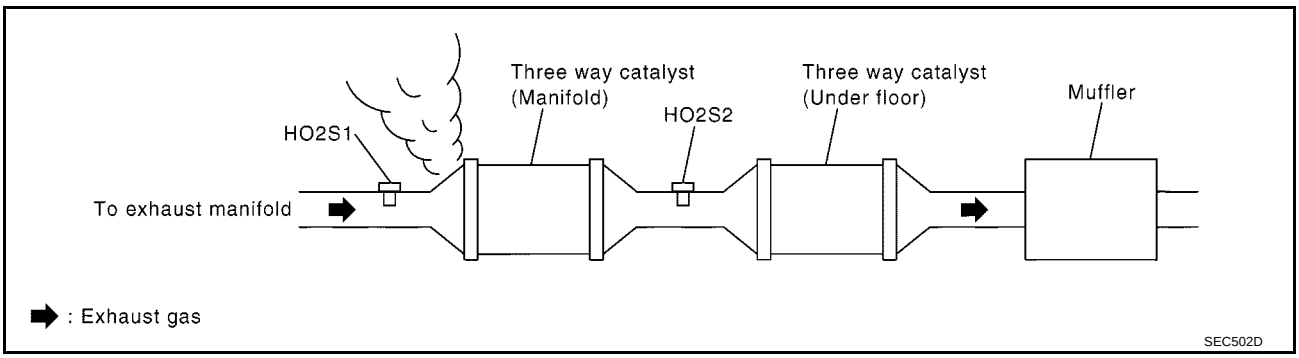
Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

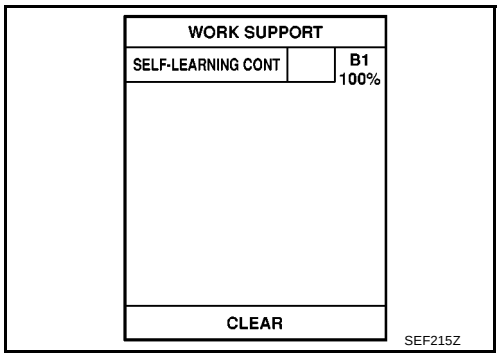
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

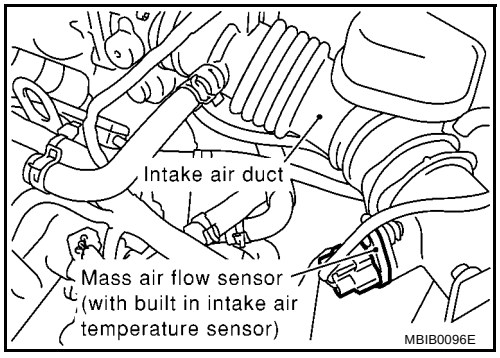
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. 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?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. 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 or No

Yes >> Perform trouble diagnosis for DTC P0171 or DTC P0172 (Refer to EC-281 or EC-296).
No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

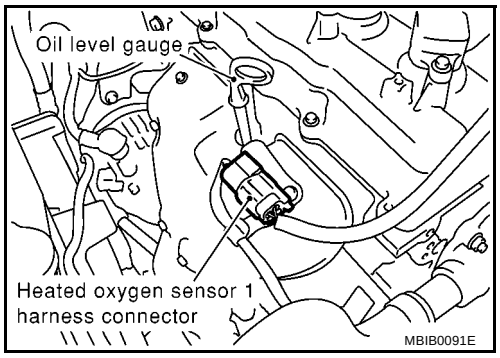
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-183, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-550, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace PCV valve.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-215, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QJW

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

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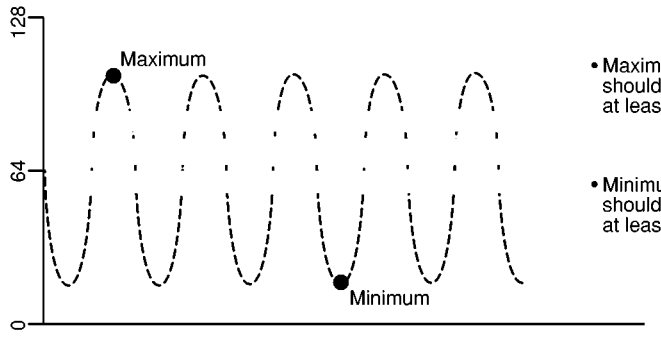
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



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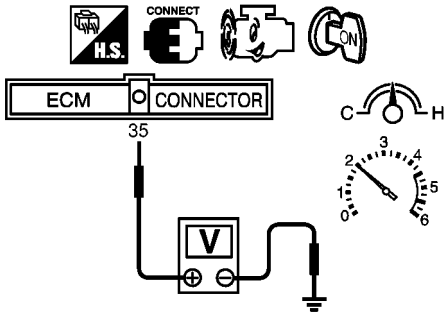
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0018E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QJX

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

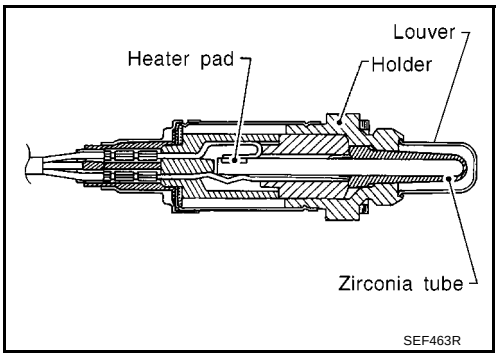
DTC P0133, P0153, HO2S1 (A/T MODELS)

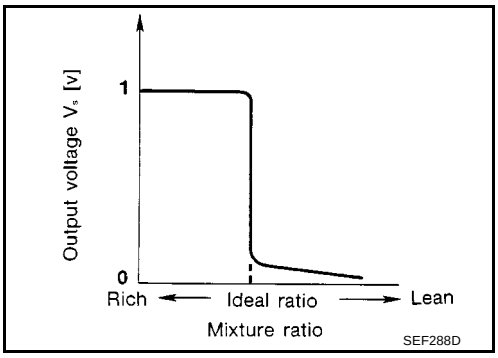
PFP:22690

Component Description

EBS00QJY

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QJZ

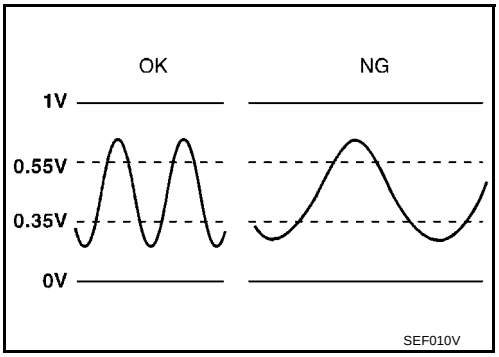
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QK0

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 0133 (Bank 1)	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 ● Injectors ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor
P0153 0153 (Bank 2)			

DTC Confirmation Procedure

EBS00QK1

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

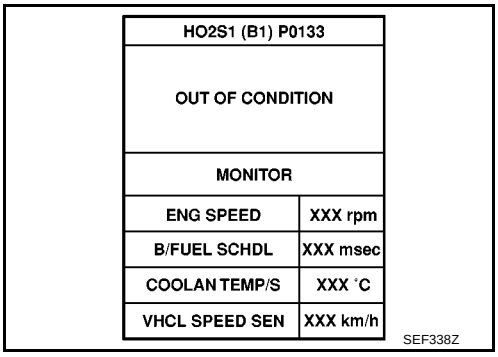
TESTING CONDITION:

- **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.**

WITH CONSULT-II

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” or “HO2S1 (B2) P0153” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

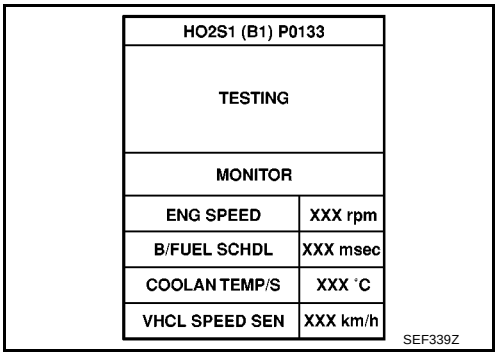
   NOTE:
   Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.



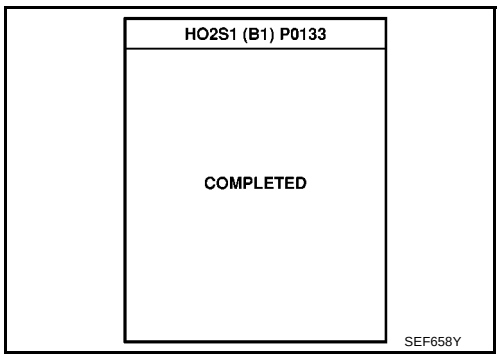
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 20 to 50 seconds.)

ENG SPEED	1,900 - 3,100 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.7 - 7.8 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-224, "Diagnostic Procedure" .



Overall Function Check

EBS00QK2

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

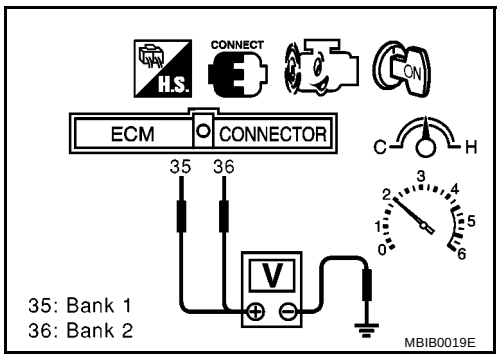
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1(B1) signal] or 36 [HO2S1(B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

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**

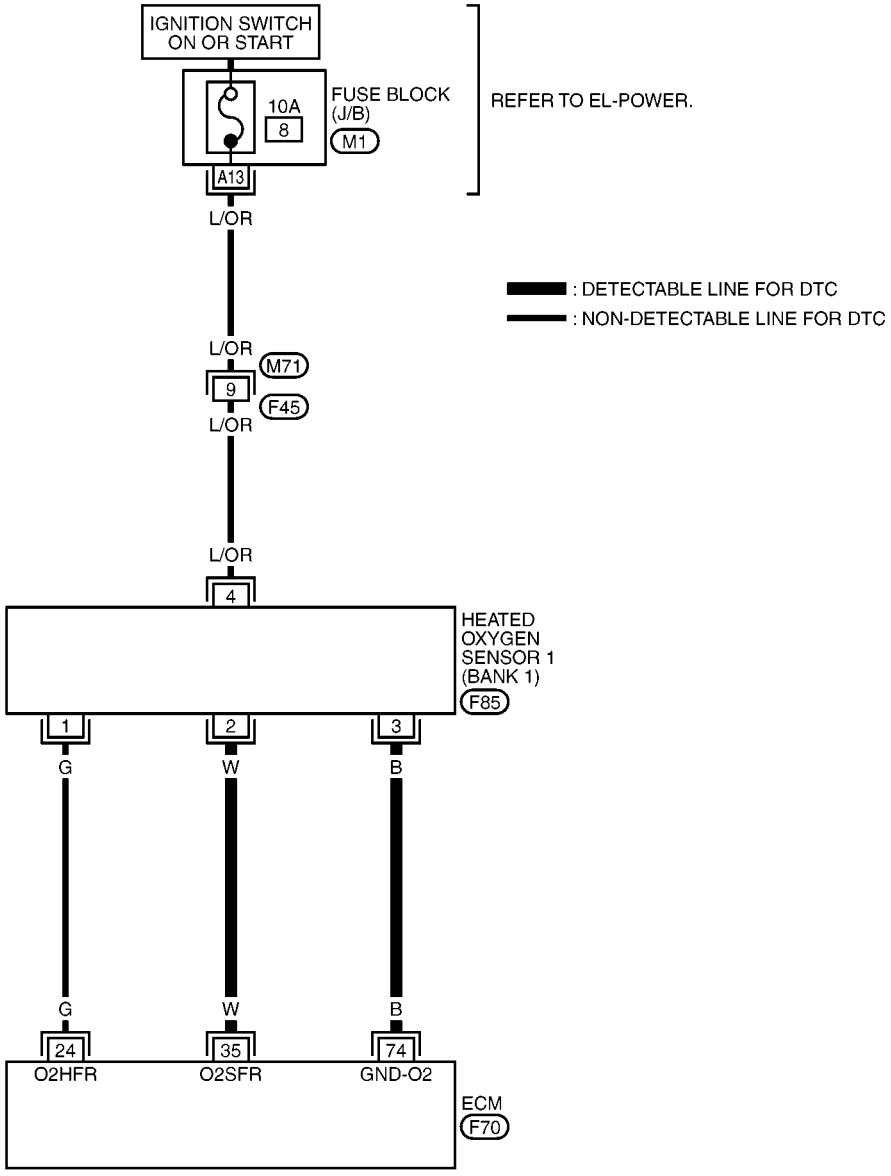
4. If NG, go to EC-224, "Diagnostic Procedure" .

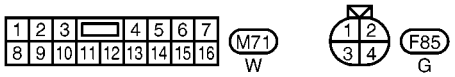


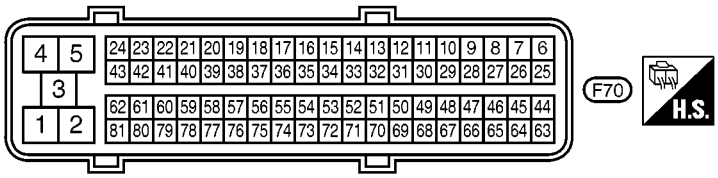
Wiring Diagram
BANK 1

EBS00QK3

EC-O2S1B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC444A

Specification data are reference values and are measured between each terminal and ground.

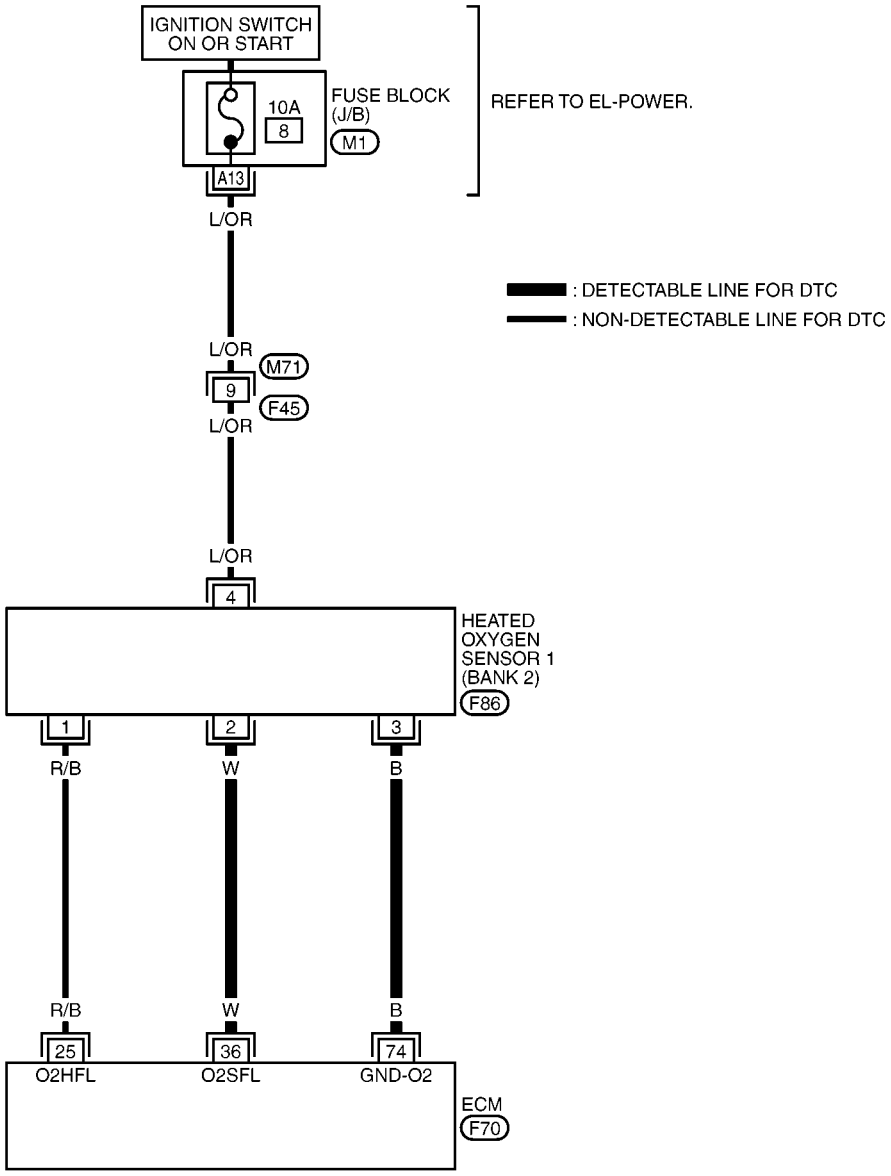
CAUTION:

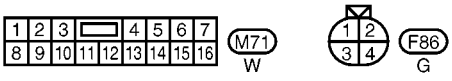
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

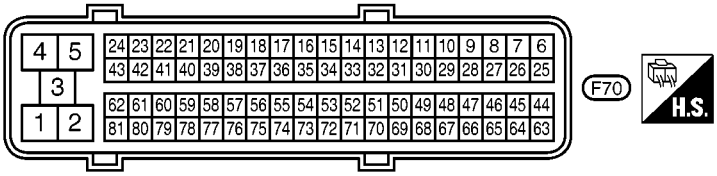
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S1B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC445A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

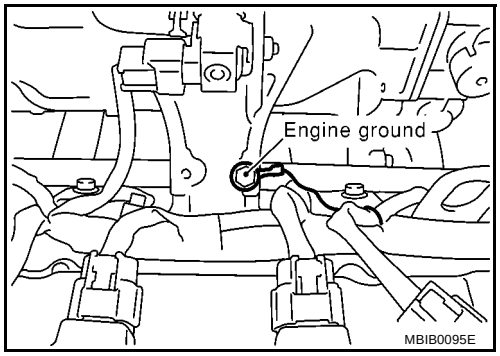
Diagnostic Procedure

EBS00QK4

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

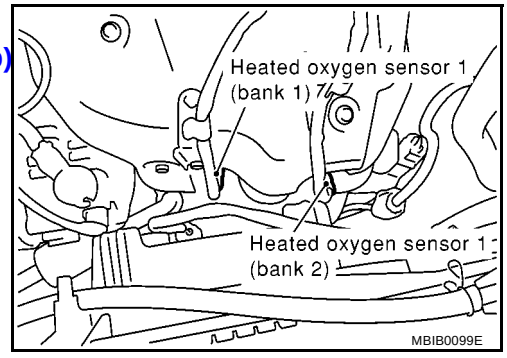


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

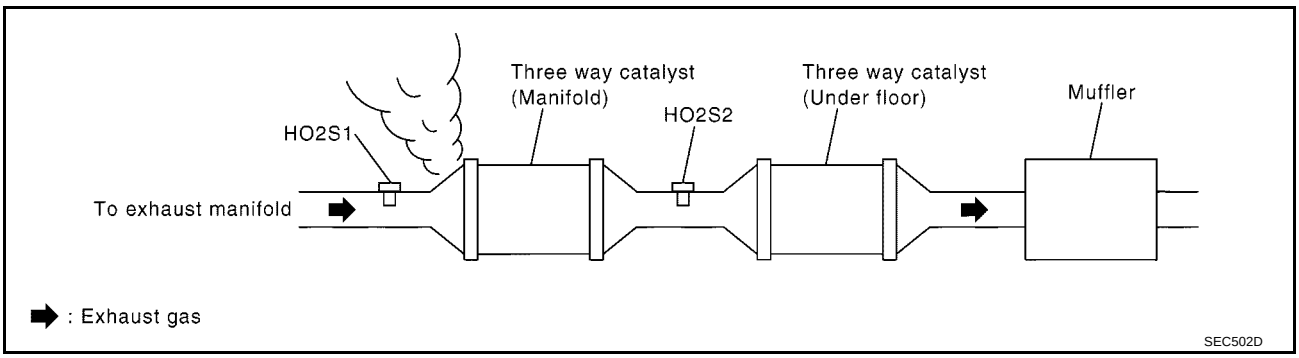
Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

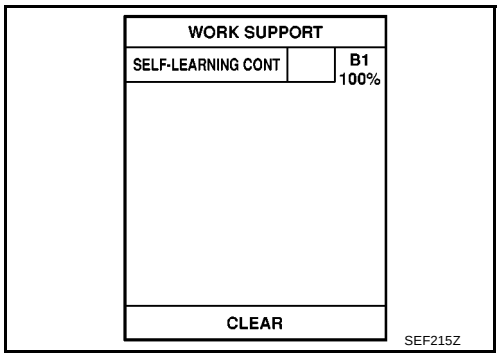
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

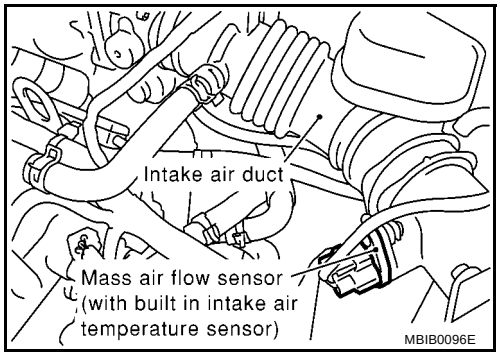
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or DTC P0172, P0175 (Refer to EC-288 or EC-302).
No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

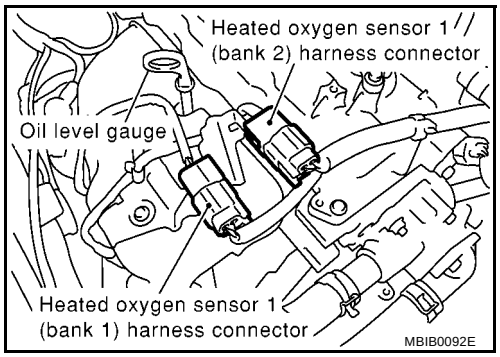
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	35	2	1
P0153	36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	35	2	1
P0153	36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-183, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-550, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace PCV valve.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-227, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

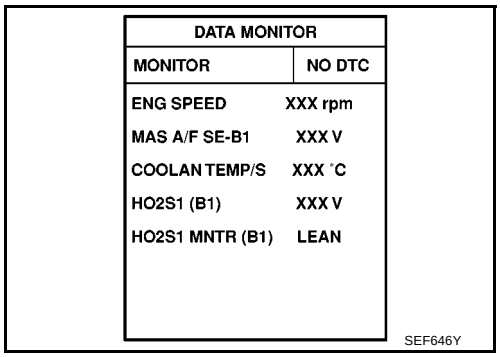
EBS00QK5

HEATED OXYGEN SENSOR 1

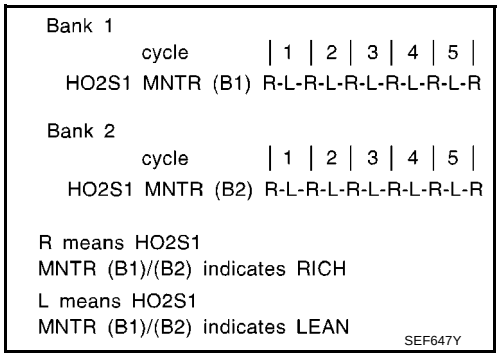
With CONSULT-II

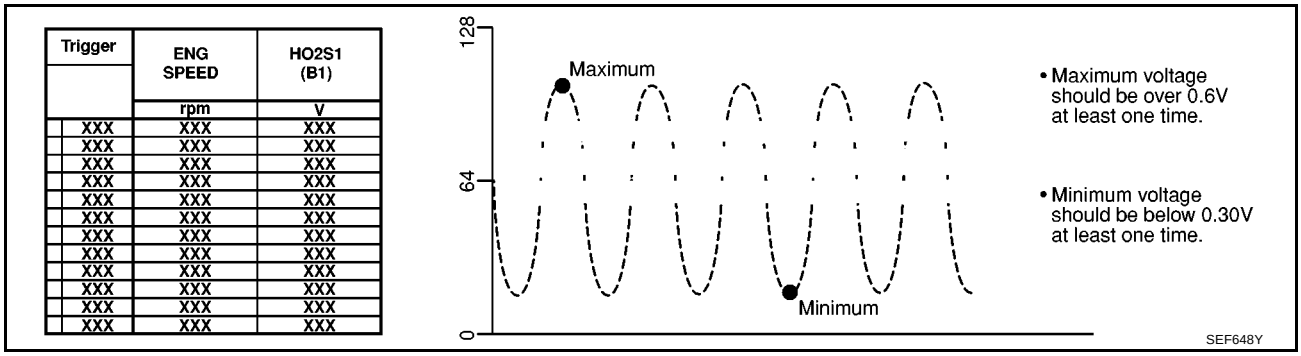
1. Start engine and warm it up to normal operating temperature.

2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
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)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.





CAUTION:

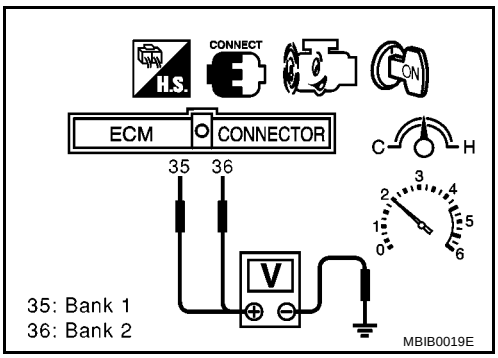
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.

3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QK6

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

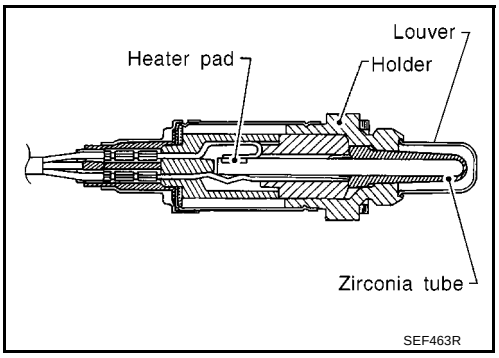
DTC P0134 HO2S1 (M/T MODELS)

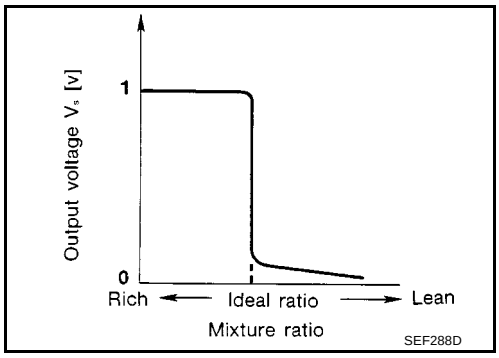
PFP:22690

Component Description

EBS00QK7

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QK8

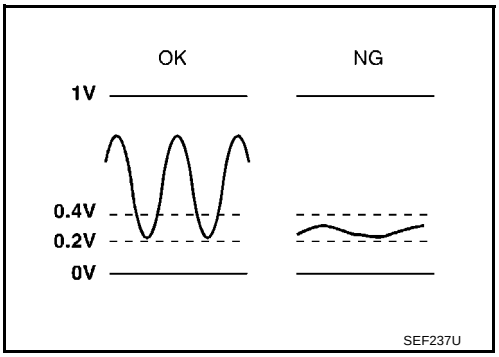
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QK9

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

EBS00QKA

CAUTION:
Always drive vehicle at a safe speed.

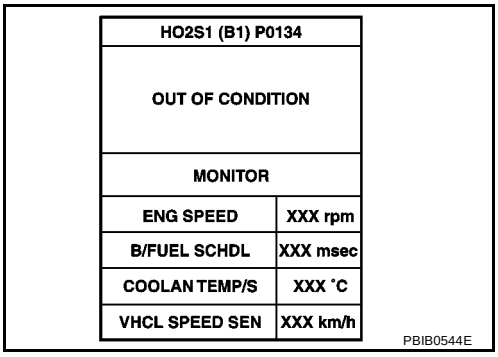
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

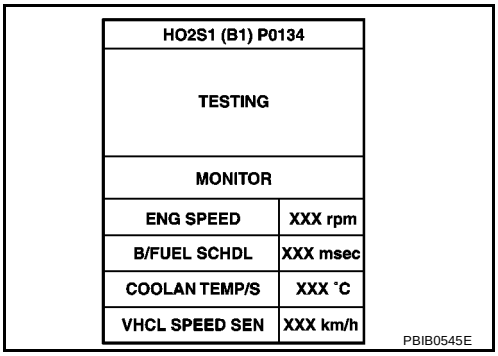
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.



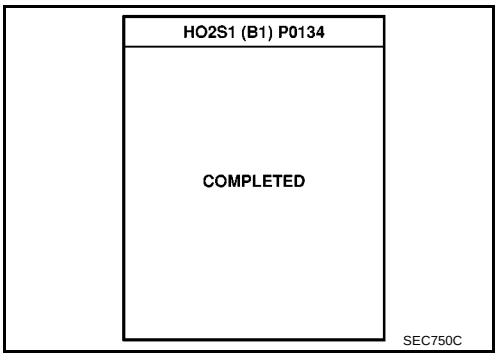
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,700 - 4,000 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	3.0 - 9.5 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-234, "Diagnostic Procedure" .



Overall Function Check

EBS00QKB

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

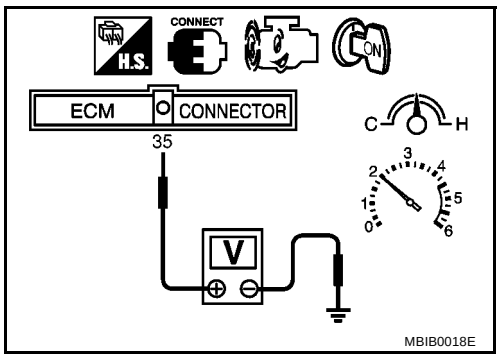
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 to 0.4V.

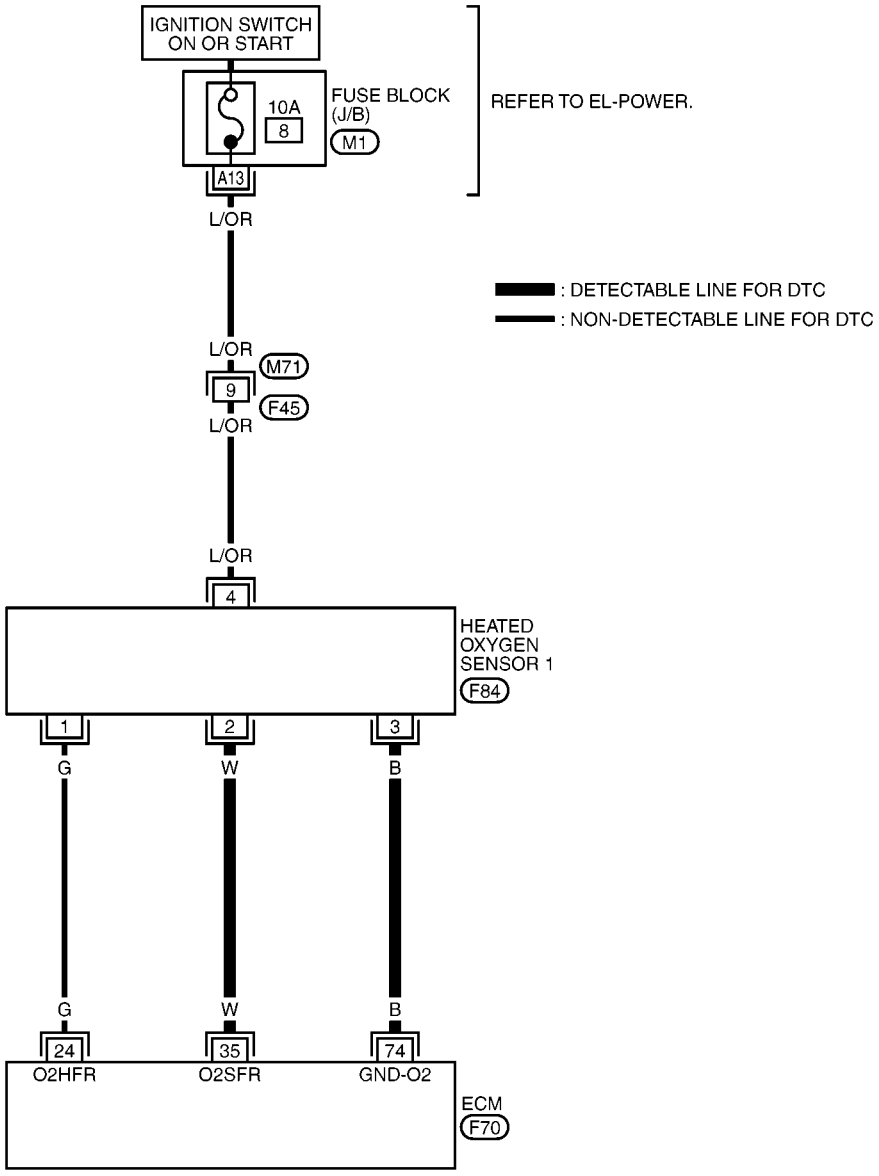
4. If NG, go to EC-234, "Diagnostic Procedure" .

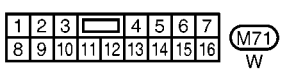


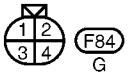
Wiring Diagram

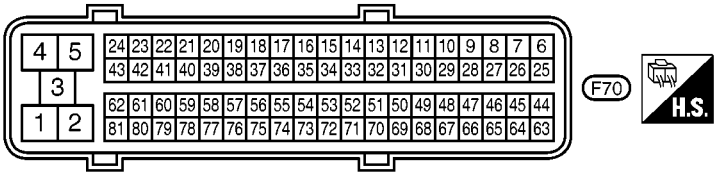
EBS00QKC

EC-HO2S1-01









REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC443A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

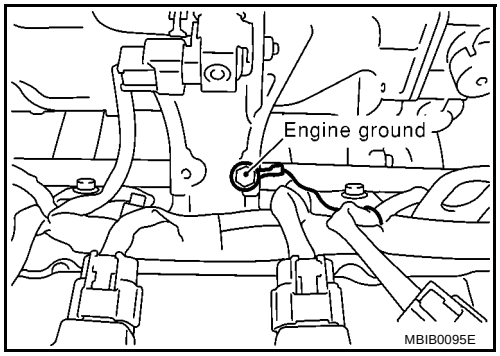
Diagnostic Procedure

EBS00QKD

1. INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

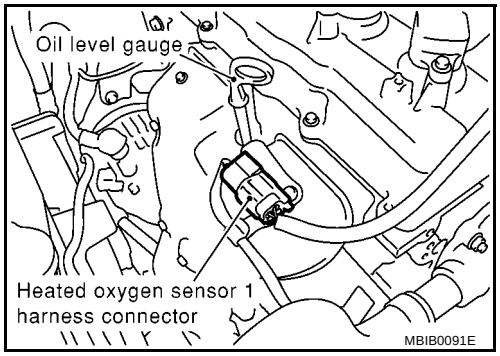
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-235, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QKE

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

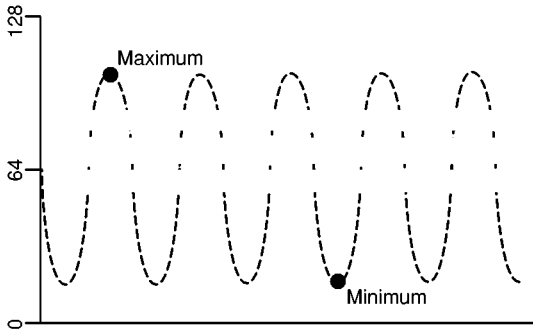
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



CAUTION:

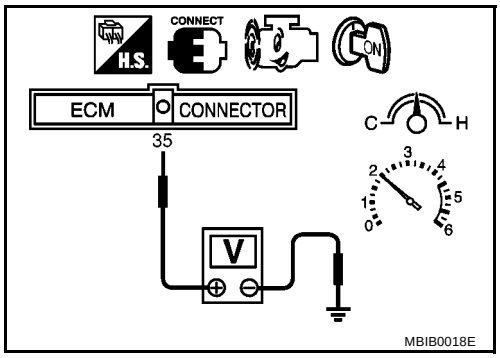
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QKF

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

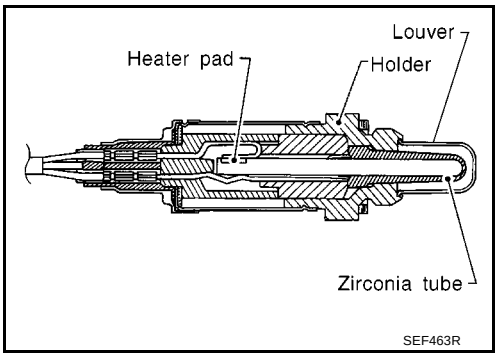
DTC P0134, P0154 HO2S1 (A/T MODELS)

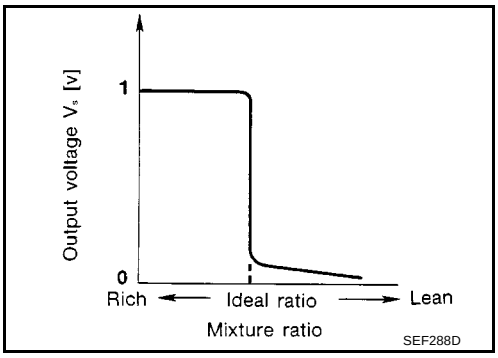
PFP:22690

Component Description

EBS00QKG

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QKH

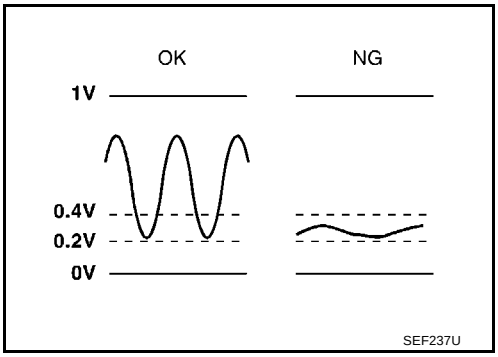
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QKI

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 (Bank 1)	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
P0154 0154 (Bank 2)			

DTC Confirmation Procedure

EBS00QKJ

CAUTION:
Always drive vehicle at a safe speed.

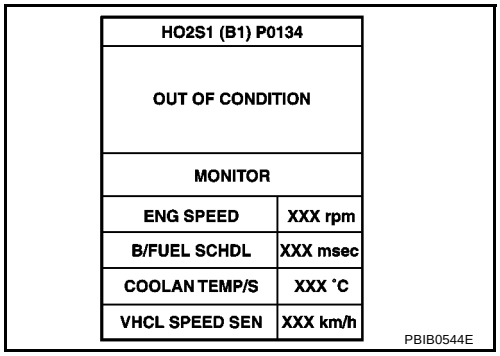
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

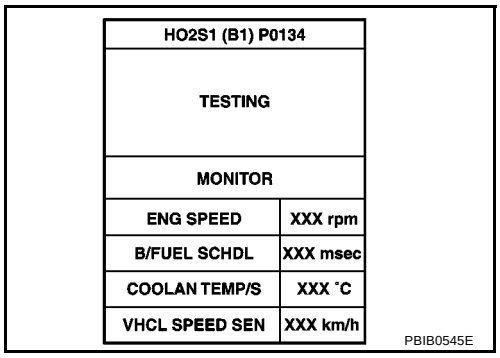
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1) P0134” or “HO2S1 (B2) P0154” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.



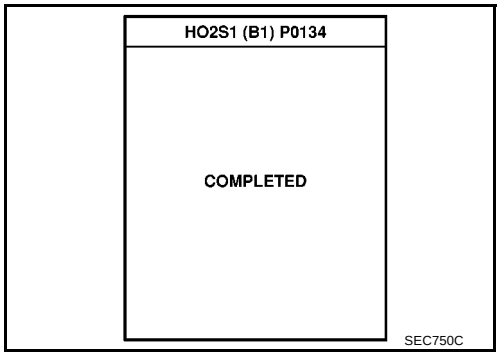
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 3,400 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	3.3 - 8.7 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-243, "Diagnostic Procedure" .



Overall Function Check

EBS00QKK

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

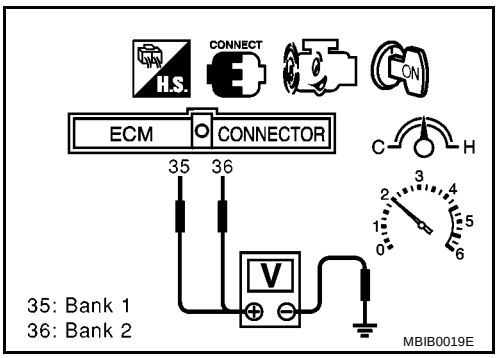
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage does not remain in the range of 0.2 to 0.4V.

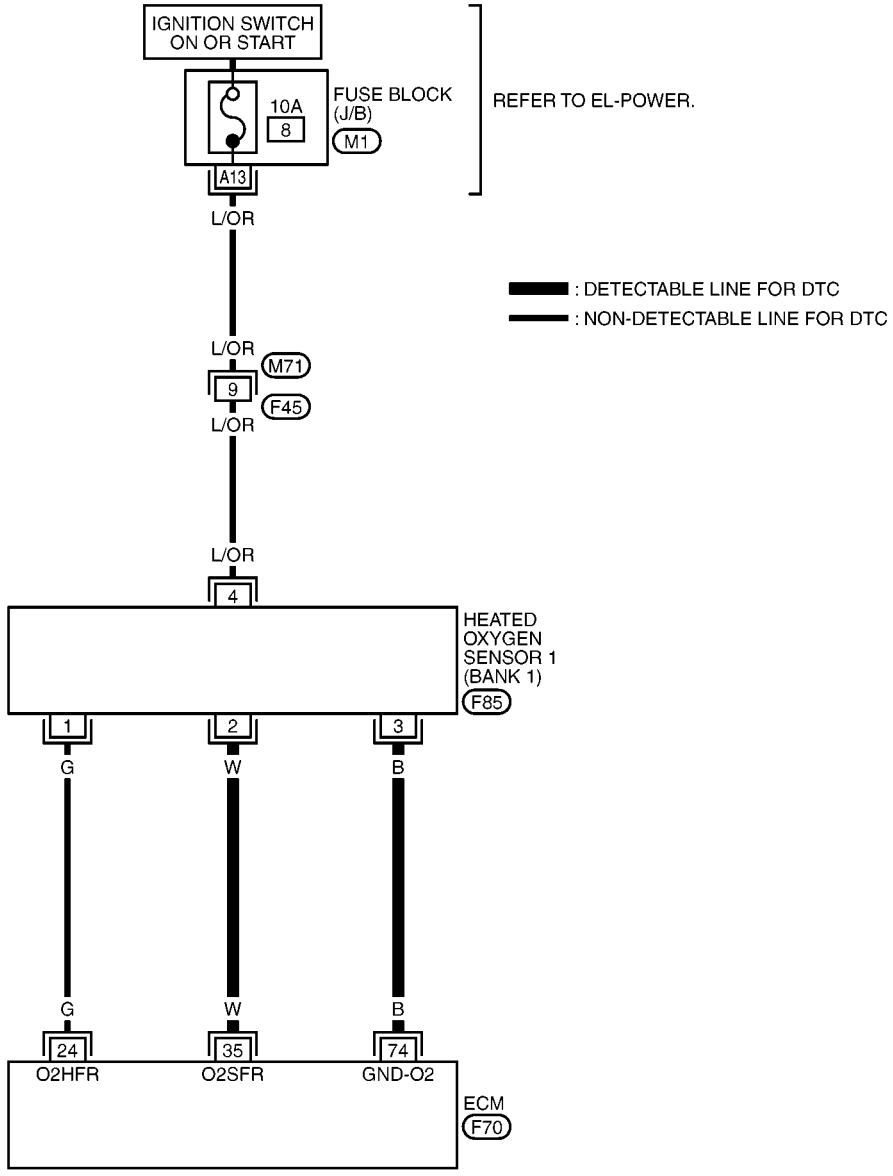
4. If NG, go to EC-243, "Diagnostic Procedure" .

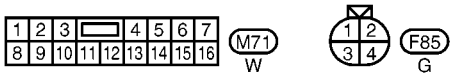


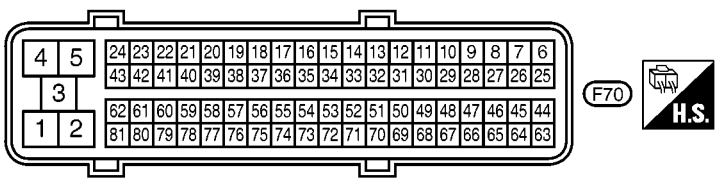
Wiring Diagram
BANK 1

EBS00QKL

EC-O2S1B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC444A

Specification data are reference values and are measured between each terminal and ground.

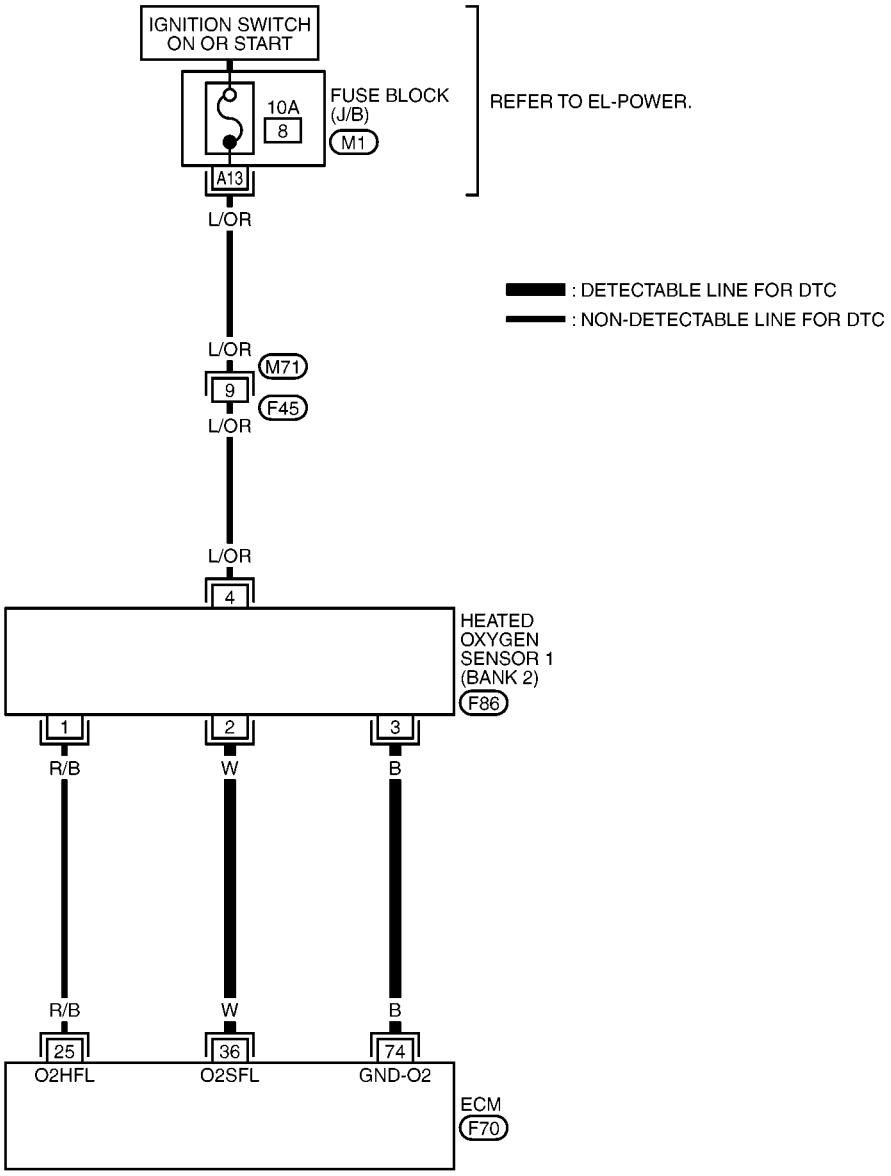
CAUTION:

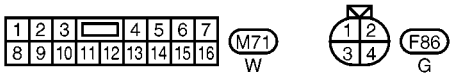
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

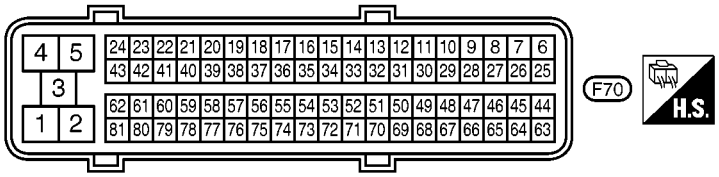
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S1B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC445A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

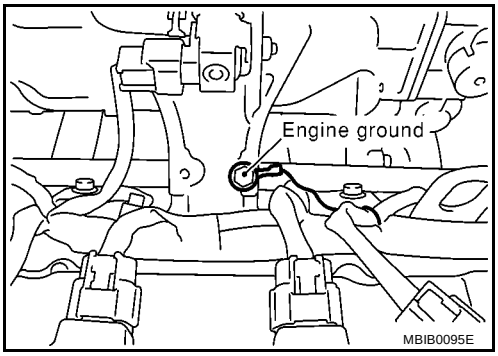
Diagnostic Procedure

EBS00QKM

1. INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



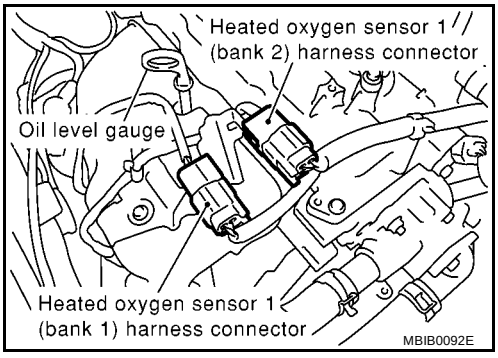
2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	2	1
P0154	36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	2	1
P0154	36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-244, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QKN

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.

5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1										
cycle		1		2		3		4		5
HO2S1 MNTR (B1)	R-L-		R-L-		R-L-		R-L-		R-L-R	

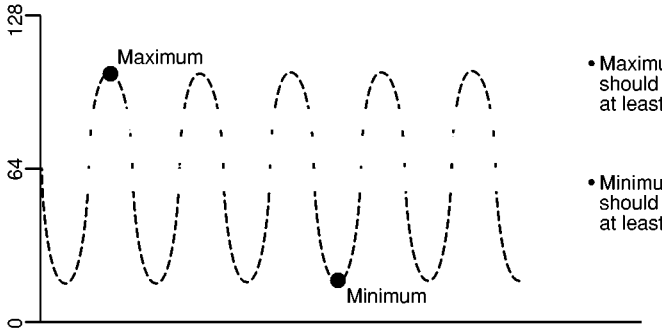
Bank 2										
cycle		1		2		3		4		5
HO2S1 MNTR (B2)	R-L-		R-L-		R-L-		R-L-		R-L-R	

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

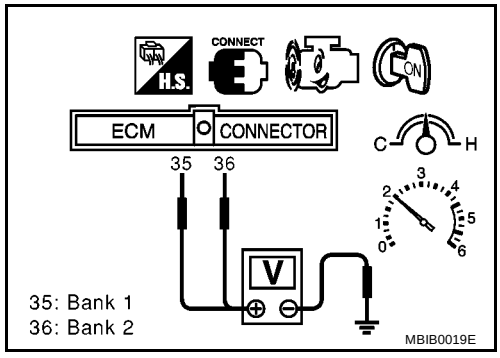
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0019E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QKO

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

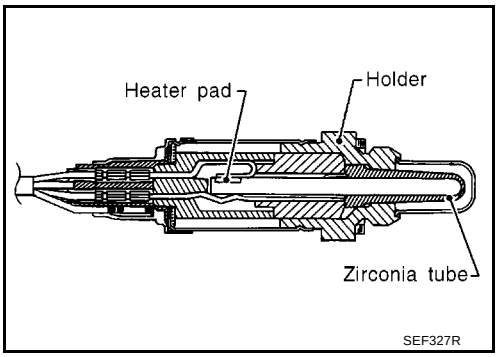
DTC P0138 HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00QKP

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QKQ

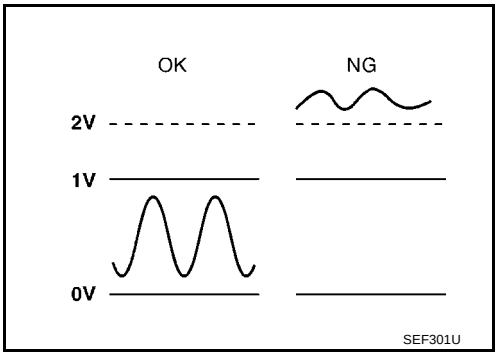
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QKR

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 0138	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

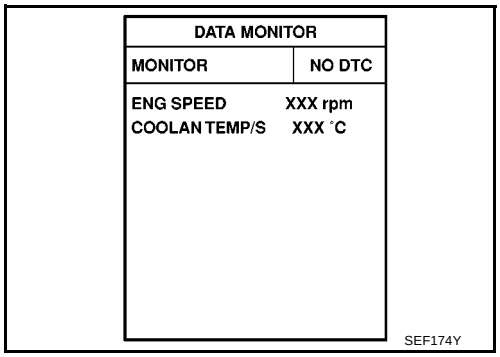
EBS00QKS

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
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 at between 3,500 and 4,000 rpm for least one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to EC-250, "Diagnostic Procedure" .



WITH GST

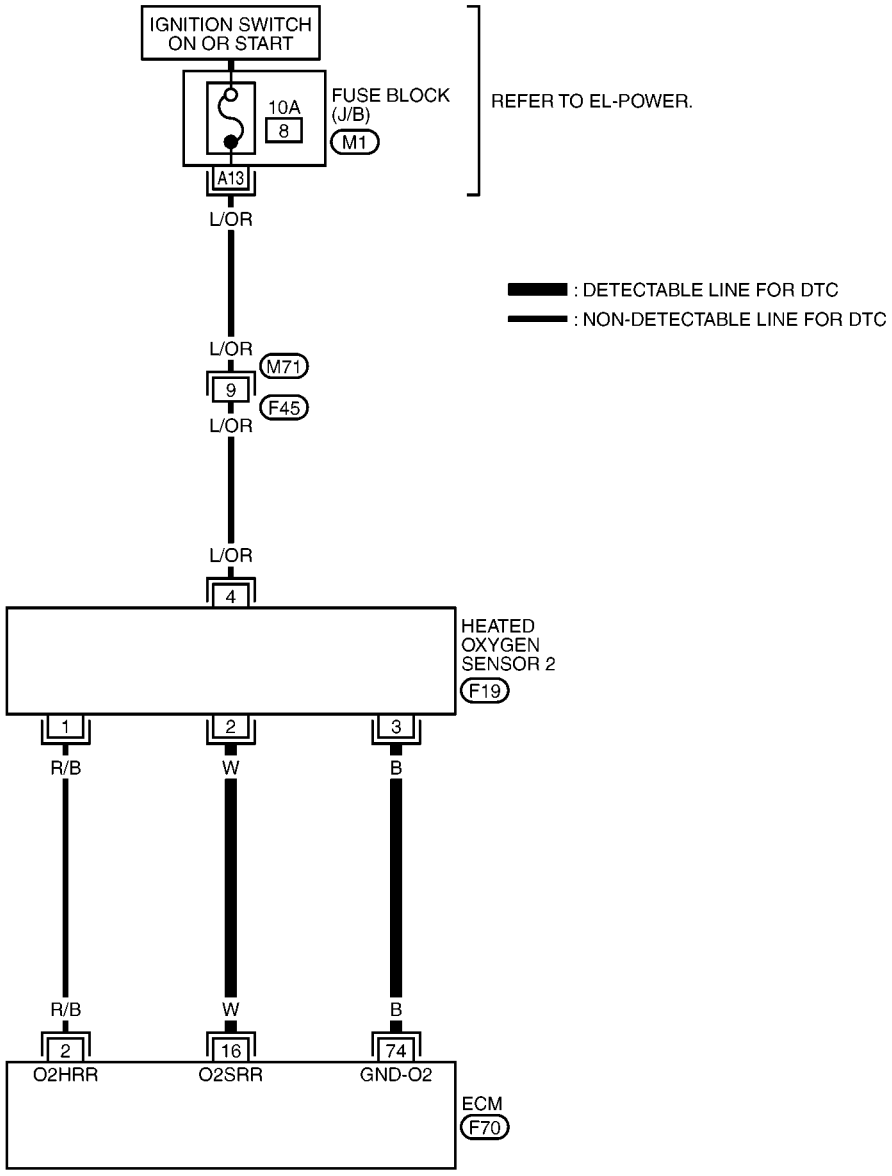
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for two minutes.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for two minutes.
8. Select “Mode 3” with GST.
9. If NG, go to EC-250, "Diagnostic Procedure" .

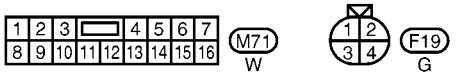
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

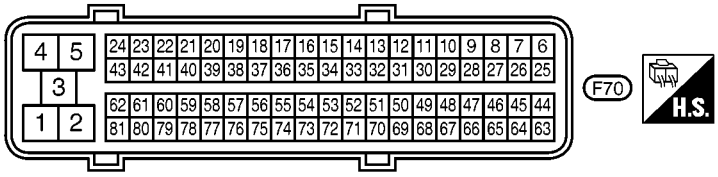
Wiring Diagram

EBS00QKT

EC-HO2S2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC446A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

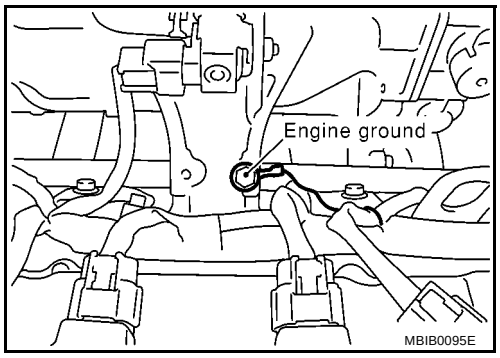
Diagnostic Procedure

EBS00QKU

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



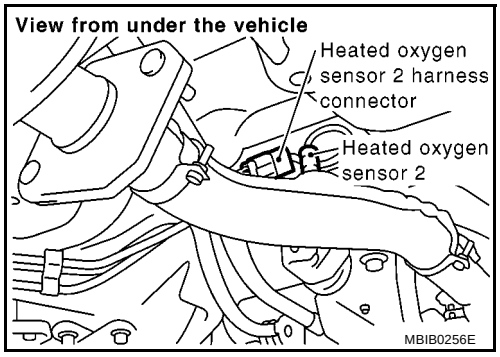
2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-251, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QKV

HEATED OXYGEN SENSOR 2

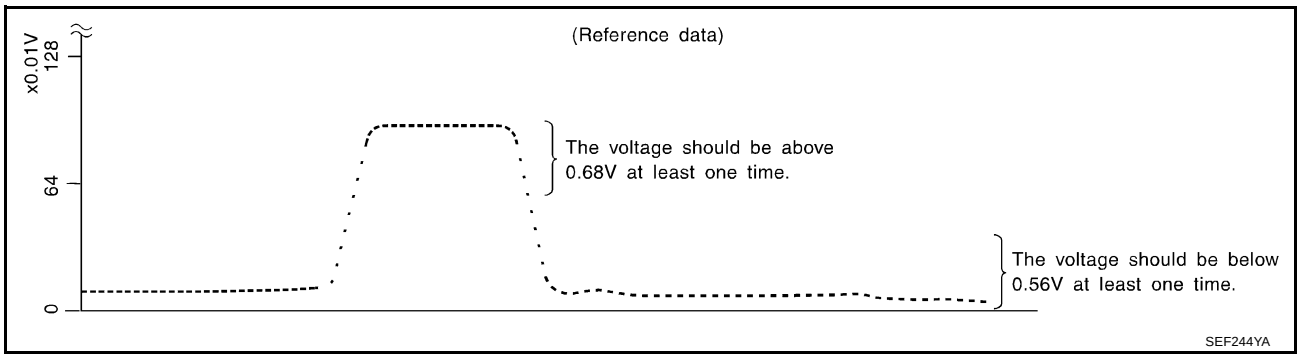
With CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



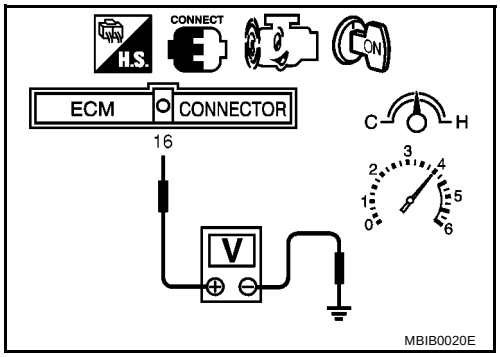
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QKW

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

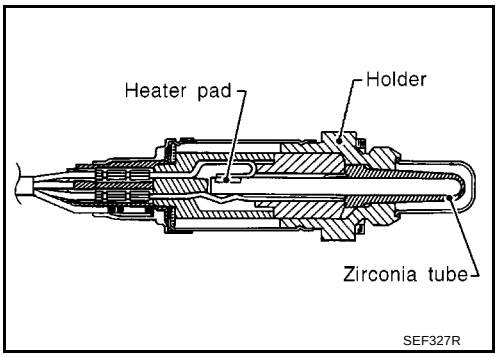
DTC P0138, P0158 HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00QKX

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QKY

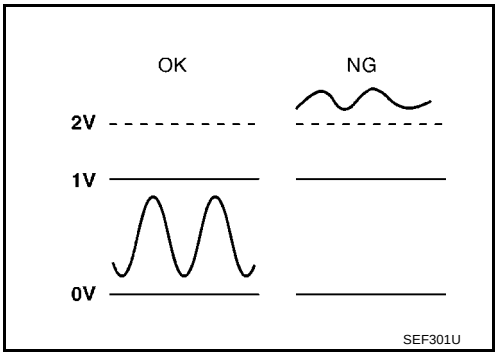
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QKZ

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 0138 (Bank 1)	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
P0158 0158 (Bank 2)			

DTC Confirmation Procedure

EBS00QL0

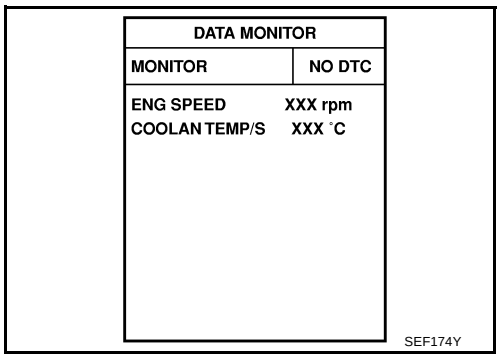
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to EC-258, "Diagnostic Procedure" .



WITH GST

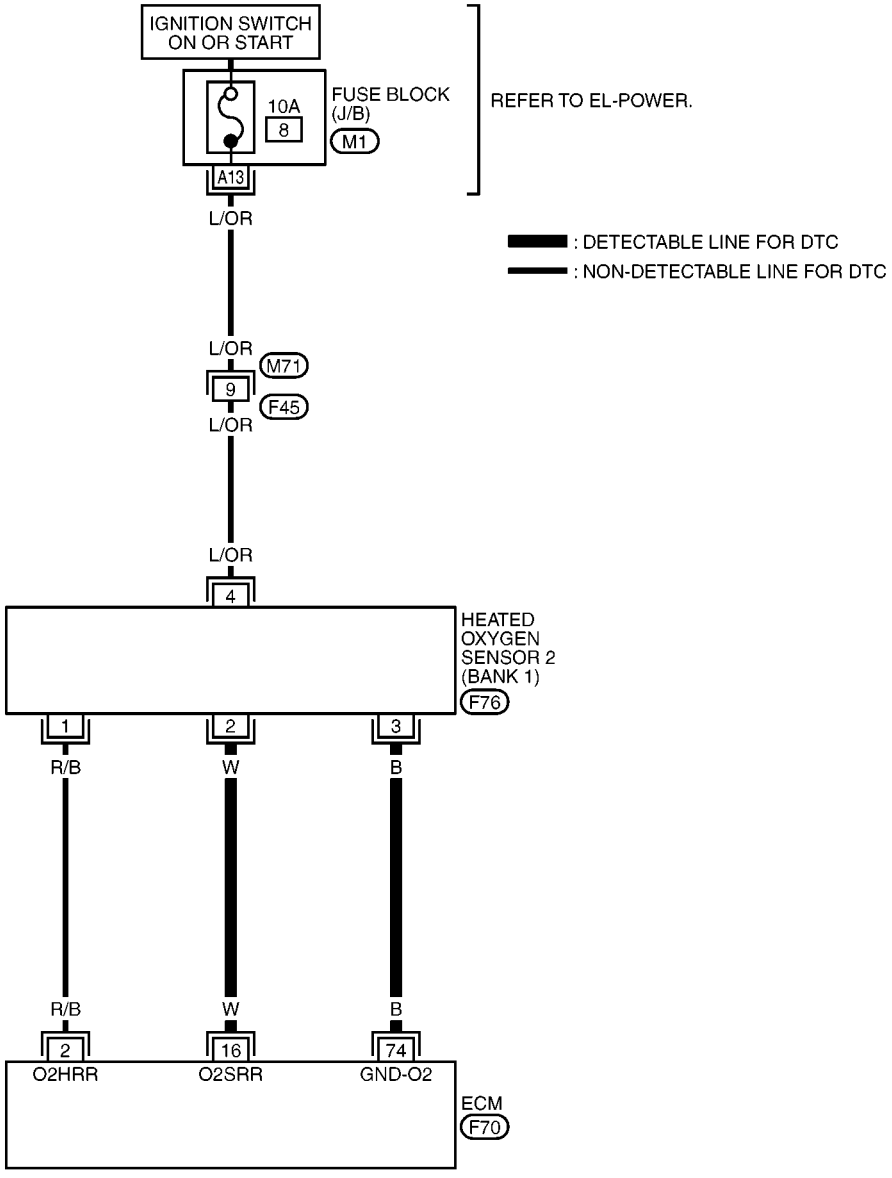
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for two minutes.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for two minutes.
8. Select “Mode 3” with GST.
9. If NG, go to EC-258, "Diagnostic Procedure" .

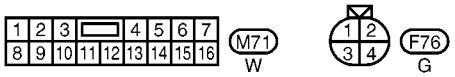
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

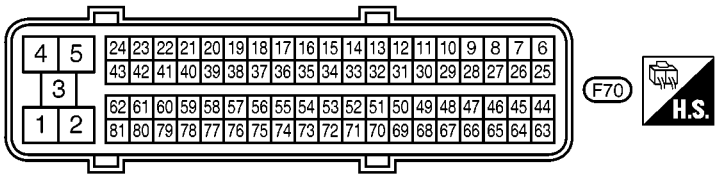
Wiring Diagram
BANK 1

EBS00QL1

EC-O2S2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC447A

Specification data are reference values and are measured between each terminal and ground.

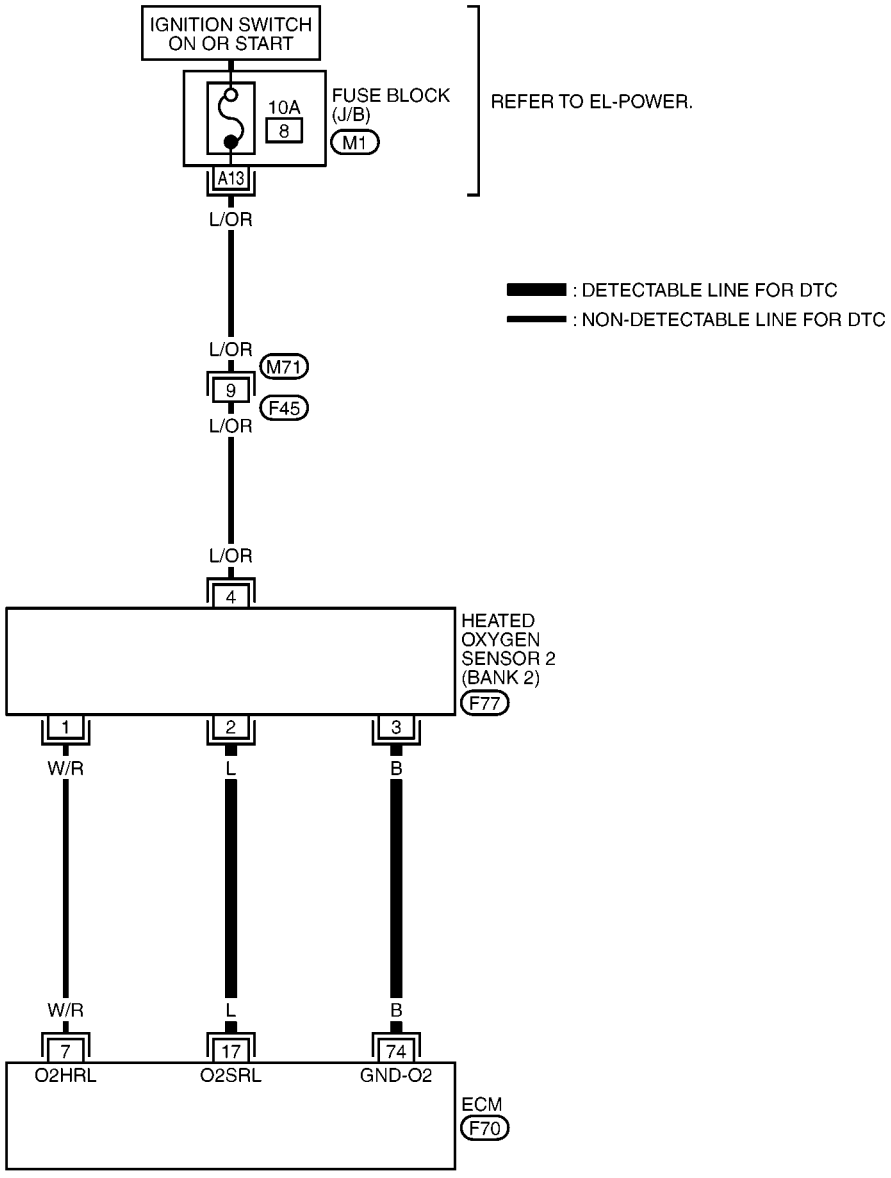
CAUTION:

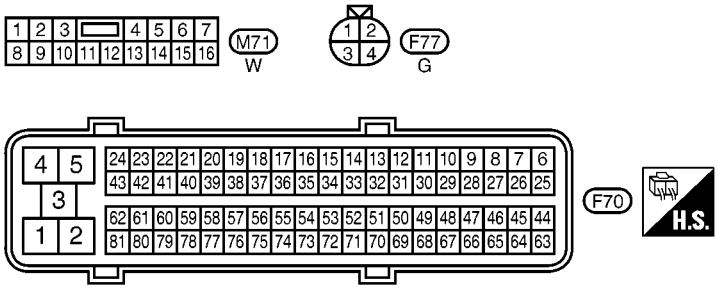
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC448A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

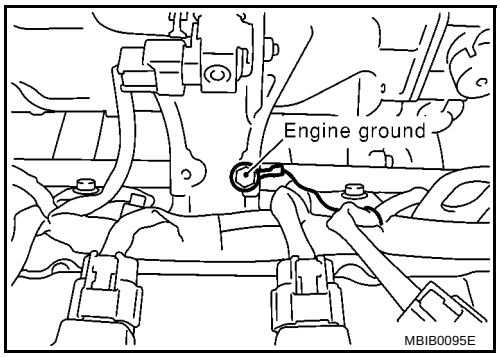
Diagnostic Procedure

EBS00QL2

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



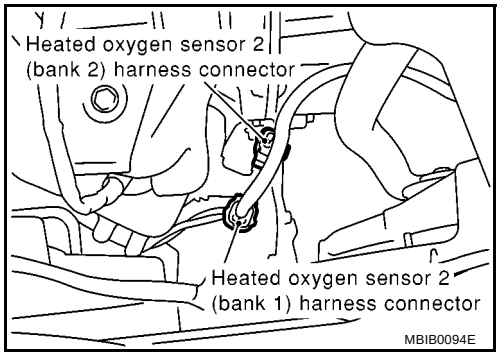
2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	16	2	1
P0158	17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	16	2	1
P0158	17	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-259, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QL3

HEATED OXYGEN SENSOR 2

With CONSULT-II

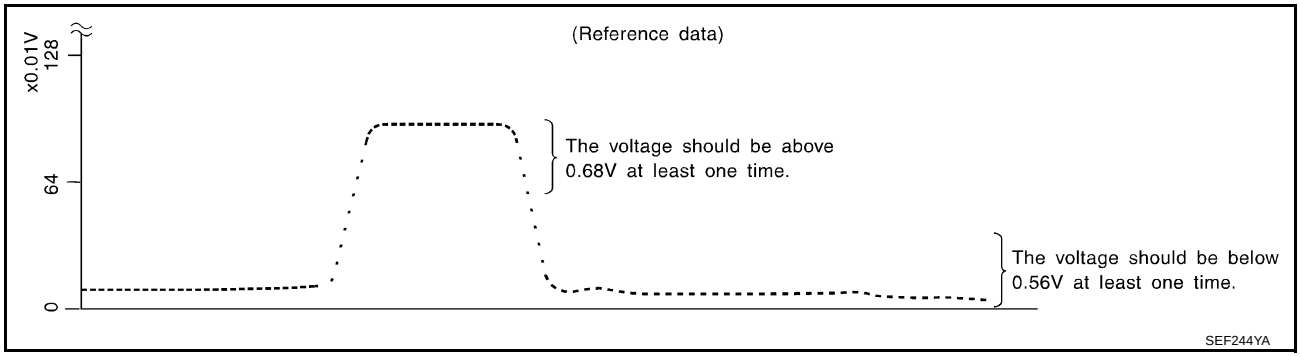
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



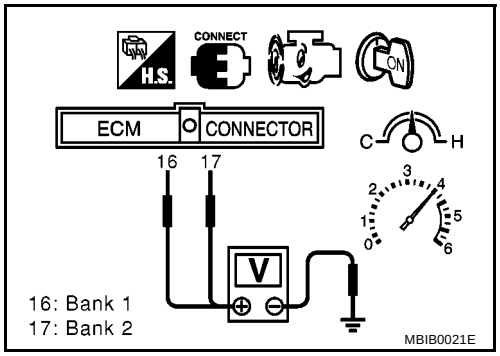
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QL4

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

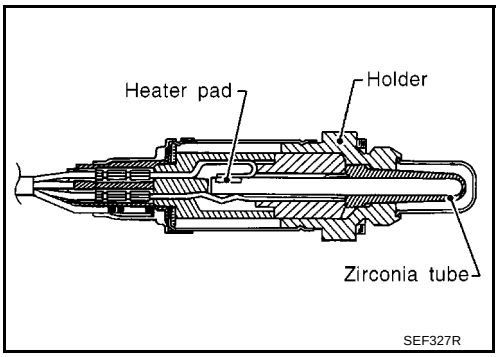
DTC P0139 HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00QL5

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QL6

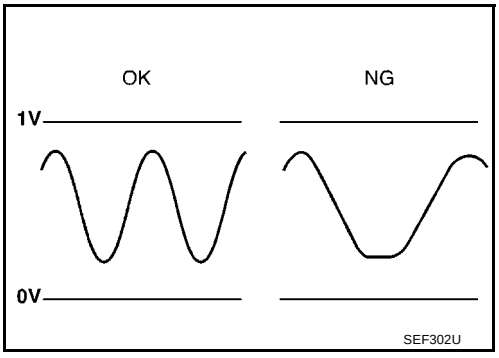
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QL7

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 0139	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 ● Injectors ● Intake air leaks

DTC Confirmation Procedure

EBS00QL8

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II 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:
Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

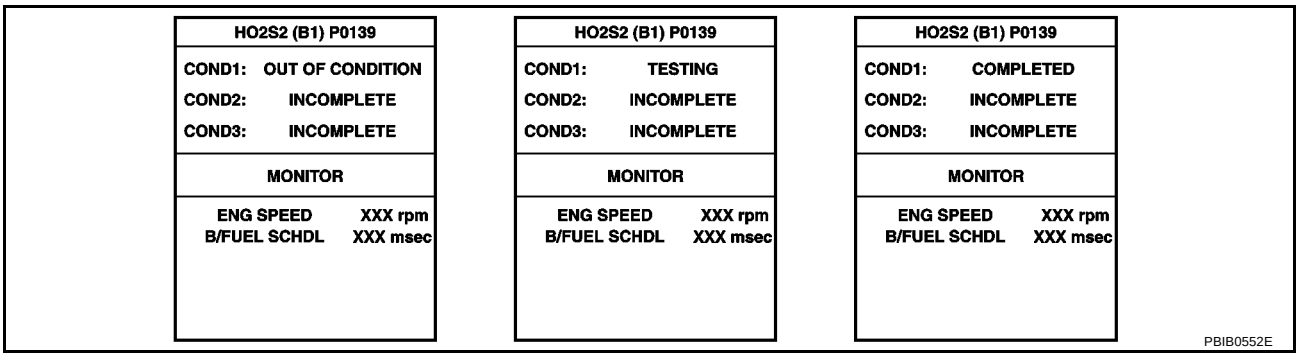
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F)

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 one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105 °C
Selector level	Suitable position

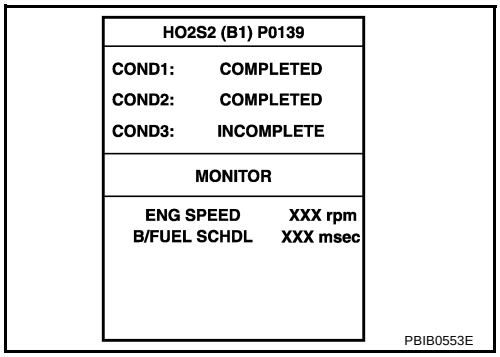


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

1. While driving, release accelerator pedal completely from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

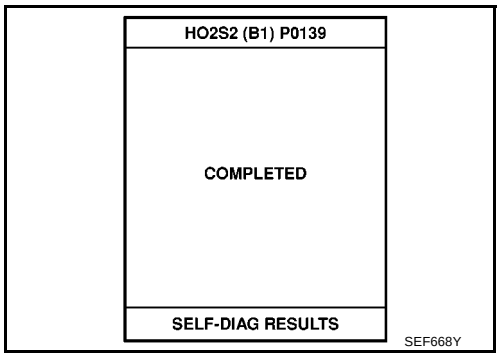
NOTE:
If “COMPLETED” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-266, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.



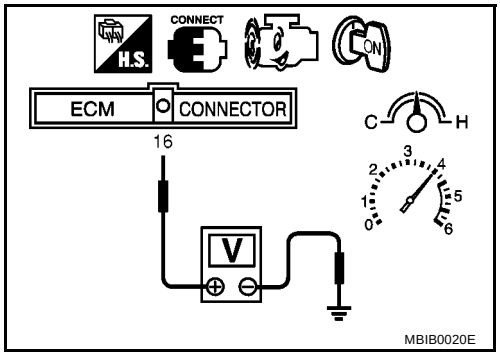
Overall Function Check

EBS00QL9

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

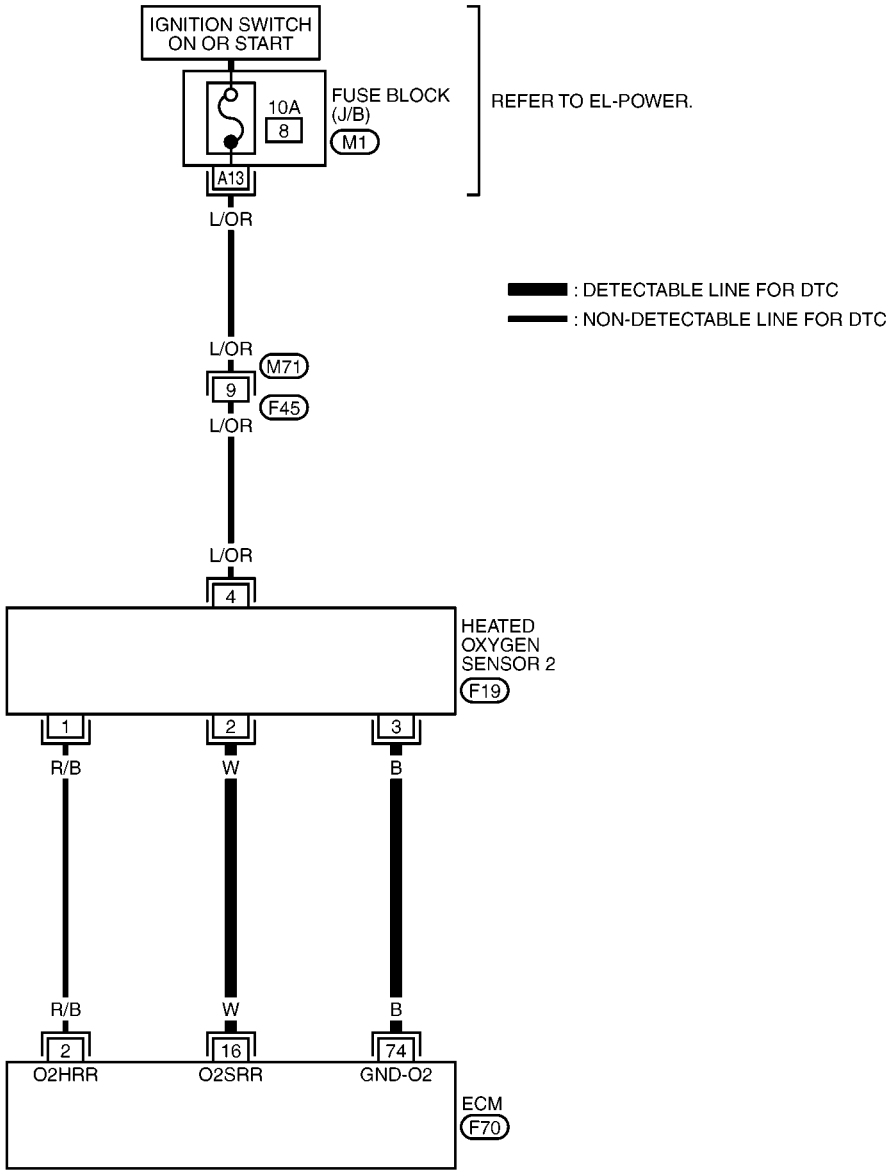
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-266, "Diagnostic Procedure" .

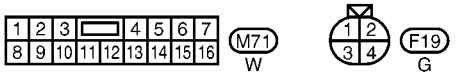


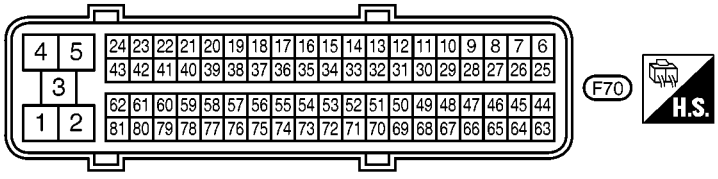
Wiring Diagram

EBS00QLA

EC-HO2S2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC446A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

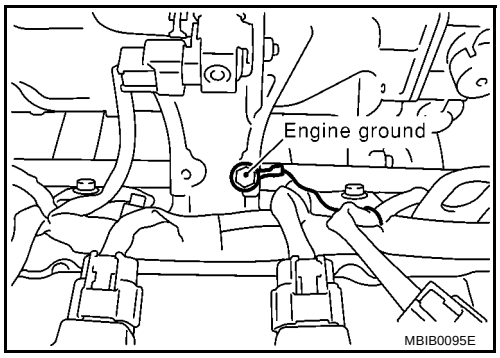
Diagnostic Procedure

EBS00QLB

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

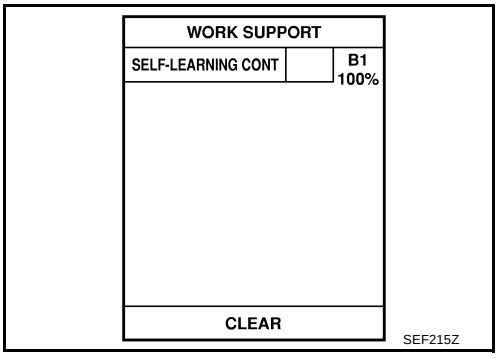
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

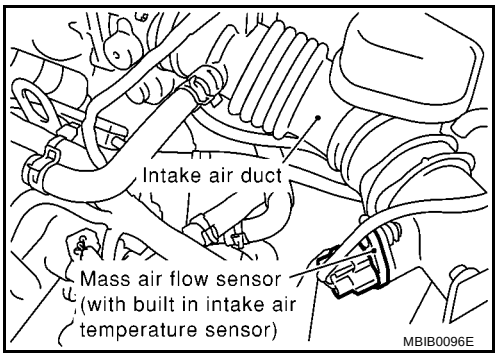
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. 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?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. 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 or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-281 or EC-296 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

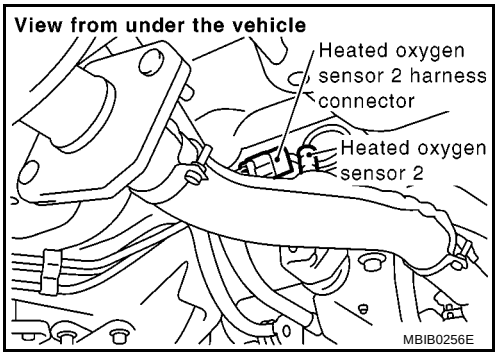
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-268, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QLC

HEATED OXYGEN SENSOR 2

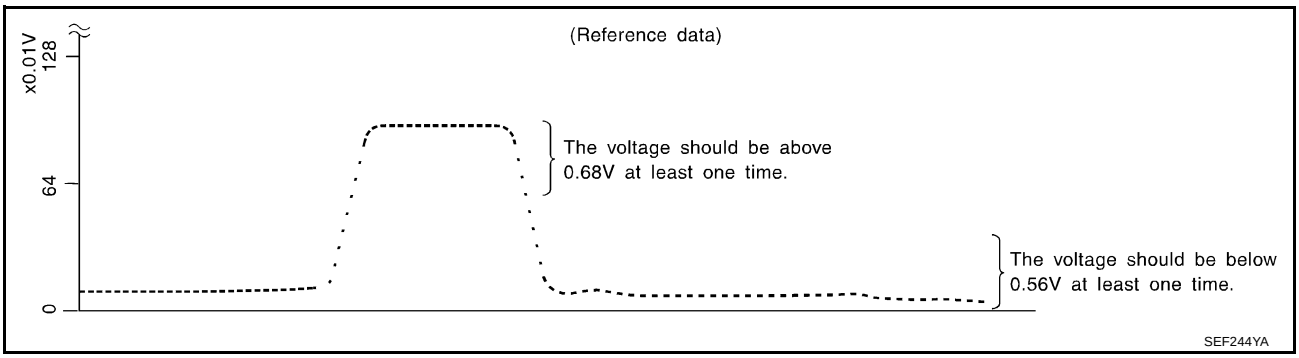
With CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



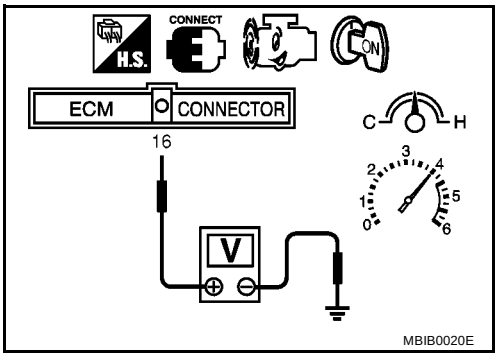
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QLD

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

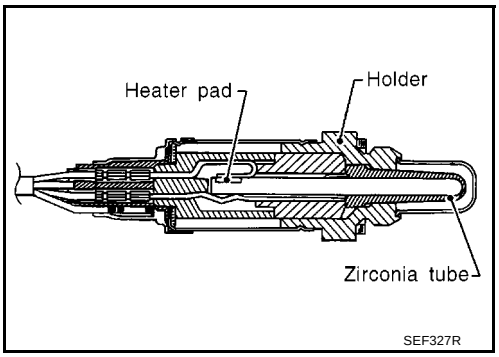
DTC P0139, P0159 HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00QLE

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QLF

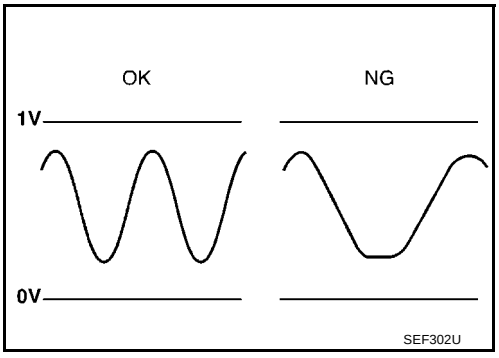
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QLG

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 0139 (Bank 1)	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 ● Injectors ● Intake air leaks
P0159 0159 (Bank 2)			

DTC Confirmation Procedure

EBS00QLH

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II 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:
Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in "Procedure for COND1".

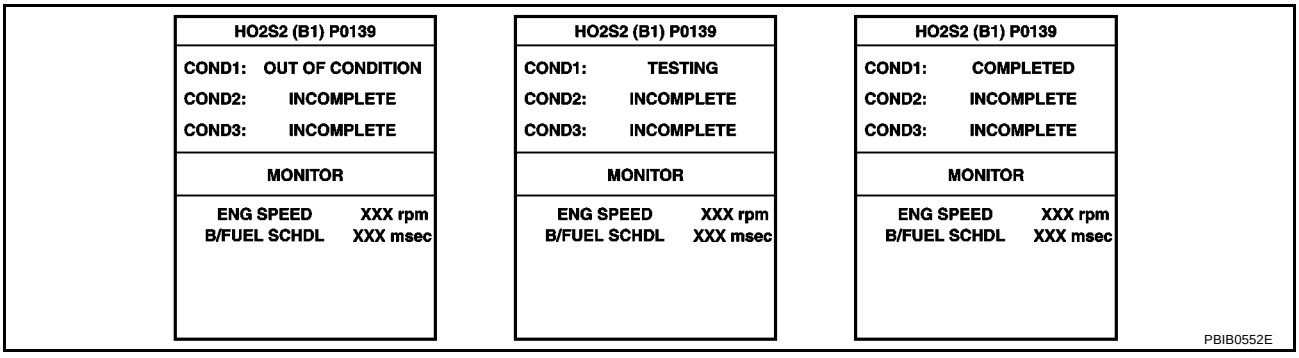
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F)

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 one minute under no load.
4. Let engine idle one minute.
5. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105 °C
Selector level	Suitable position

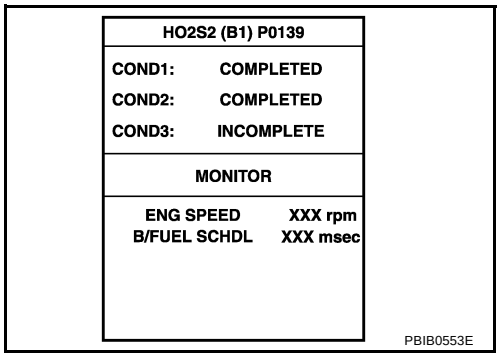


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

1. While driving, release accelerator pedal completely with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

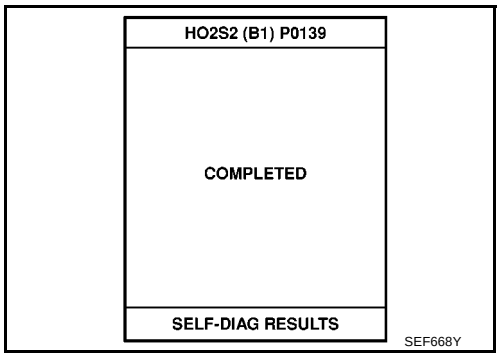
NOTE:
If “COMPLETED” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-276, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.



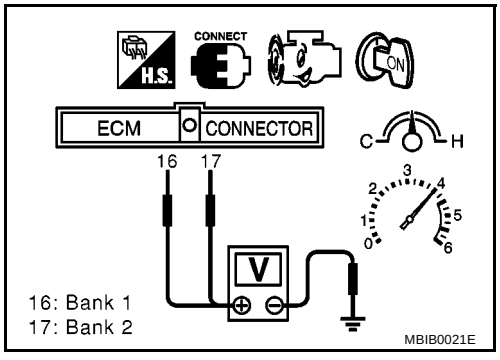
Overall Function Check

EBS00QLI

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

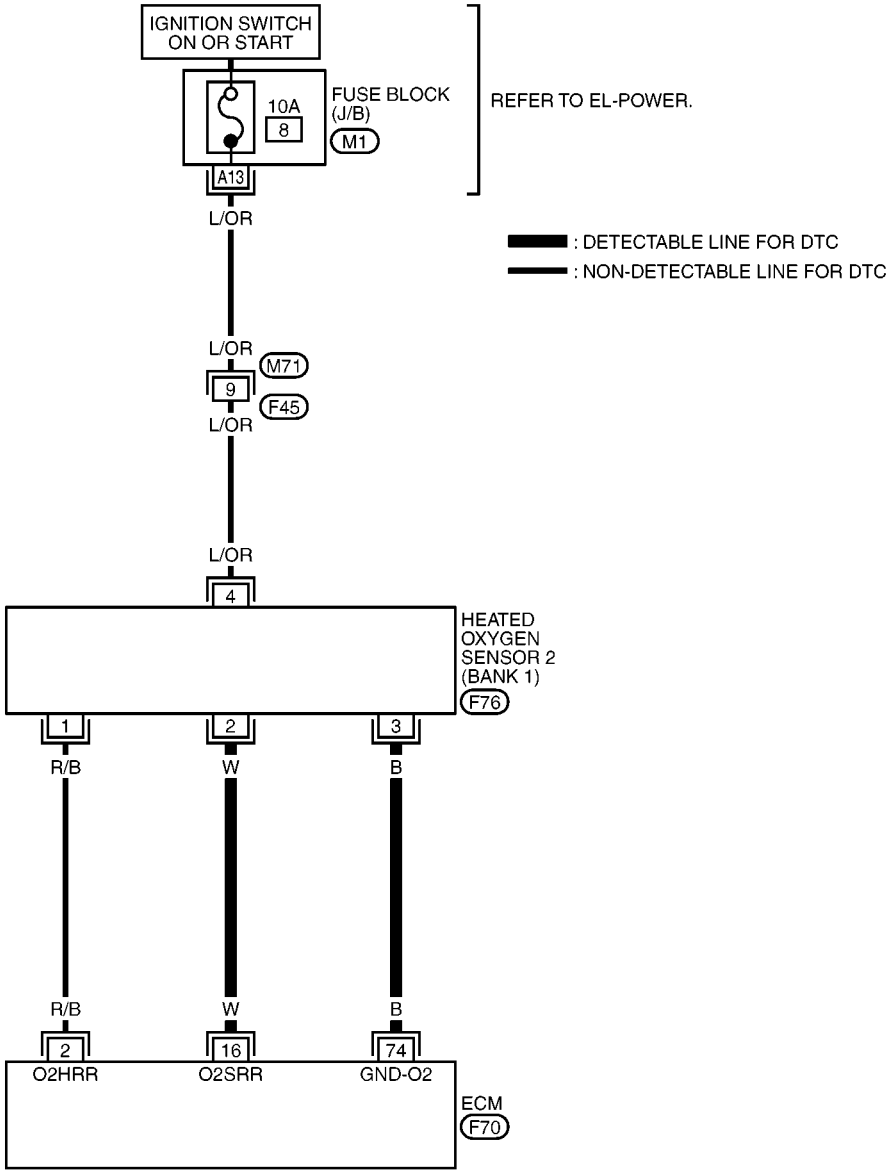
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-276, "Diagnostic Procedure" .

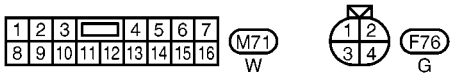


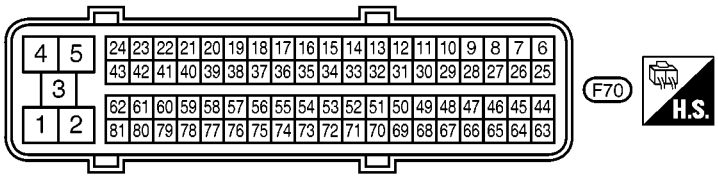
Wiring Diagram
BANK 1

EBS00QLJ

EC-O2S2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC447A

Specification data are reference values and are measured between each terminal and ground.

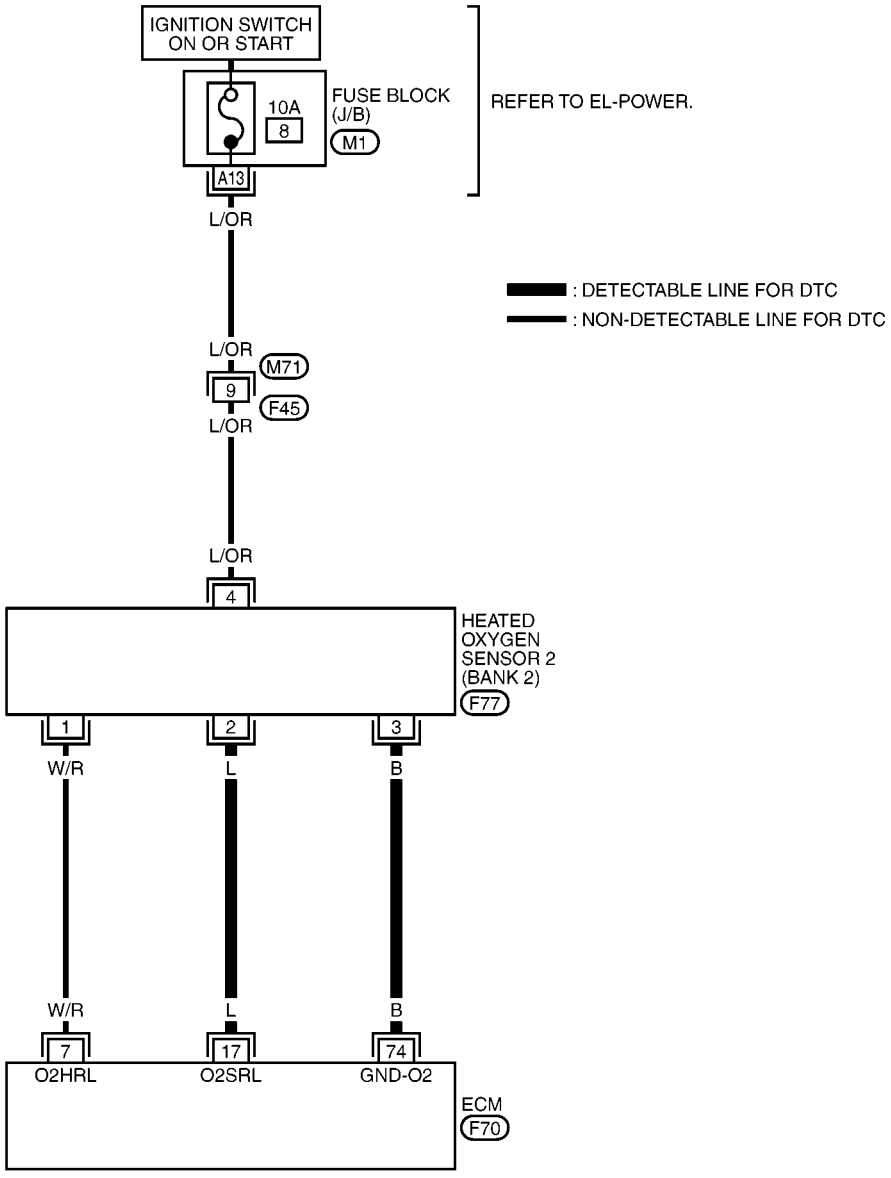
CAUTION:

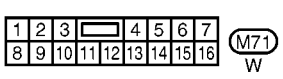
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

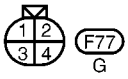
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

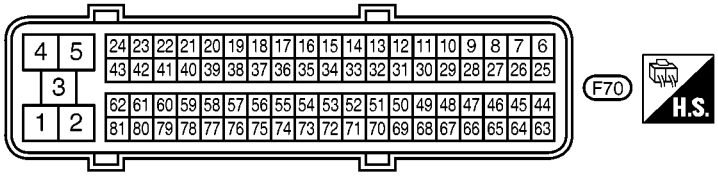
BANK 2

EC-O2S2B2-01









REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC448A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

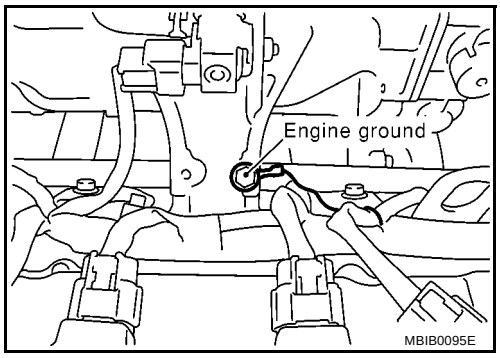
Diagnostic Procedure

EBS00QLK

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

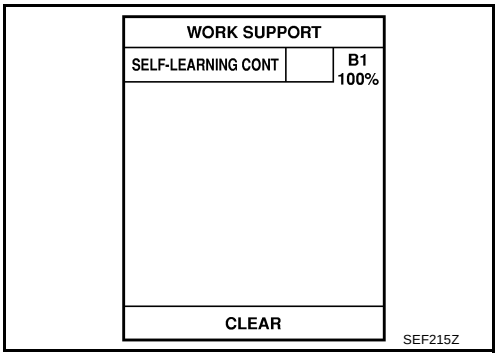
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

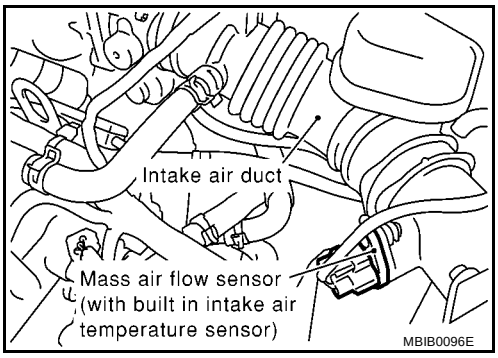
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

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 toEC-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-288 or EC-302 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

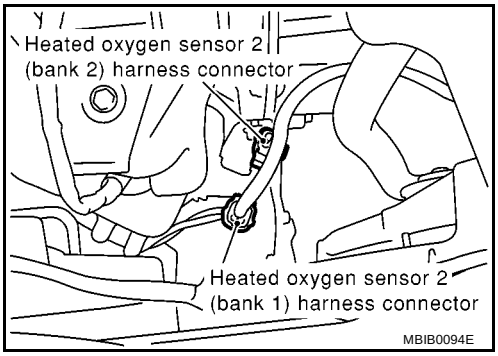
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	16	2	1
P0159	17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	16	2	1
P0159	17	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-278, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QLL

HEATED OXYGEN SENSOR 2

With CONSULT-II

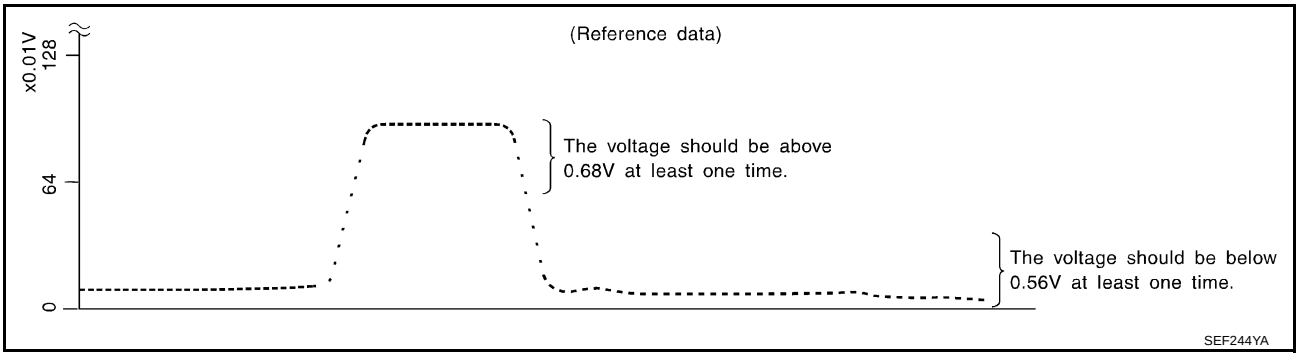
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



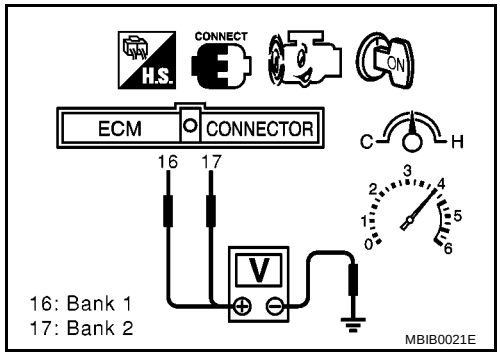
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is –25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QLM

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION (M/T MODELS)

PFP:16600

On Board Diagnosis Logic

EBS00QLN

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 sensor 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 light up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	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 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

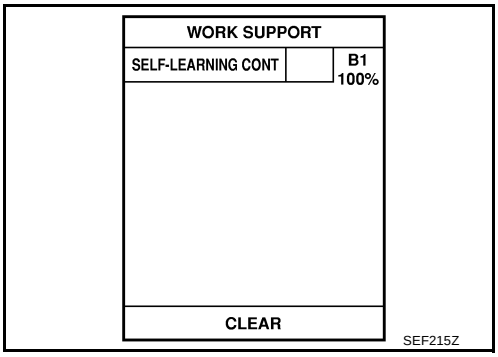
DTC Confirmation Procedure

EBS00QLO

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

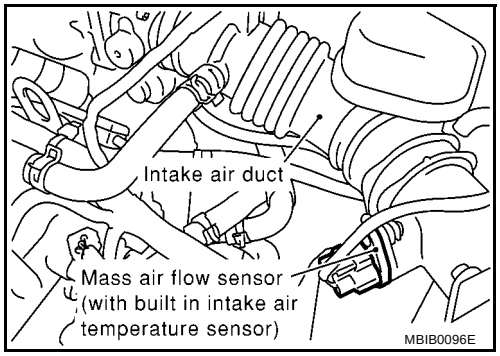
WITH CONSULT-II

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” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-284, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-284, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.



WITH GST

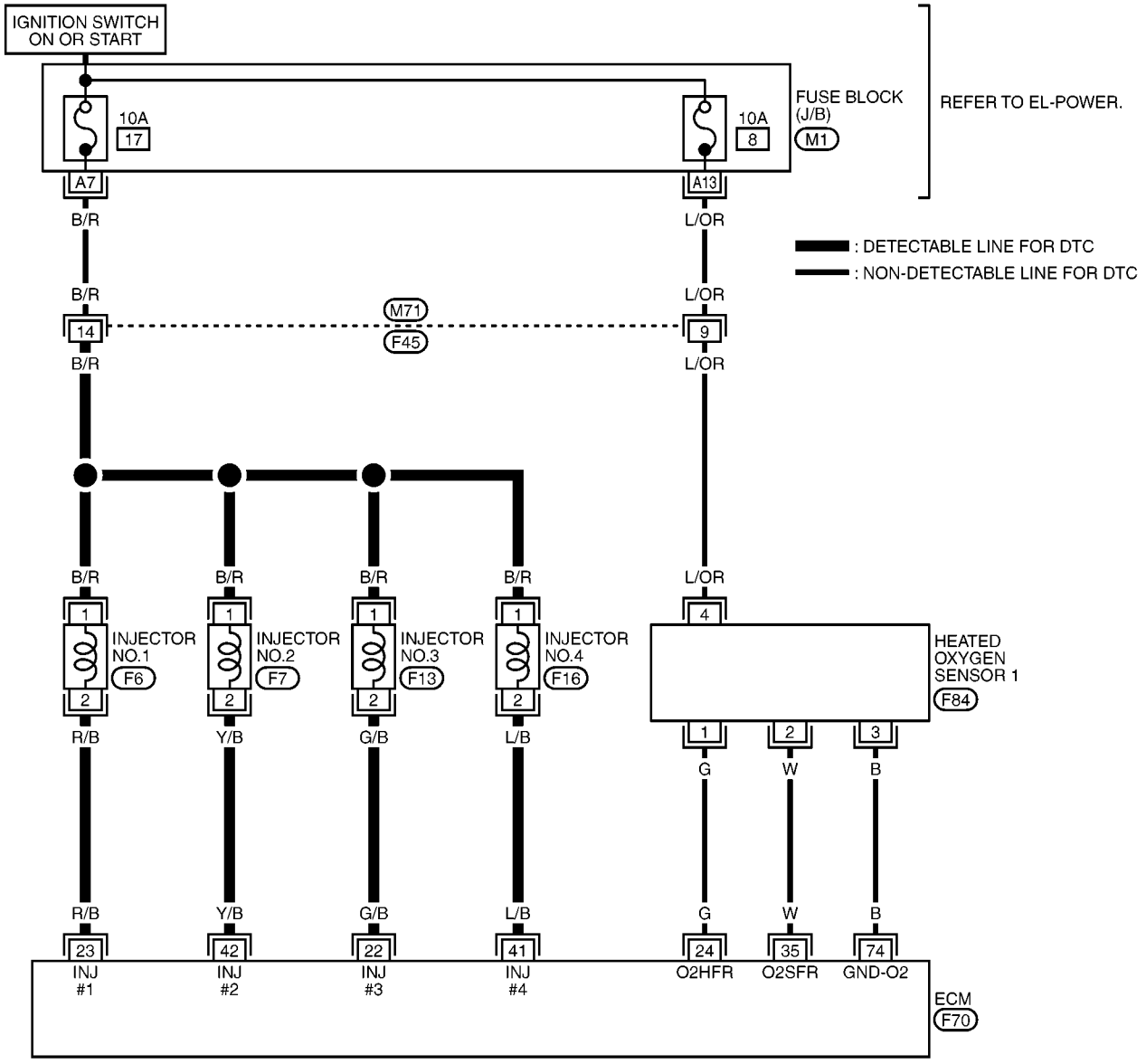
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-284, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-284, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

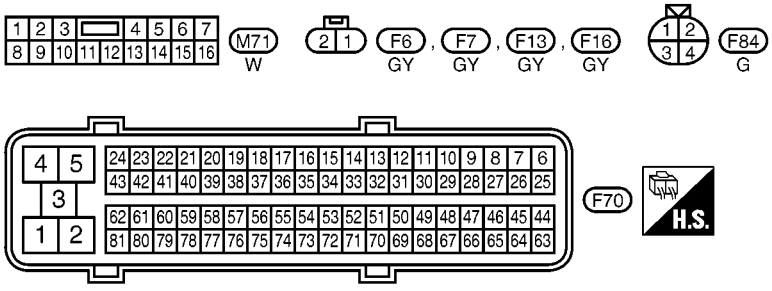


Wiring Diagram

EBS00QLP

EC-FUEL-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

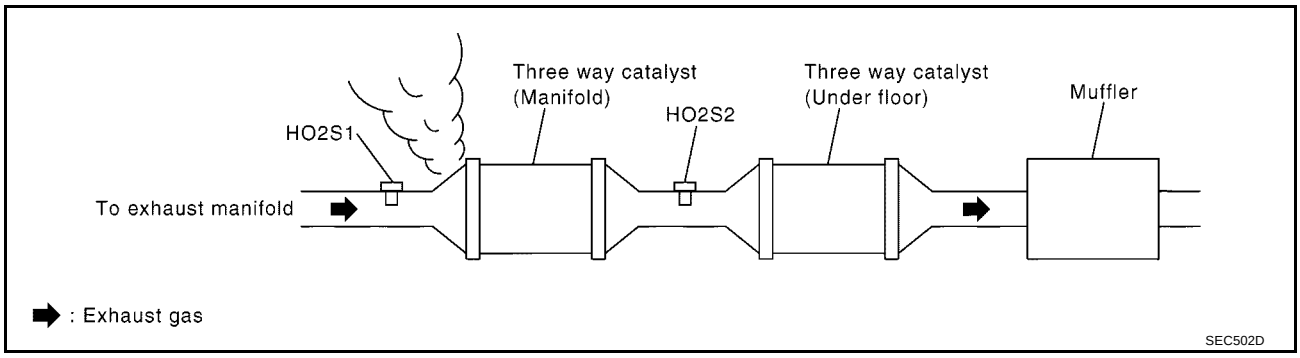
YEC449A

Diagnostic Procedure

EBS00QLQ

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).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

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.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

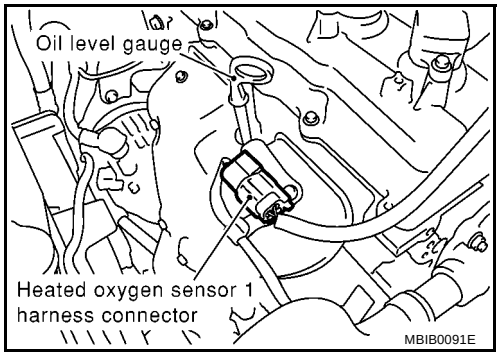
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2, ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminals 35 or HO2S1 terminals 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> 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-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-52, "FUEL PRESSURE CHECK" .

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of “FUEL PRESSURE CHECK”.

5. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-178, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

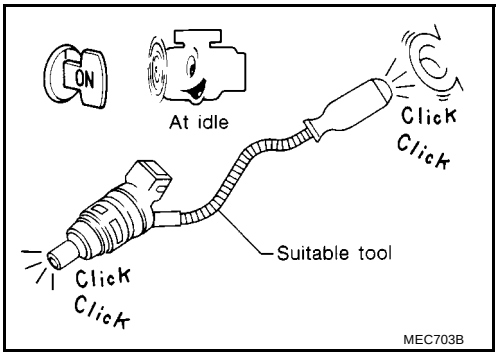
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



MEC703B

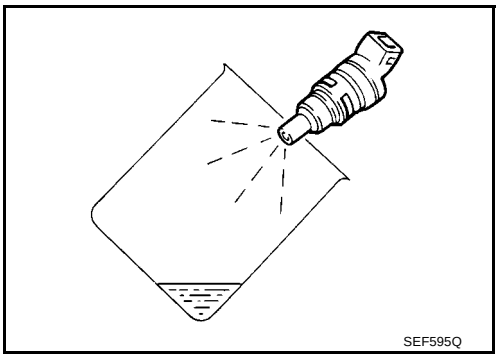
OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-524, "INJECTOR CIRCUIT" .

7. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Remove injector gallery assembly. Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injector.
6. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.



SEF595Q

OK or NG

OK >> GO TO 8.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION (A/T MODELS) PFP:16600

On Board Diagnosis Logic EBS00QLR

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 sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

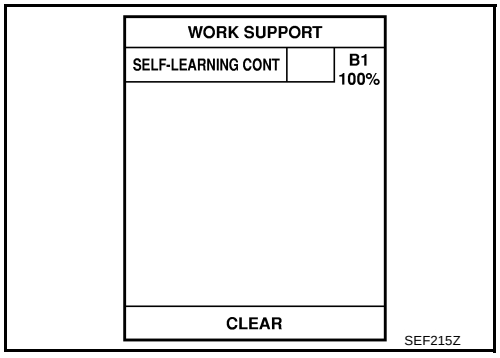
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171 (Bank 1) P0174 0174 (Bank 2)	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

DTC Confirmation Procedure EBS00QLS

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

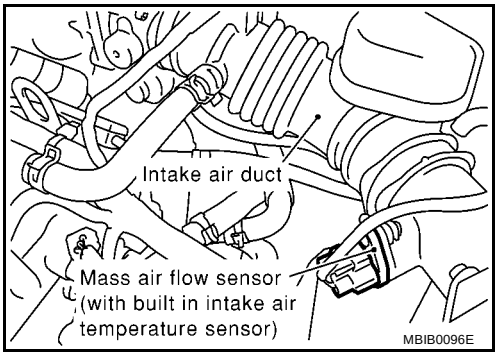
WITH CONSULT-II

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” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-292, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-292, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-292, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-292, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

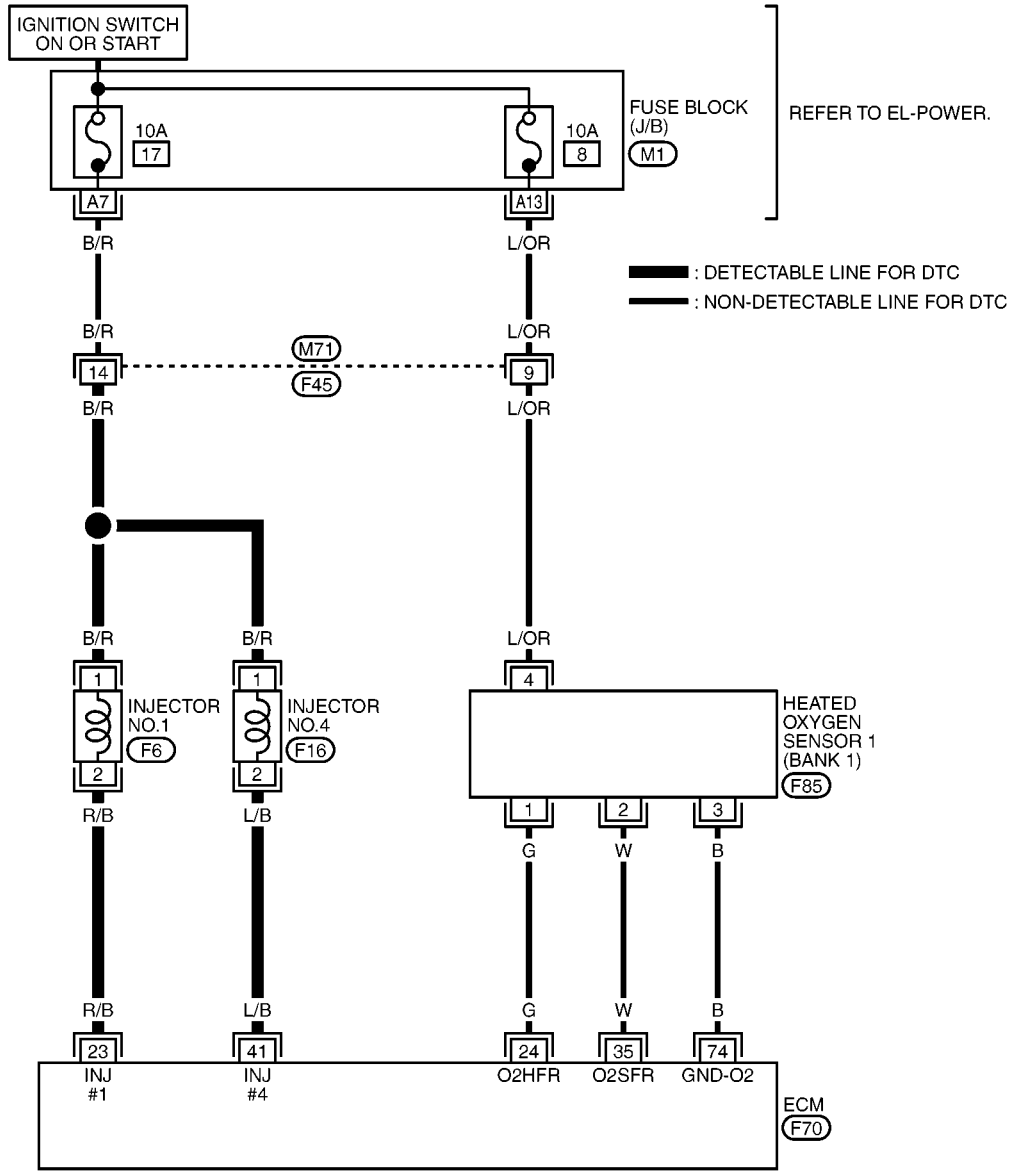


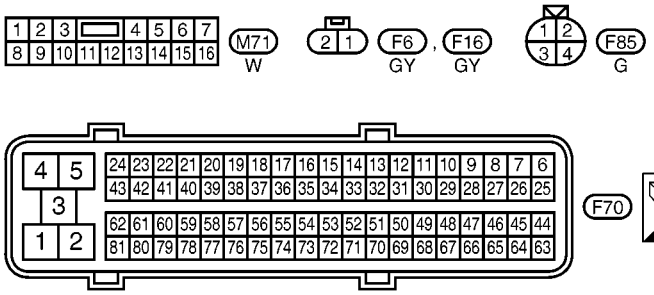
Wiring Diagram

EBS00QLT

BANK 1

EC-FUELB1-01



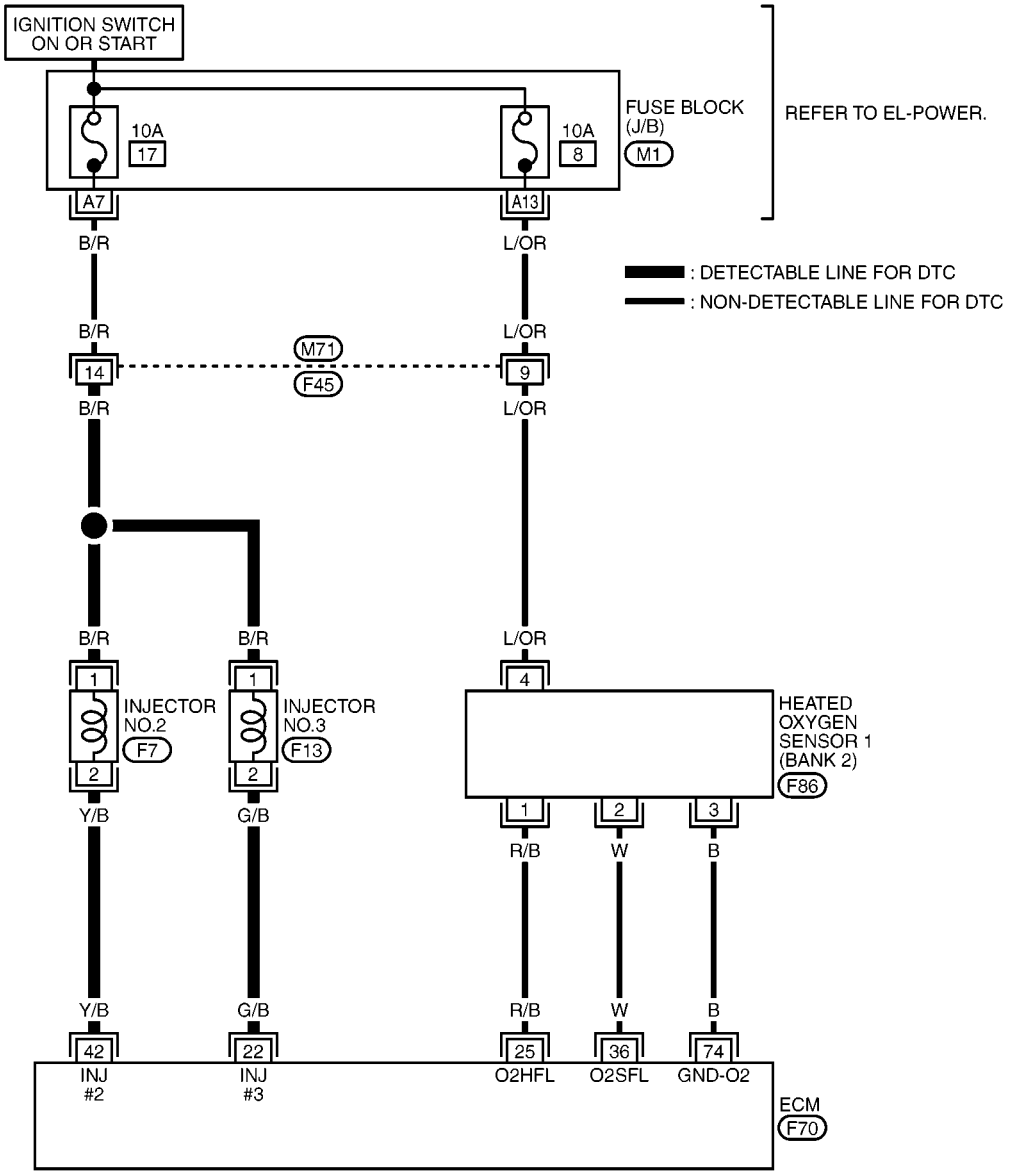


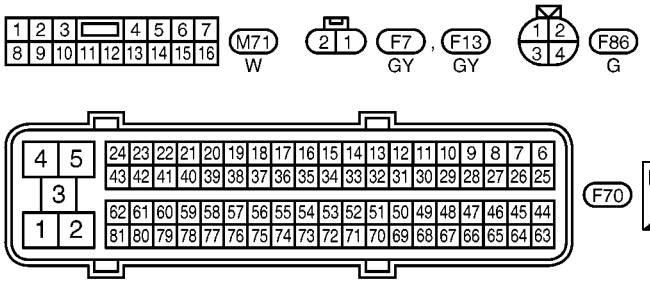
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC450A

BANK 2

EC-FUELB2-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

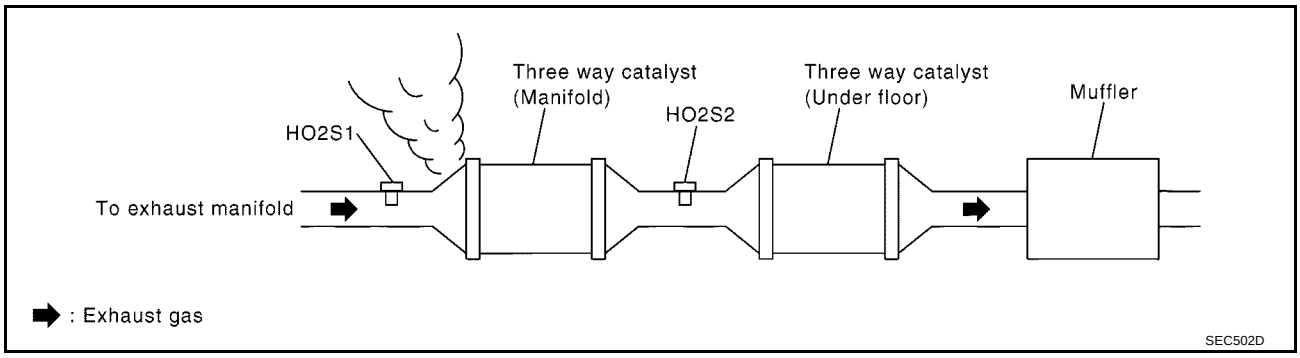
YEC451A

Diagnostic Procedure

EBS00QLU

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).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

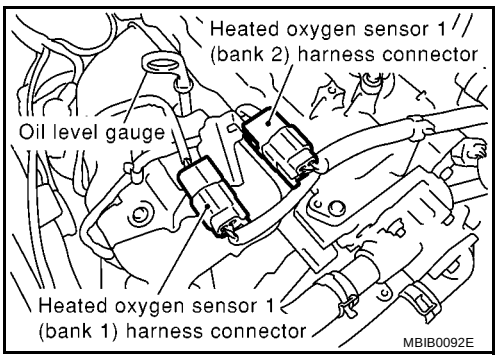
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0171	35	2	1
	74	3	
P0174	36	2	2
	74	3	

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	35	2	1
P0174	36	2	2

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> 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-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-52, "FUEL PRESSURE CHECK" .

At idling: 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-530, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-52, "FUEL PRESSURE CHECK" .)
- Fuel lines (Refer to “Checking Fuel Lines”, FE-5.)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-178, "DTC P0102, P0103 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

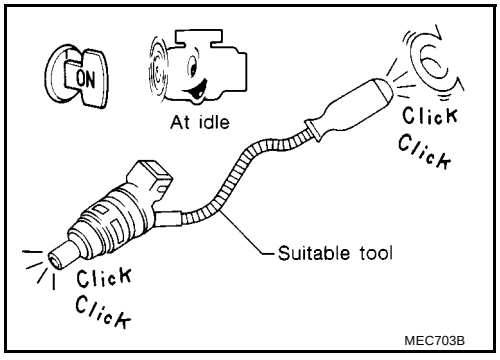
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

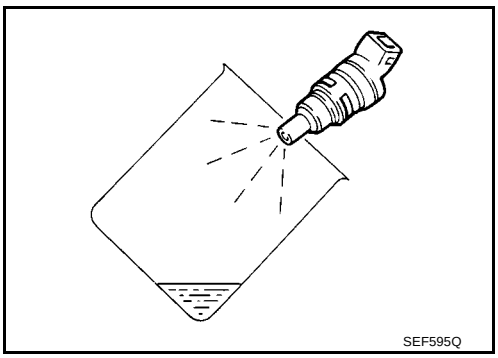


OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-524, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch “OFF”.
3. Disconnect all injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
5. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from injectors on bank 2.



Fuel should be sprayed evenly for each injector.

OK or NG

OK >> GO TO 9.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION (M/T MODELS)

PFP:16600

On Board Diagnosis Logic

EBS00QLV

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 light up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	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 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

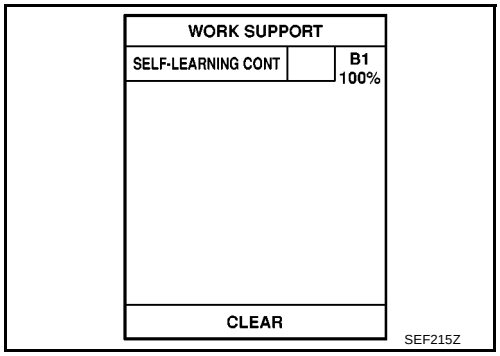
DTC Confirmation Procedure

EBS00QLW

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

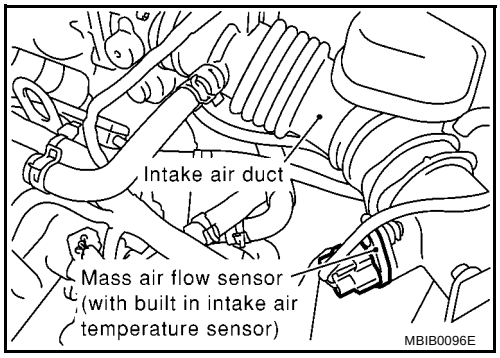
WITH CONSULT-II

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” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-299, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
   If engine starts, go to EC-299, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-299, "Diagnostic Procedure" .

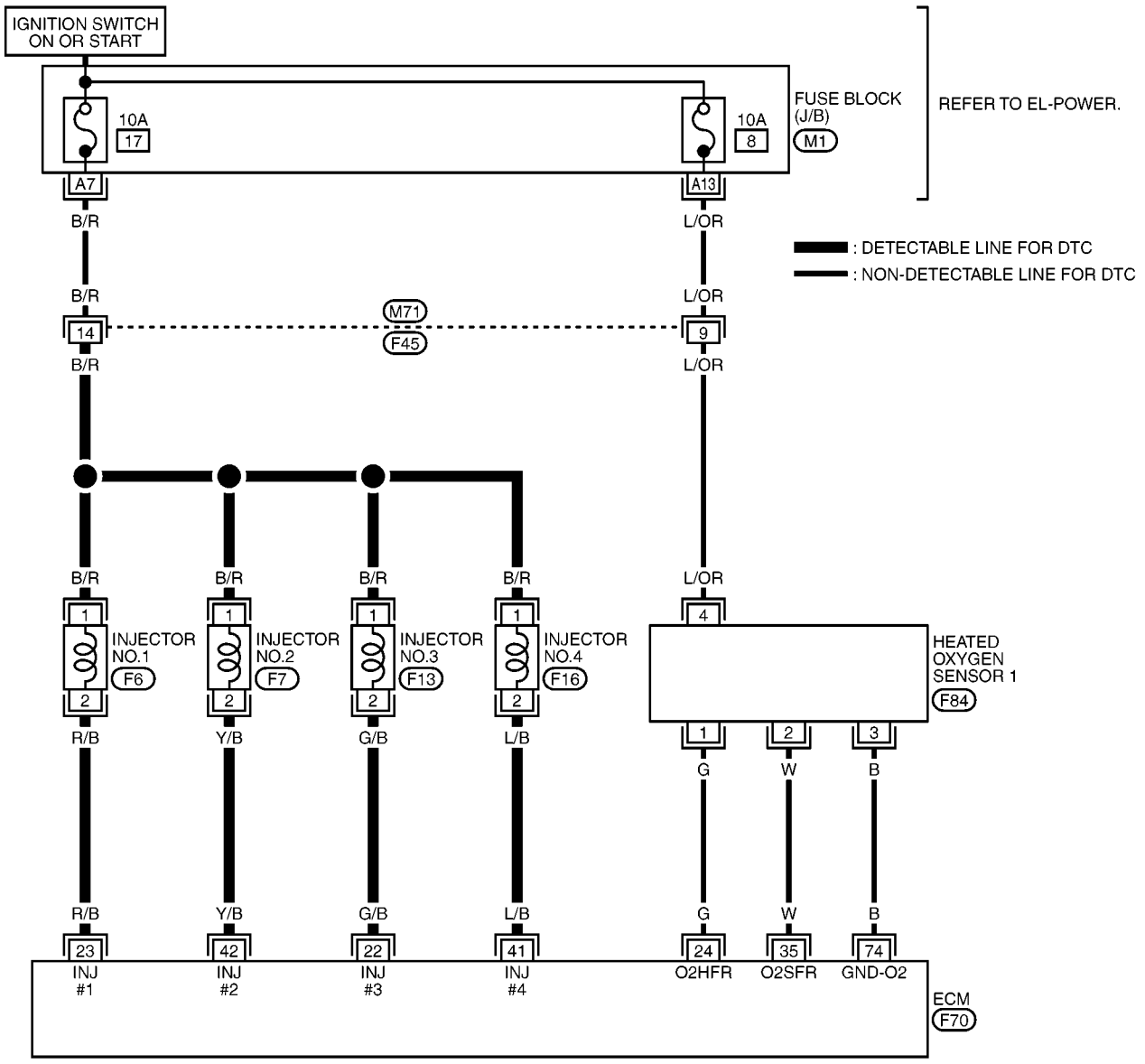


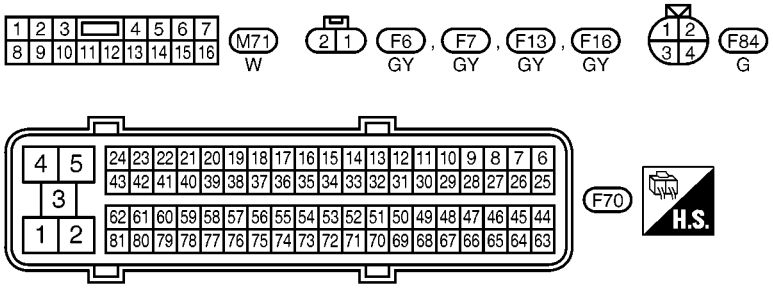
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-299, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

EBS00QLX

EC-FUEL-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

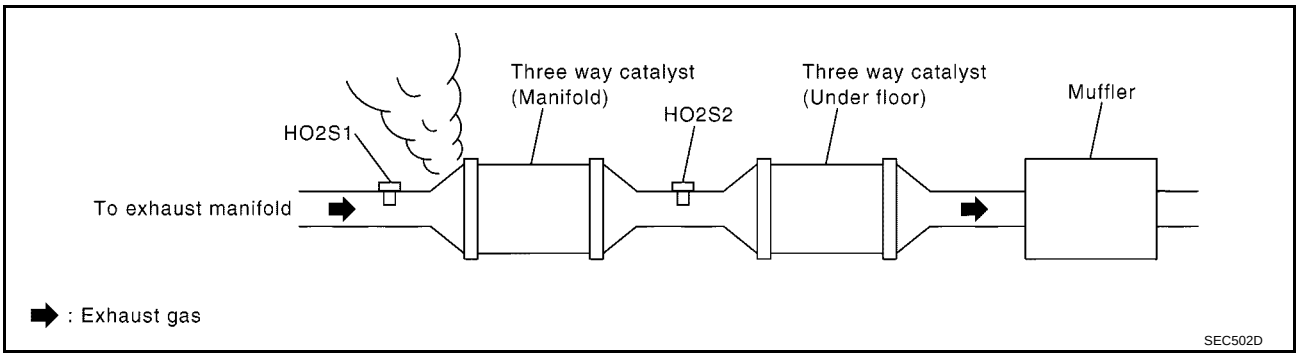
YEC449A

Diagnostic Procedure

EBS00QLY

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).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

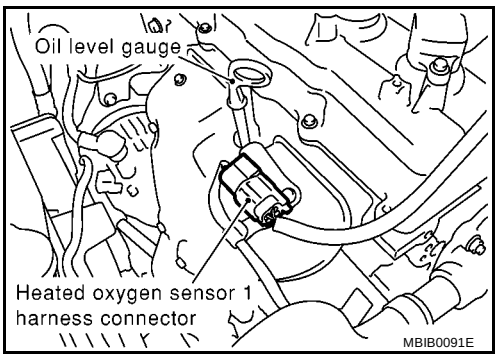
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2, ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminals 35 or HO2S1 terminals 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> 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-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-52, "FUEL PRESSURE CHECK" .

   At idling: 350 kPa (3.5 bar, 3.57 kg/cm2, 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of “FUEL PRESSURE CHECK”.

5. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-178, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

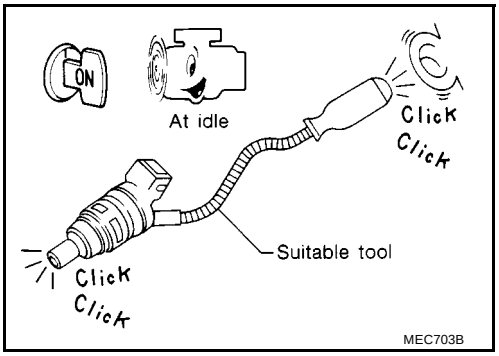
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



MEC703B

OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-524, "INJECTOR CIRCUIT" .

7. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION (A/T MODELS) PFP:16600

On Board Diagnosis Logic

EBS00QLZ

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 sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172 (Bank 1) P0175 0175 (Bank 2)	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 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

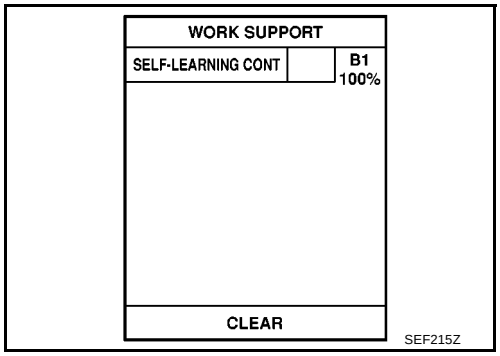
DTC Confirmation Procedure

EBS00QM0

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

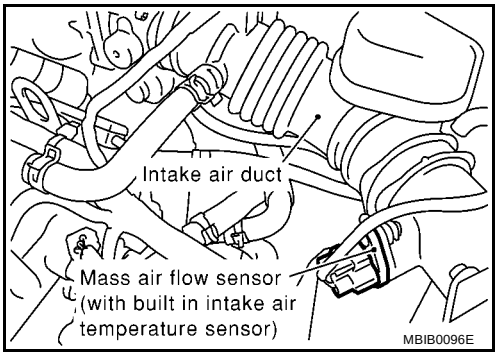
WITH CONSULT-II

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” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-306, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
   If engine starts, go to EC-306, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-306, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-306, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

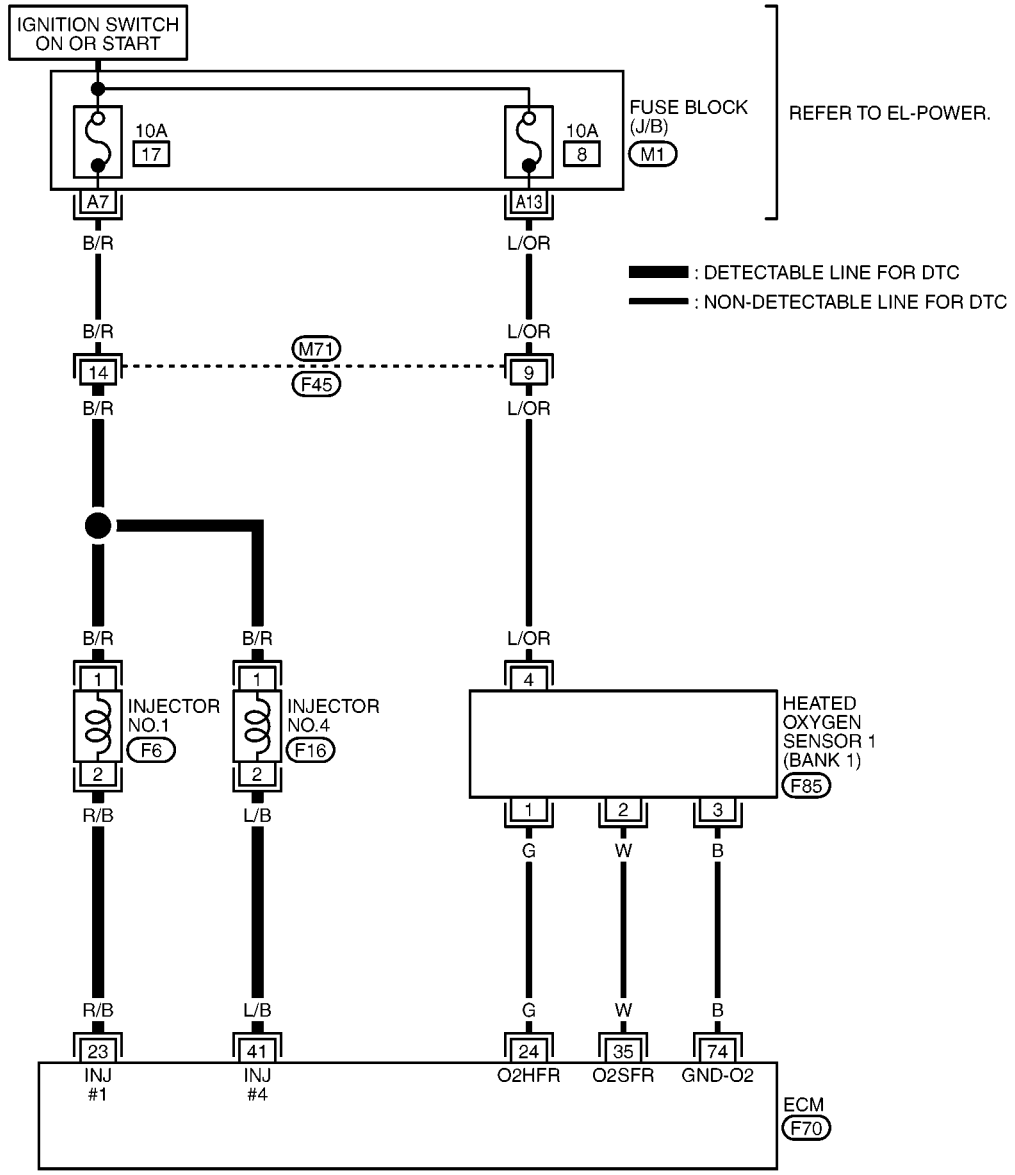


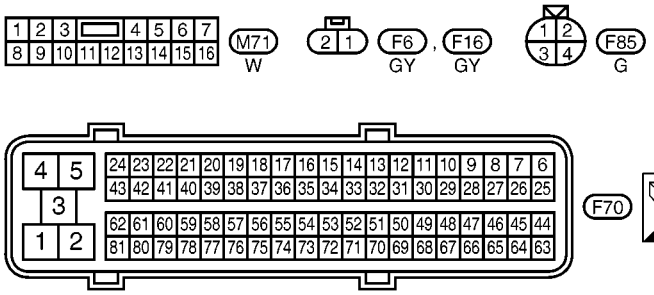
Wiring Diagram

EBS00QM1

BANK 1

EC-FUELB1-01



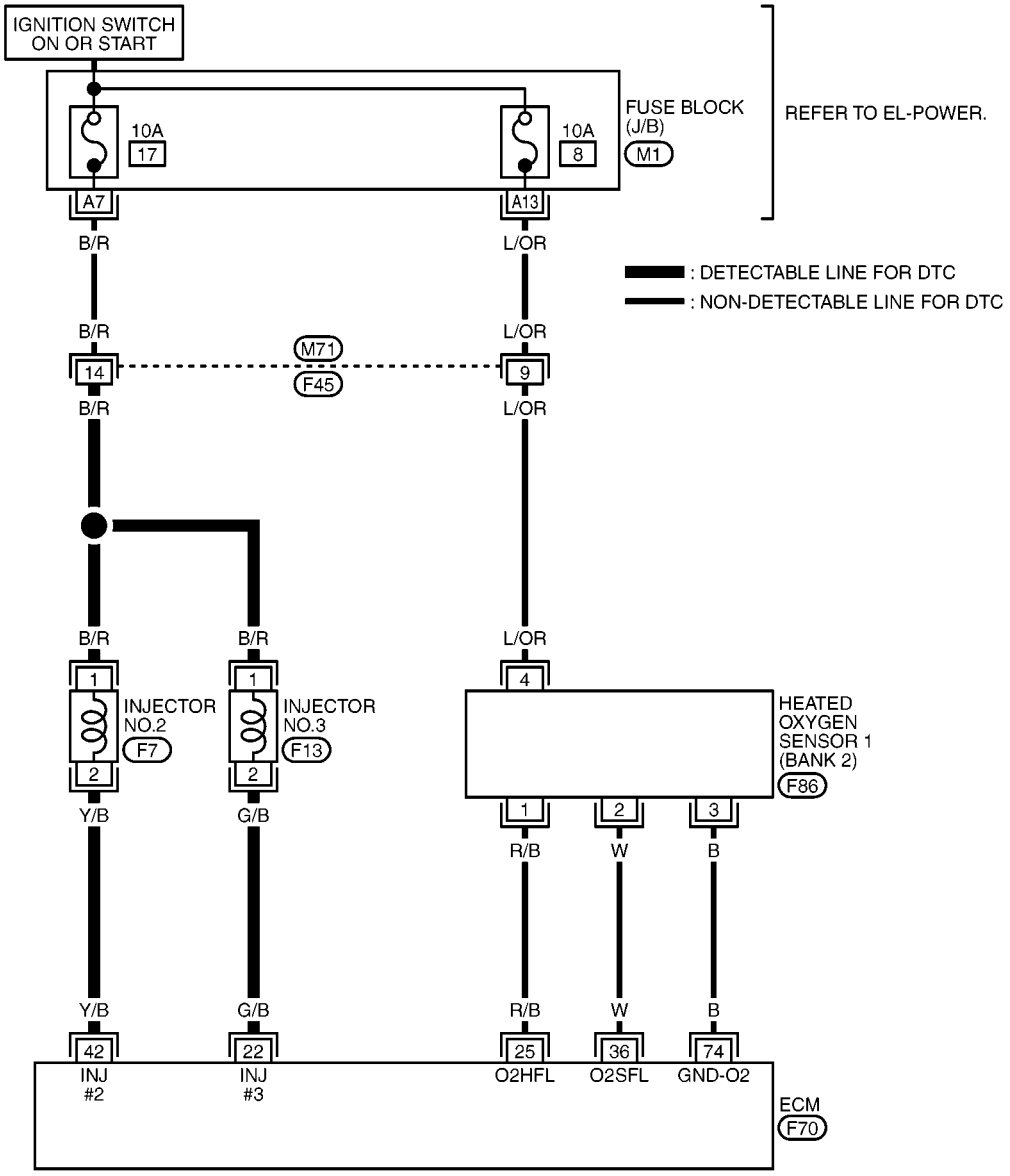


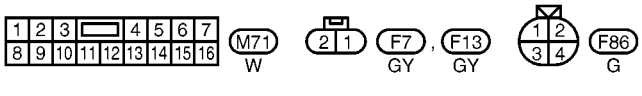
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

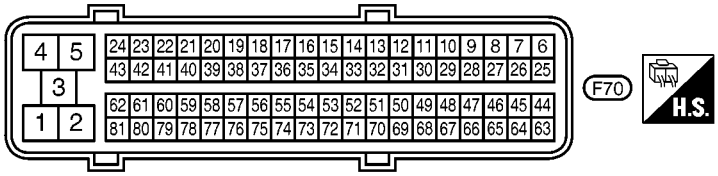
YEC450A

BANK 2

EC-FUELB2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

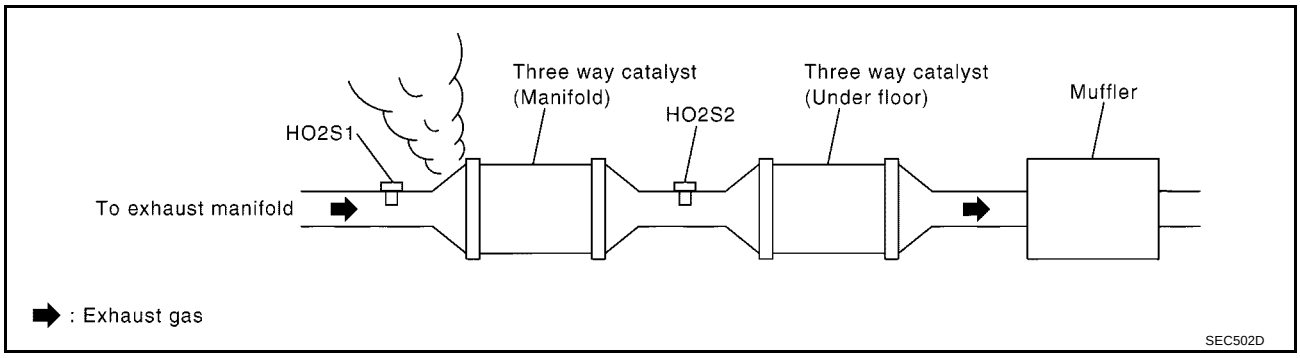
YEC451A

Diagnostic Procedure

EBS00QM2

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).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

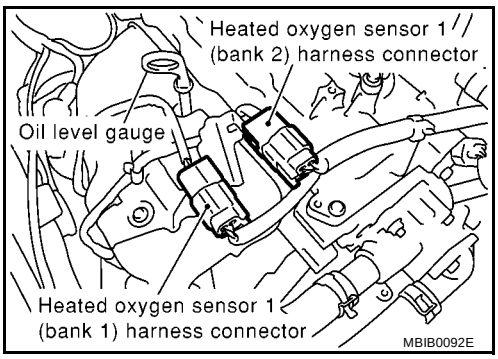
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0172	35	2	1
	74	3	
P0175	36	2	2
	74	3	

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	35	2	1
P0175	36	2	2

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> 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-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-52, "FUEL PRESSURE CHECK" .

At idling: 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-530, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-52, "FUEL PRESSURE CHECK" .)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in MODE 1 with GST.

2.0 - 6.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-178, "DTC P0102, P0103 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

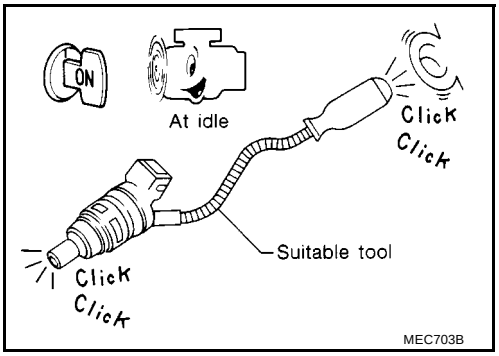
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



MEC703B

OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-524, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

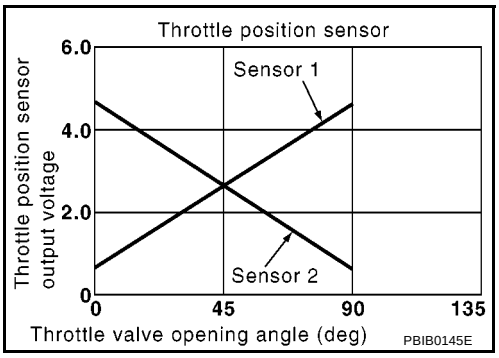
DTC P0221 TP SENSOR

PFP:16119

Component Description

EBS00QM3

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QM4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QM5

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0221 0221	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

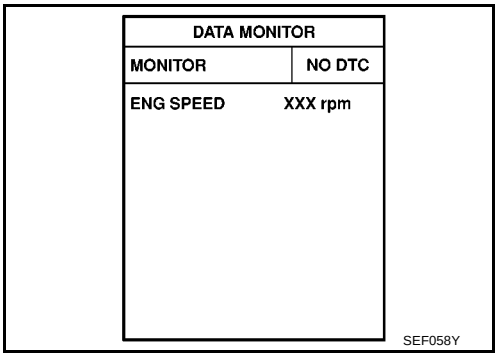
DTC Confirmation Procedure

EBS00QM6

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-313, "Diagnostic Procedure" .



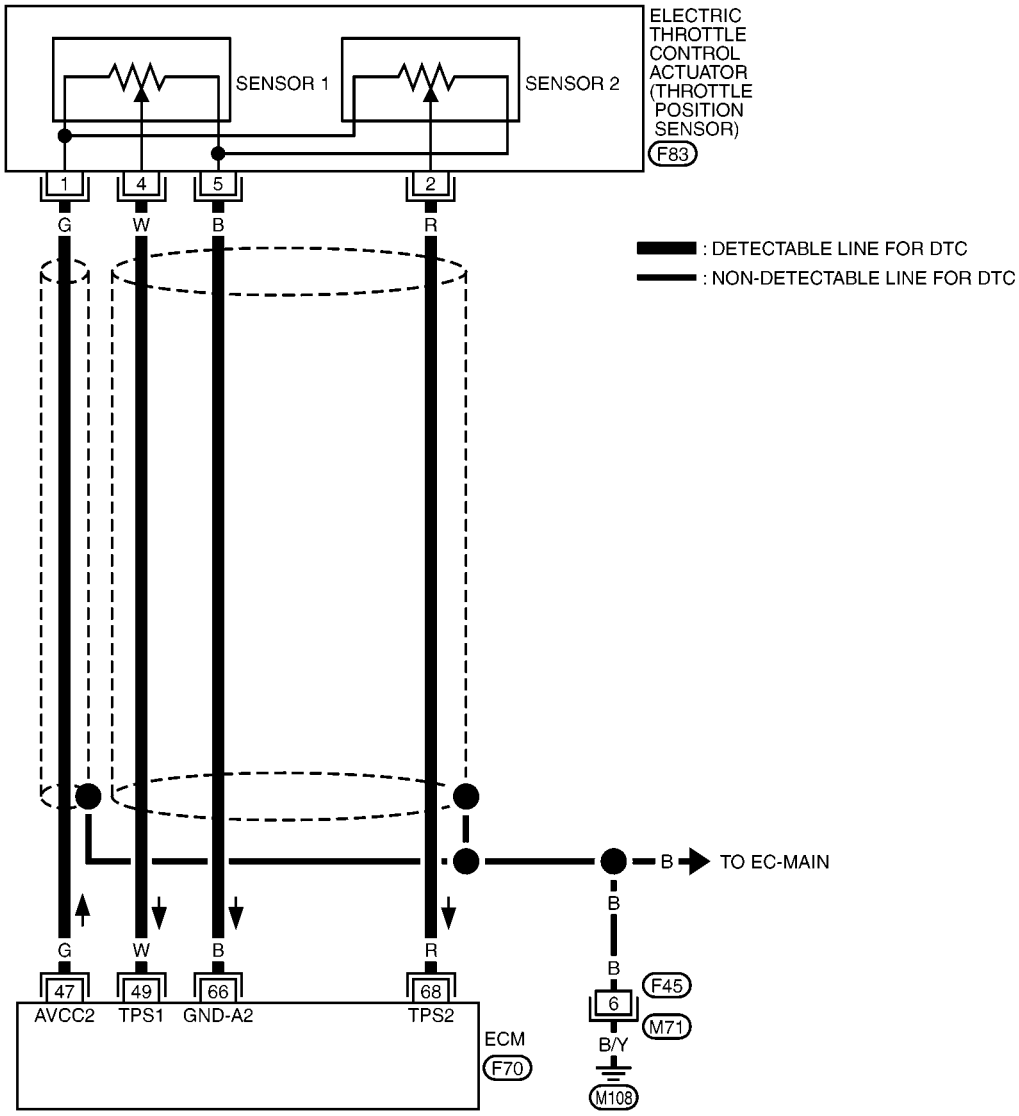
WITH GST

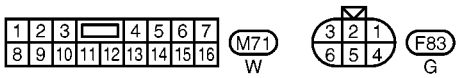
Follow the procedure “WITH CONSULT-II” above.

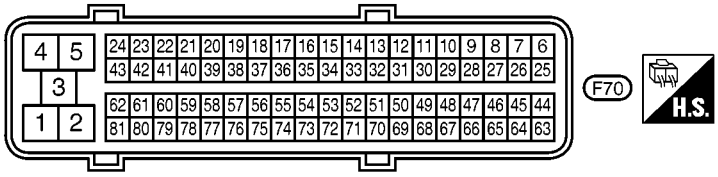
Wiring Diagram

EBS00QM7

EC-TPS3-01







YEC452A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

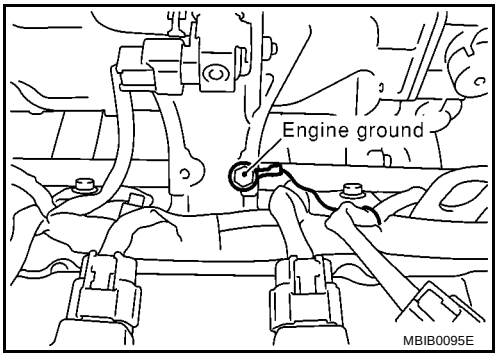
Diagnostic Procedure

EBS00QM8

1. RETIGHTEN GROUND SCREWS

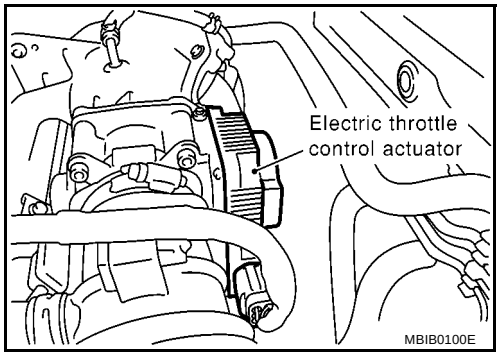
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

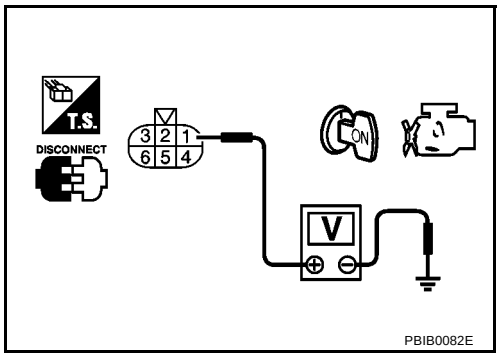


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4, ECM terminal 68 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-315, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

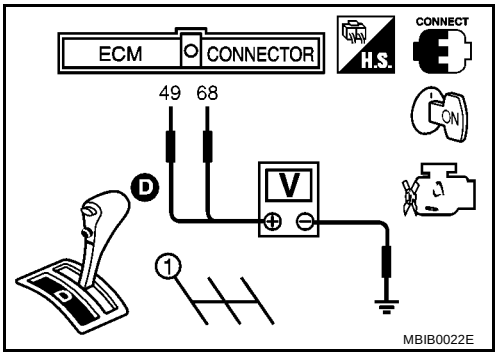
Component Inspection

EBS00QM9

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-49, "Throttle Valve Closed Position Learning" .
8. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QMA

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

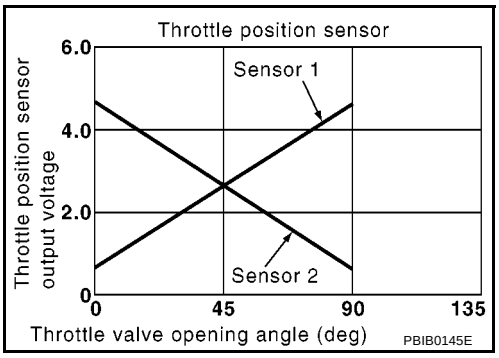
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

EBS00QMB

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QMC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QMD

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

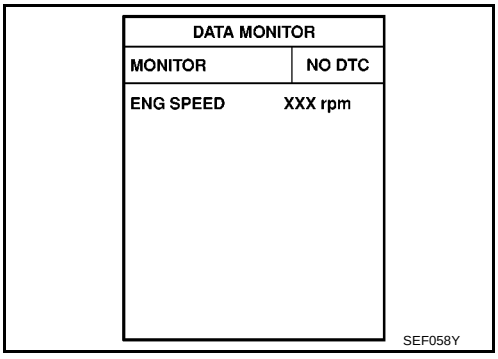
DTC Confirmation Procedure

EBS00QME

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-319, "Diagnostic Procedure" .



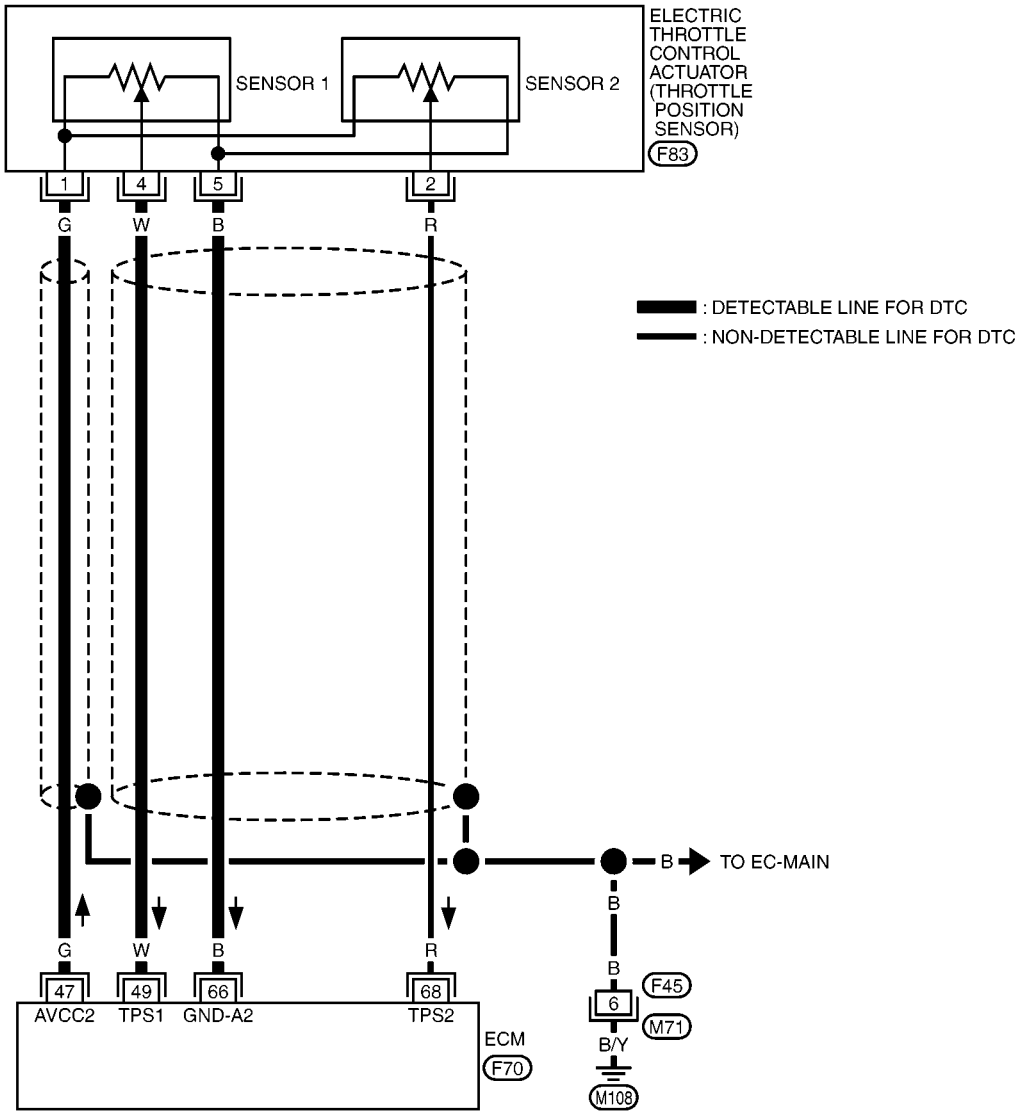
WITH GST

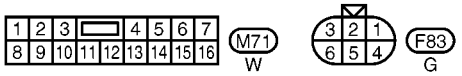
Follow the procedure “WITH CONSULT-II” above.

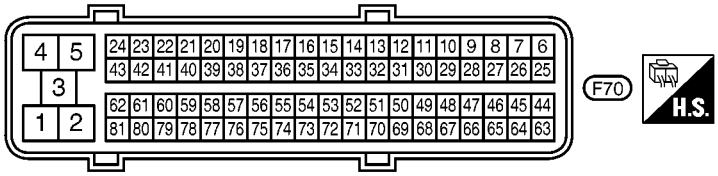
Wiring Diagram

EBS00QMF

EC-TPS1-01







YEC453A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

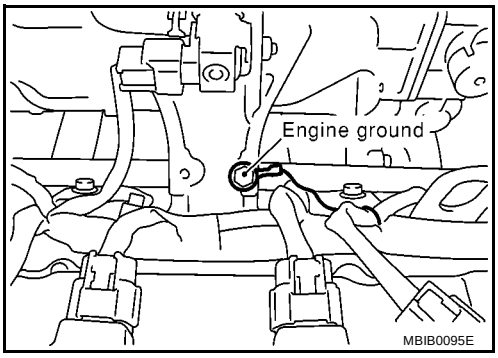
Diagnostic Procedure

EBS00QMG

1. RETIGHTEN GROUND SCREWS

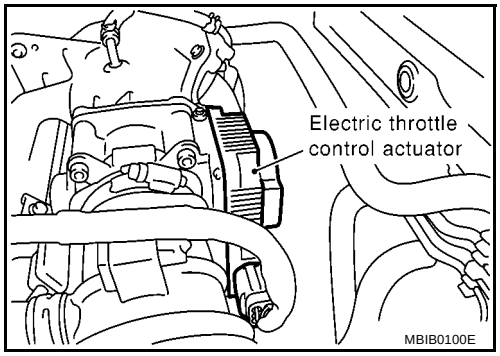
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

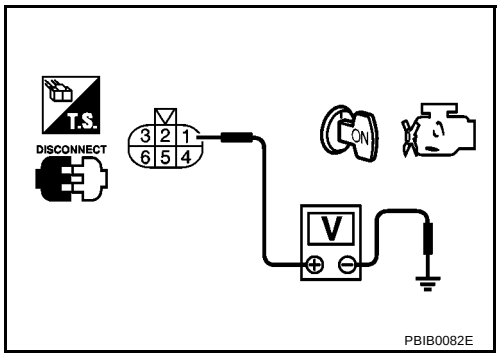


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-321, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

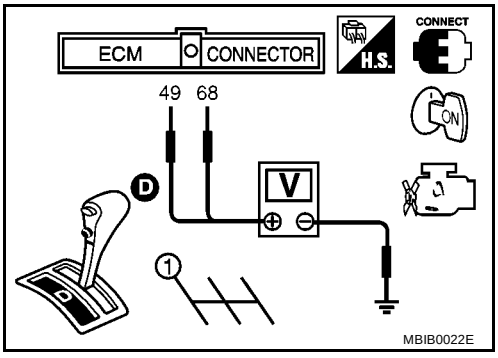
Component Inspection

EBS00QMH

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-49, "Throttle Valve Closed Position Learning" .
8. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QMI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

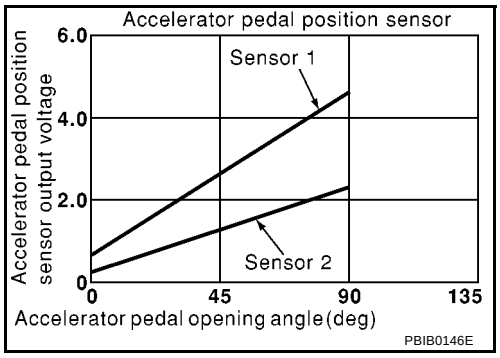
DTC P0226 APP SENSOR

PFP:18002

Component Description

EBS00QMJ

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QMK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QML

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0226 0226	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) ● Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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 throttle valve to be slower than the normal condition. So, the acceleration will be poor.

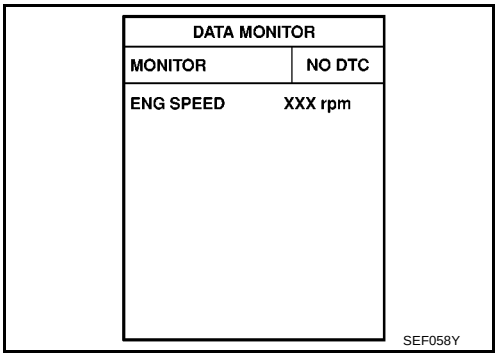
DTC Confirmation Procedure

EBS00QMM

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-325, "Diagnostic Procedure" .

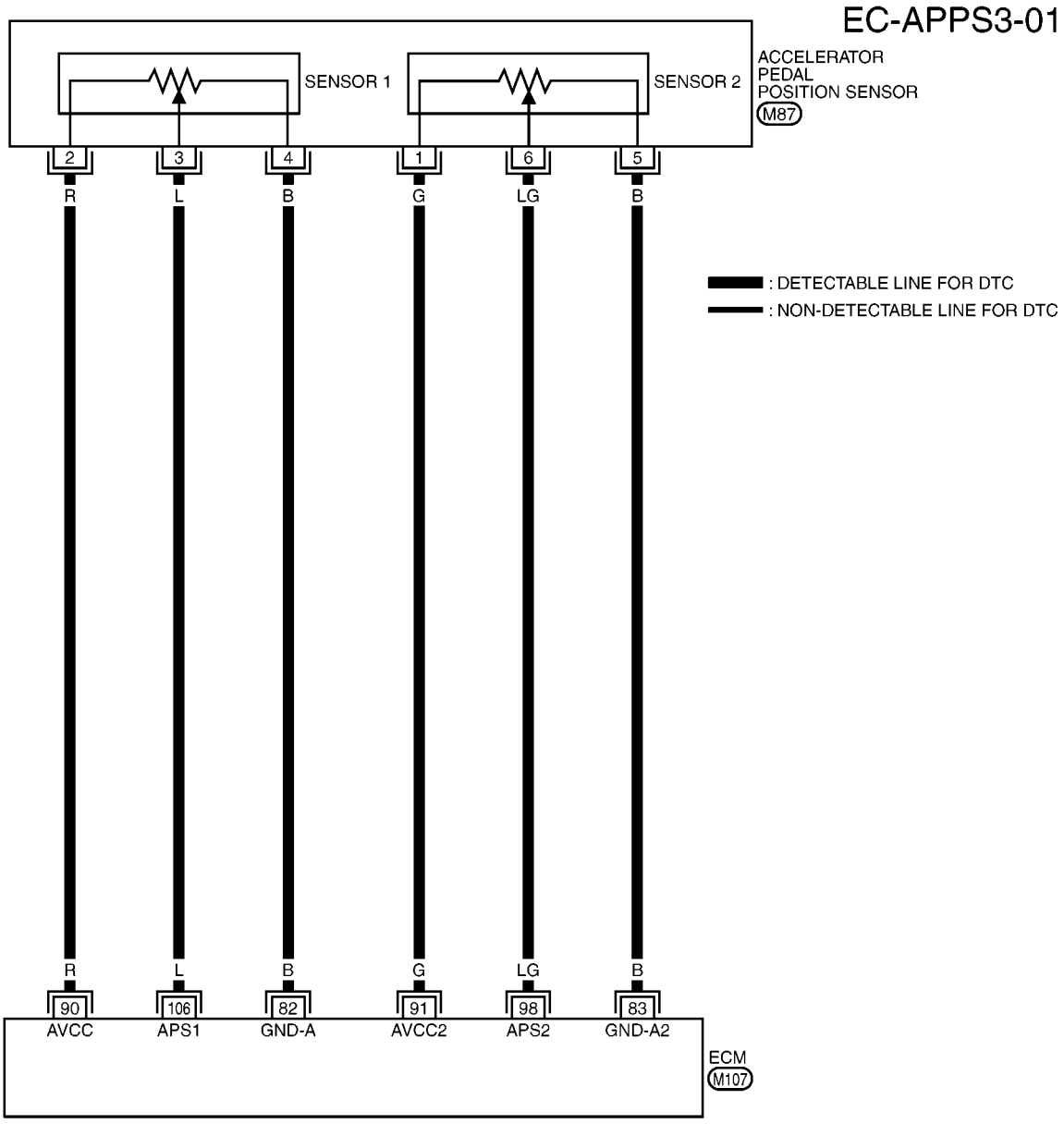


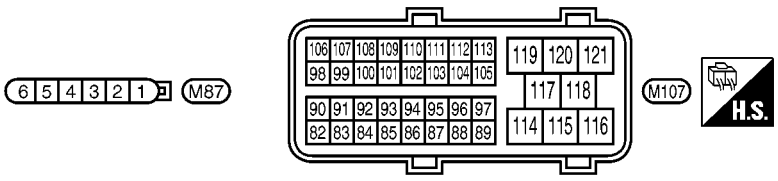
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QMN





YEC454A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

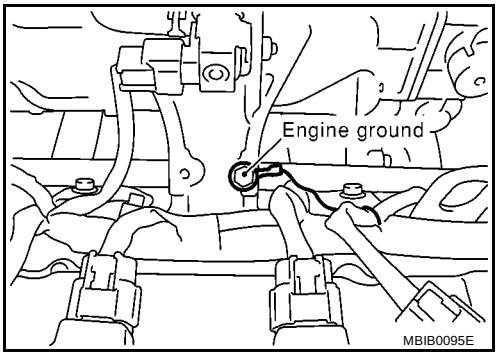
Diagnostic Procedure

EBS00QMO

1. RETIGHTEN GROUND SCREWS

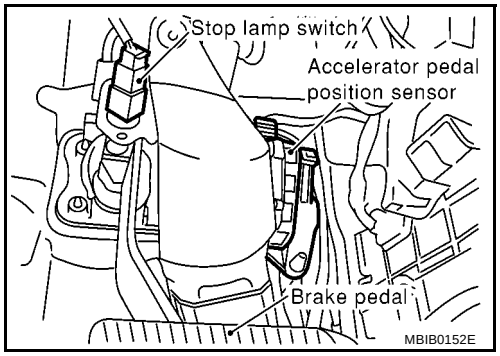
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



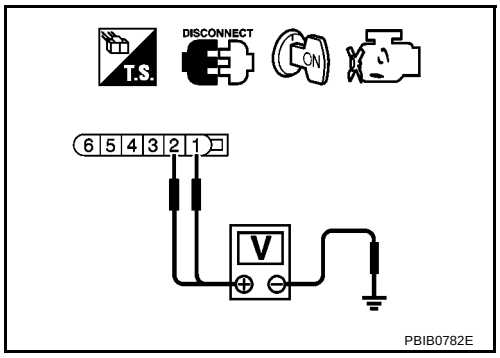
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 4, ECM terminal 83 and APP sensor terminal 5.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-327, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-49, "Throttle Valve Closed Position Learning" .
4. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

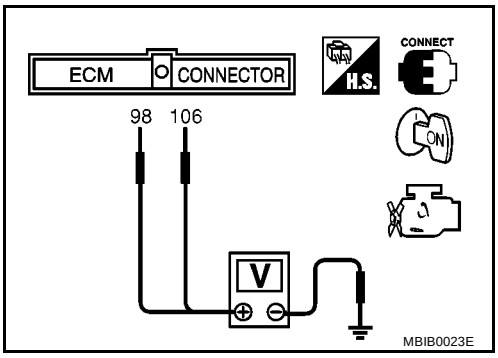
>> **INSPECTION END**

Component Inspection

EBS00QMP

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-49, "Throttle Valve Closed Position Learning" .
7. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QMQ

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

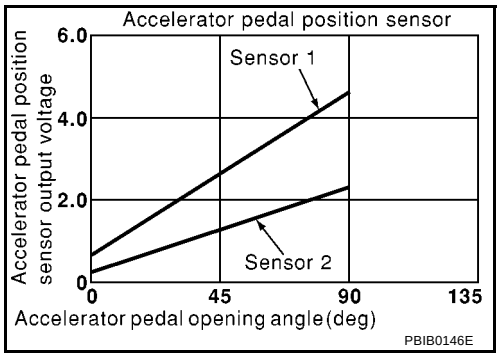
DTC P0227, P0228 APP SENSOR

PFP:18002

Component Description

EBS00QMR

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QMS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QMT

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0228 0228	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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 throttle valve to be slower than the normal condition. So, the acceleration will be poor.

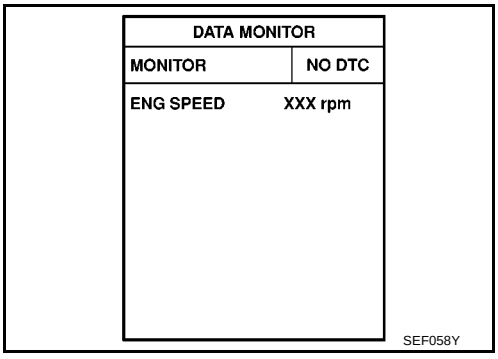
DTC Confirmation Procedure

EBS00QMU

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-331, "Diagnostic Procedure" .

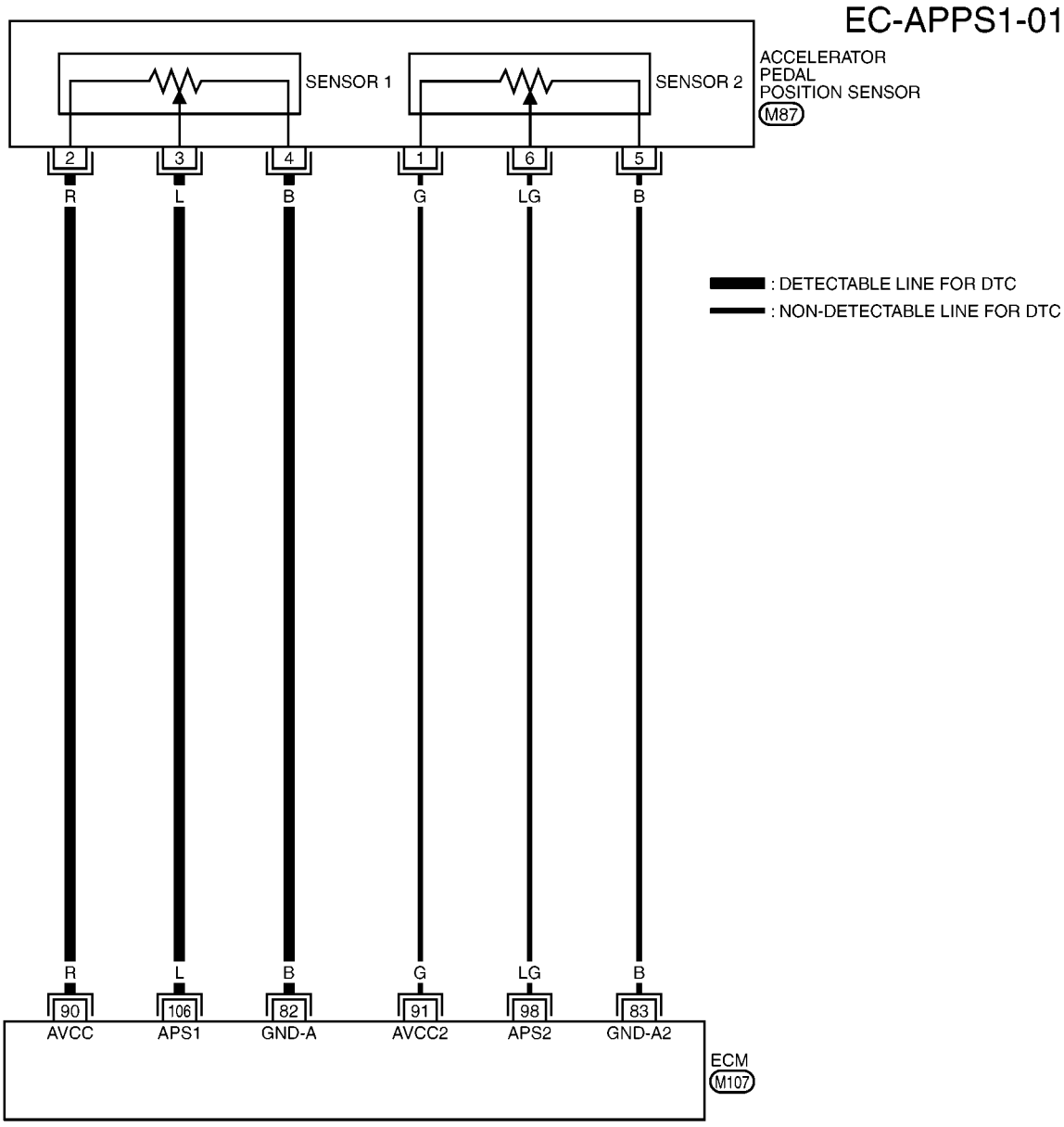


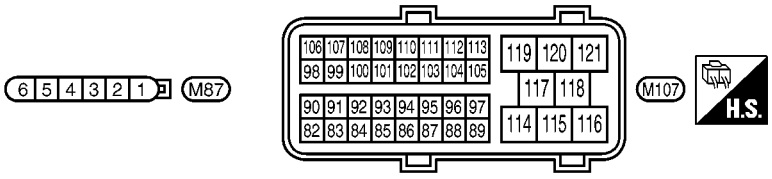
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QMV





YEC455A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

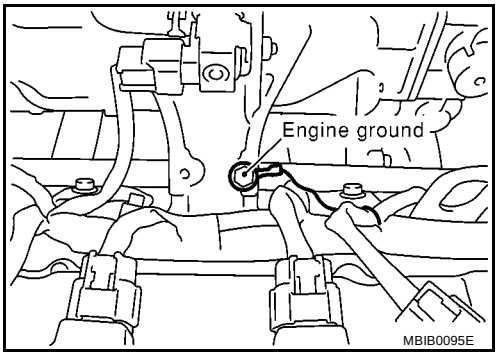
Diagnostic Procedure

EBS00QMW

1. RETIGHTEN GROUND SCREWS

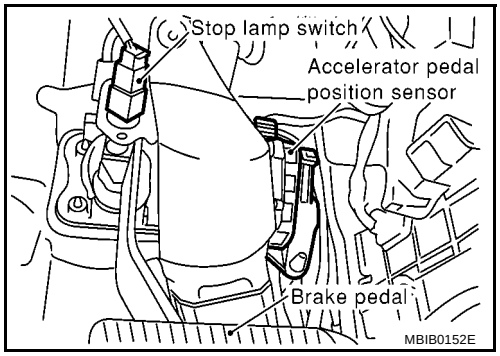
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



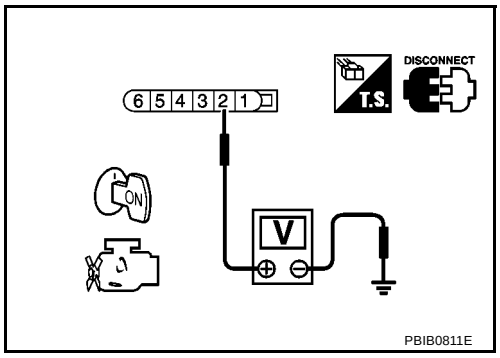
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 82 and APP sensor terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-333, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-49, "Throttle Valve Closed Position Learning" .
4. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

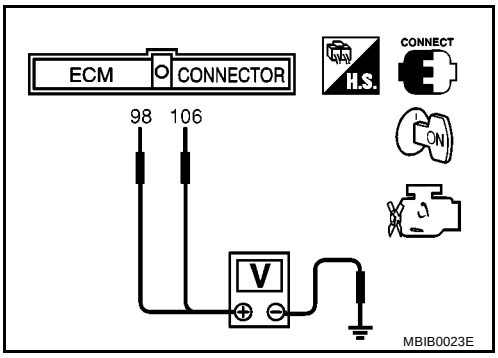
>> **INSPECTION END**

Component Inspection

EBS00QMX

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-49, "Throttle Valve Closed Position Learning" .
7. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QMY

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

EBS00QMZ

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 first 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 (POS) 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 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injectors ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Drive plate or flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

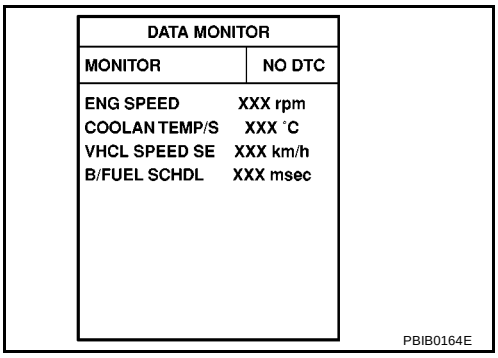
EBS00QN0

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch “OFF” and wait at least 10 seconds.
4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.
   NOTE:
   Refer to the freeze frame data for the test driving conditions.
5. If 1st trip DTC is detected, go to EC-335, "Diagnostic Procedure"
   .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS00QN1

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.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

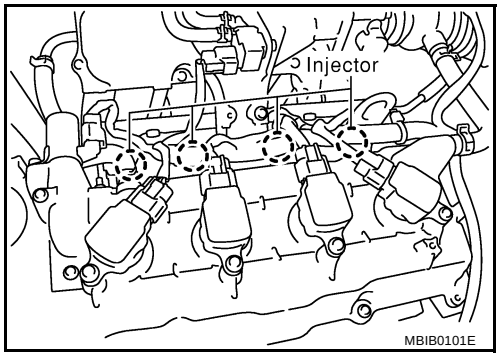
PBIB0133E

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes or No

Yes >> GO TO 4.
No >> GO TO 7.



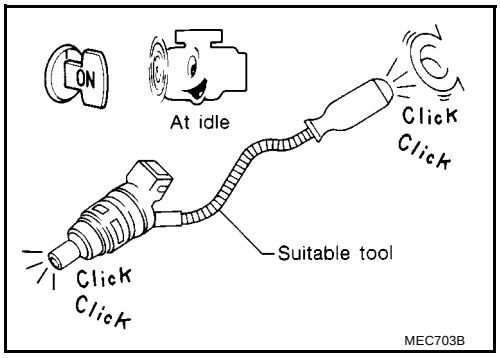
MBIB0101E

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-524, "INJECTOR CIRCUIT" .



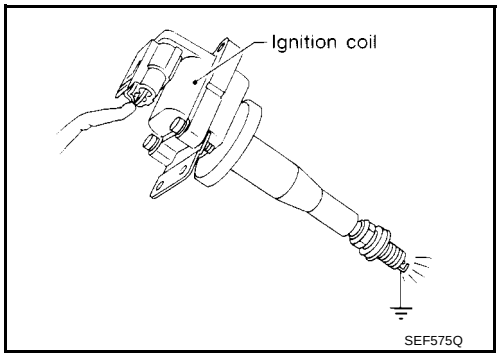
MEC703B

5. CHECK IGNITION SPARK

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

OK or NG

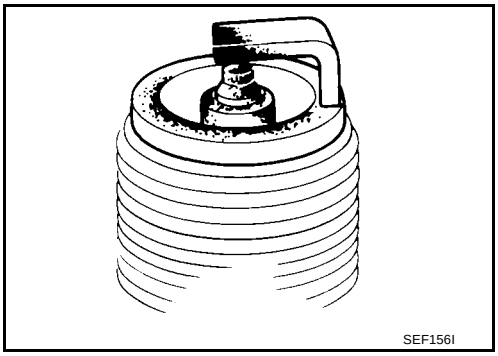
OK >> GO TO 6.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-514, "IGNITION SIGNAL" .



SEF575Q

6. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 7.

NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-28, "SPARK PLUG (CONVENTIONAL)" .

7. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-60, "CHECKING COMPRESSION PRESSURE" .

Standard: **1,324 kPa (13.24 bar, 13.5 kg/cm^2 , 192 psi)/350 rpm**

Minimum: **1,128 kPa (11.28 bar, 11.5 kg/cm^2 , 164 psi)/350 rpm**

Difference between each cylinder: **98 kPa (0.98 bar, 1.0 kg/cm^2 , 14 psi)/350 rpm**

OK or NG

OK >> GO TO 8.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-52, "FUEL PRESSURE CHECK" .

At idle: Approx. 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 9.

NG >> Follow the construction of “FUEL PRESSURE CHECK”.

9. CHECK IGNITION TIMING

Check the following items. Refer to EC-87, "Basic Inspection" .

Items		Specifications
Target idle speed	A/T	800 ± 50 rpm (in “P” or “N” position)
	M/T	700 ± 50 rpm (in “Neutral” position)
Ignition timing	A/T	10 ± 5° BTDC (in “P” or “N” position)
	M/T	8 ± 5° BTDC (in “Neutral” position)

OK or NG

OK >> GO TO 10.

NG >> Follow the “Basic Inspection”.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-197, "Component Inspection" (M/T models), EC-205, "Component Inspection" (A/T models).

OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

11. CHECK MASS AIR FLOW SENSOR

With CONSULT-II
Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

With GST
Check mass air flow sensor signal in MODE 1 with GST.

1.0 - 4.0 g·m/sec: at idling
5.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 12.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-178, "DTC P0102, P0103 MAF SENSOR" .

12. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-92, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

13. 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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

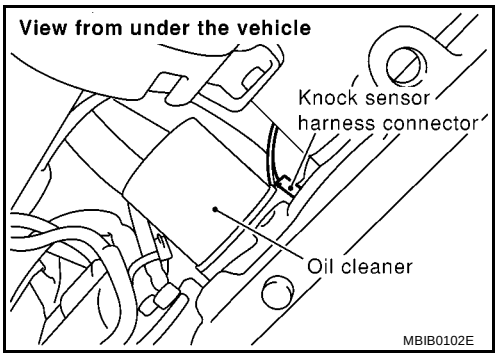
DTC P0327, P0328 KS

PFP:22060

Component Description

EBS00QN2

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.



On Board Diagnosis Logic

EBS00QN3

The MI will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	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 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

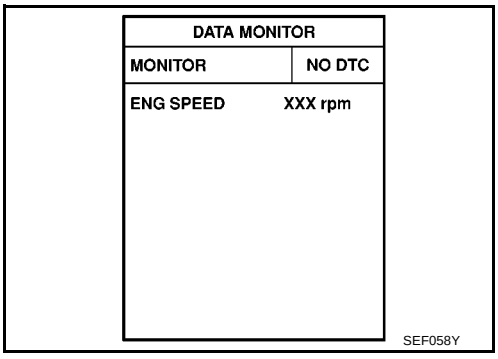
EBS00QN4

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-341, "Diagnostic Procedure" .



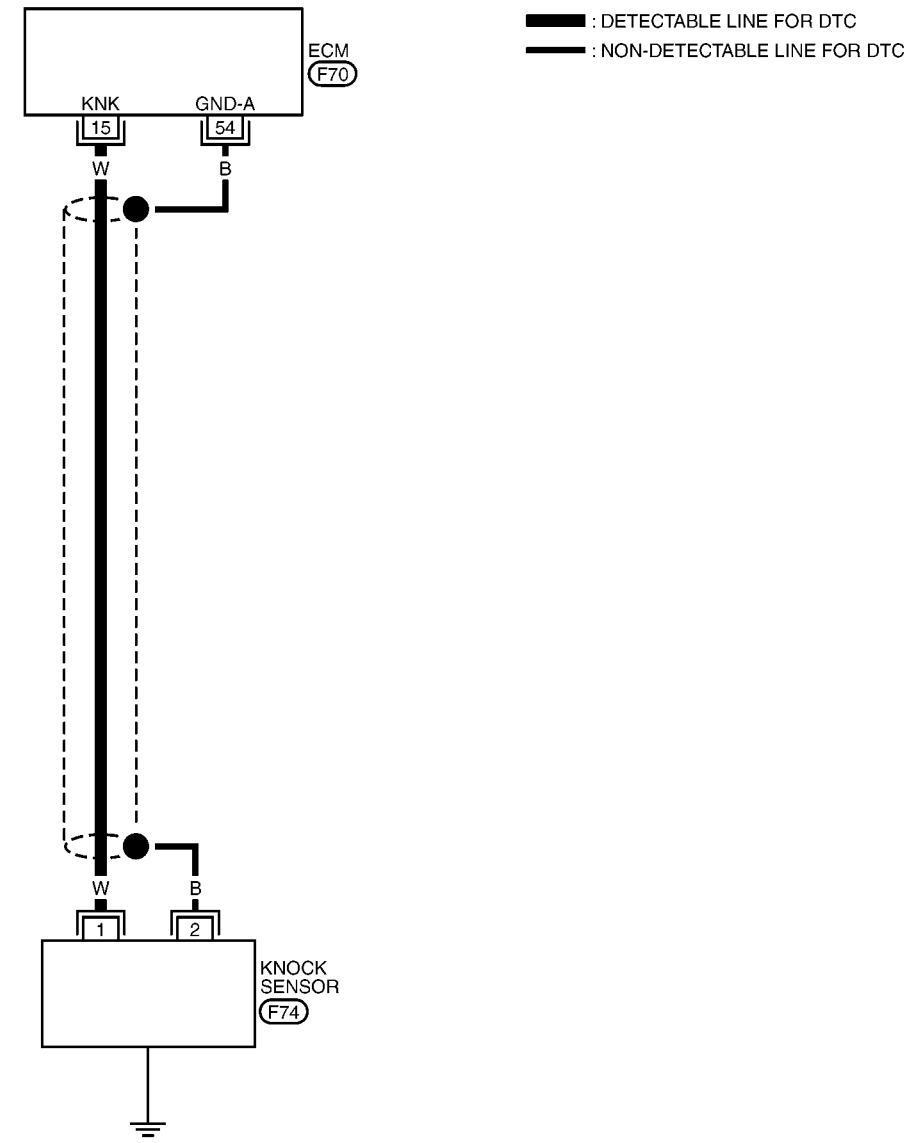
WITH GST

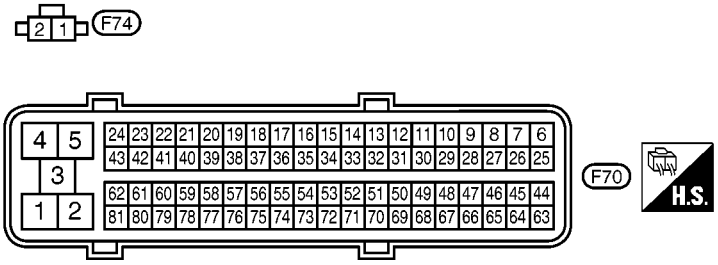
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QN5

EC-KS-01





YEC456A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
54	B	Sensor ground (Knock sensor shield circuit)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00QN6

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

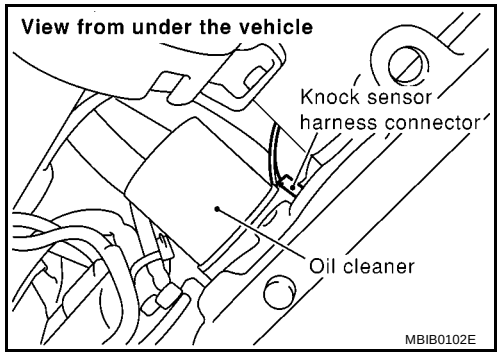
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and engine ground. Refer to Wiring Diagram.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.
   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

Refer to EC-342, "Component Inspection" .

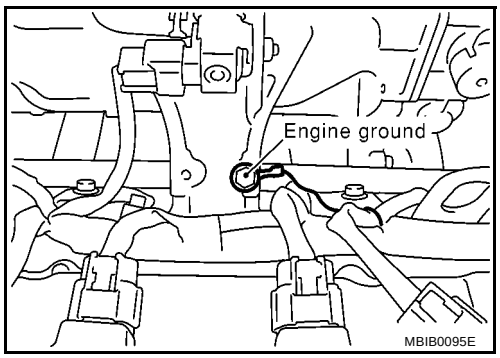
OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

4. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 5.



5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 54 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QN7

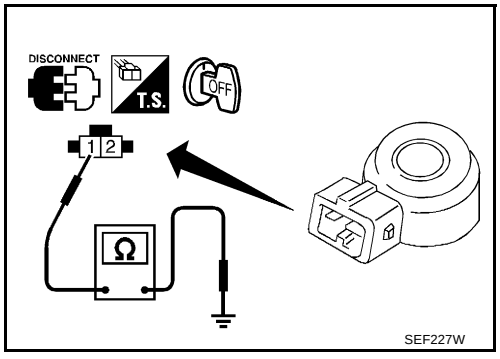
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

EBS00QN8

KNOCK SENSOR

Refer to EM-74, "CYLINDER BLOCK" .

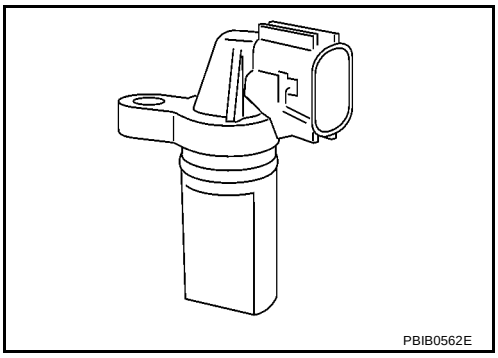
DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

EBS00QN9

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the 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.


PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

EBS00QNA

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

EBS00QNB

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	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 (The sensor circuit is open or shorted.) ● Crankshaft position sensor (POS) ● Signal plate

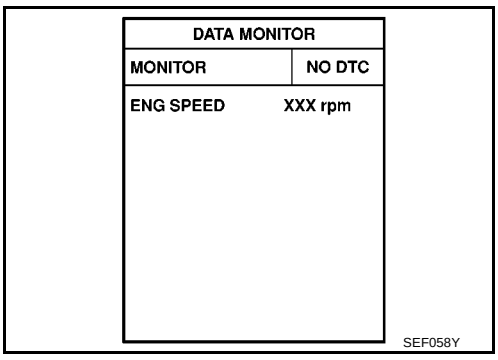
DTC Confirmation Procedure

EBS00QNC

NOTE:
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”.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-345, "Diagnostic Procedure" .



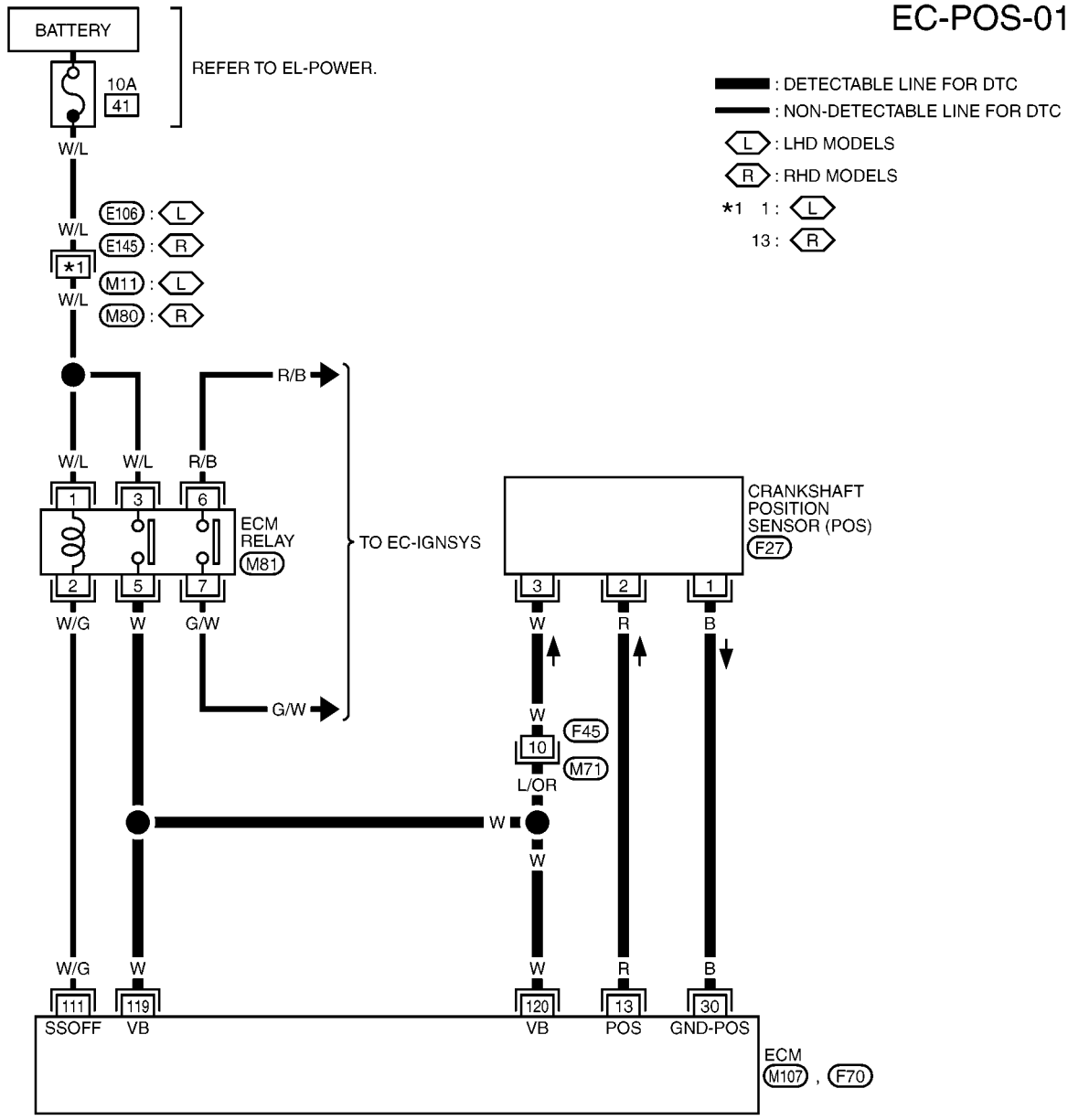
SEF058Y

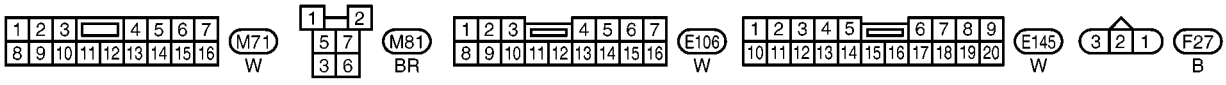
WITH GST

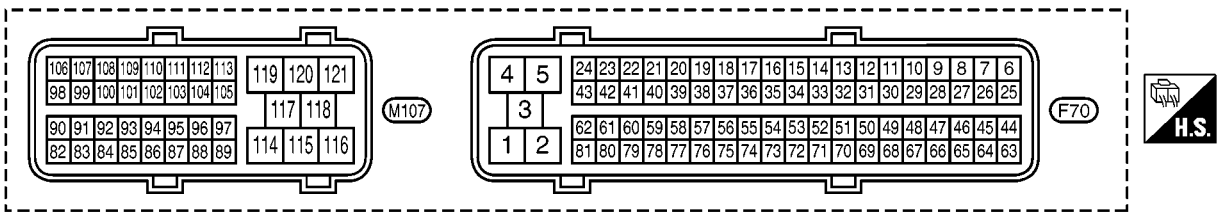
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QND





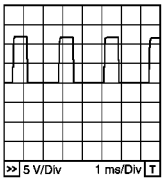
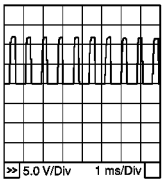


YEC457A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3V★  PBIB0528E
30	B	Crankshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

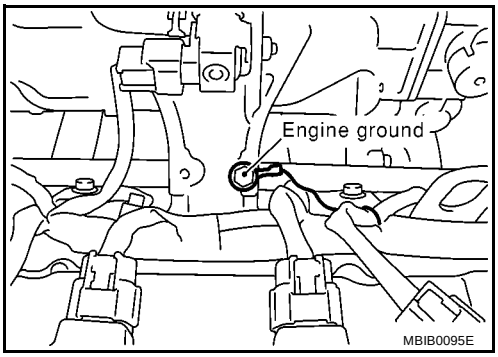
Diagnostic Procedure

EBS00QNE

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

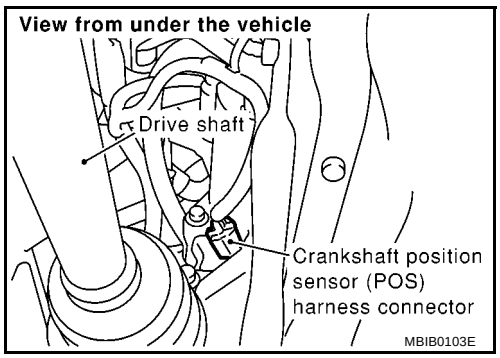
>> GO TO 2.



MBIB0095E

2. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

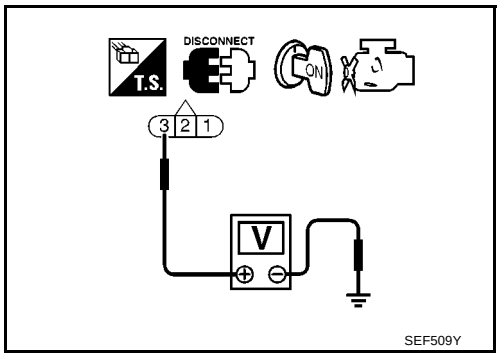
1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 30 and CKP sensor (POS) terminal 1
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-347, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

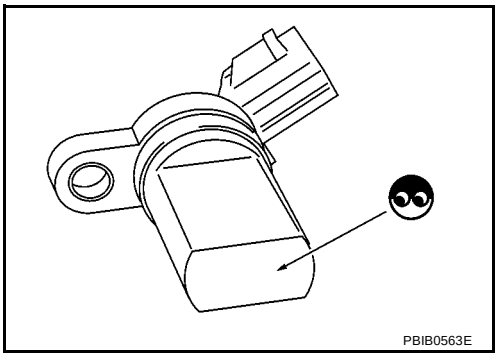
>> **INSPECTION END**

Component Inspection

EBS00QNF

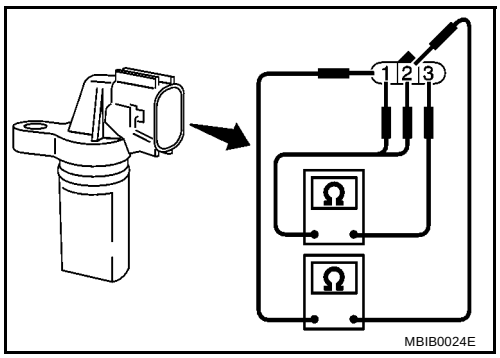
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

EBS00QNG

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-74, "CYLINDER BLOCK" .

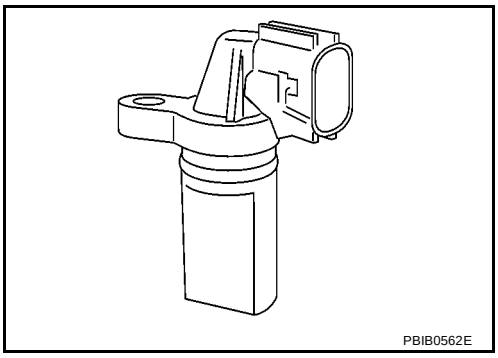
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

EBS00QNH

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft 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.


PBIB0562E

On Board Diagnosis Logic

EBS00QNI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set 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 (Intake) ● Starter motor (Refer to SC-13.) ● Starting system circuit (Refer to SC-13.) ● Dead (Weak) battery

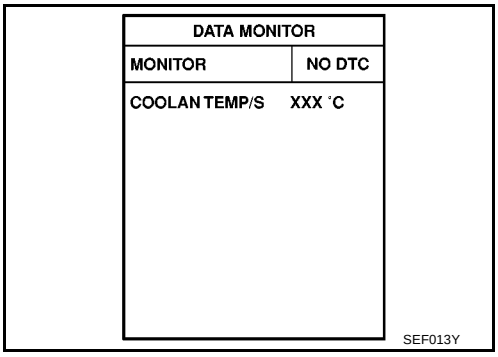
DTC Confirmation Procedure

EBS00QNJ

NOTE:
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”.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-351, "Diagnostic Procedure"
   .
   If 1st trip DTC is not detected, go to next step.
5. Maintain engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-351, "Diagnostic Procedure"
   .



SEF013Y

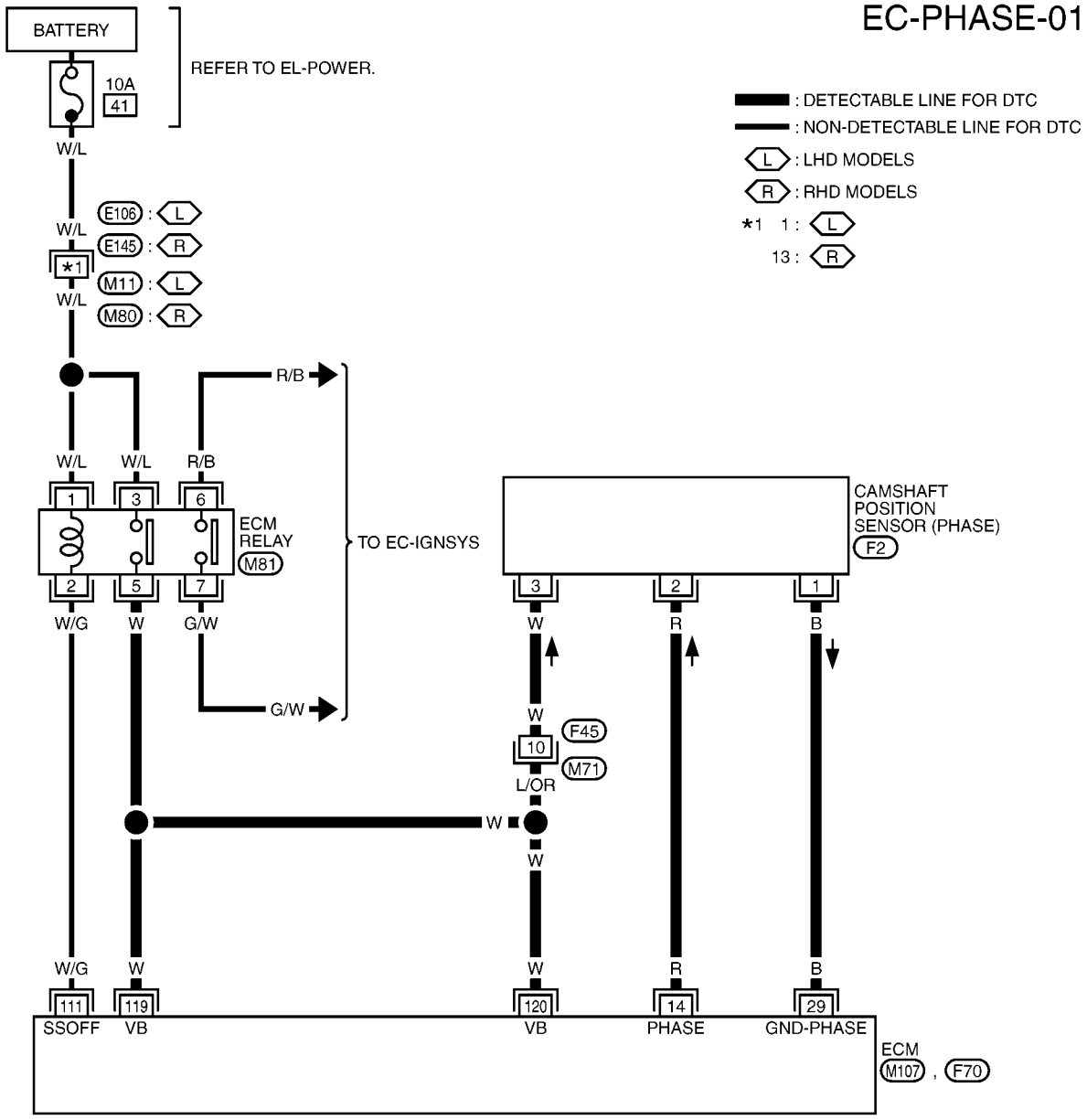
WITH GST

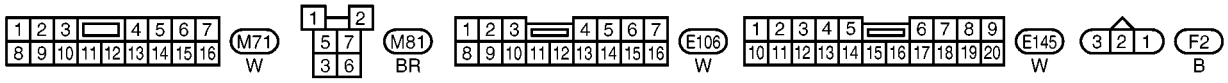
Follow the procedure “WITH CONSULT-II” above.

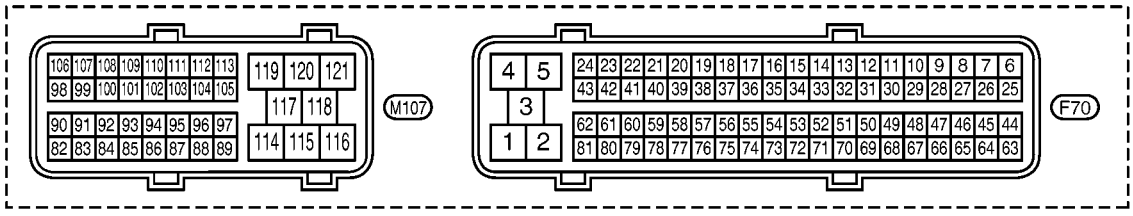
Wiring Diagram

EBS00QNK

EC-PHASE-01





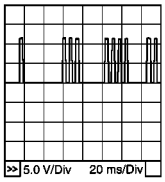
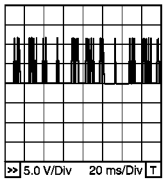


YEC458A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QNL

1. CHECK STARTING SYSTEM

Turn ignition switch to “START” position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

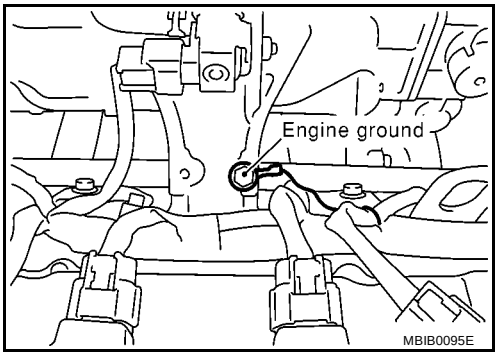
Yes >> GO TO 2.

No >> Check starting system. (Refer to “STARTING SYSTEM”, SC-13.)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

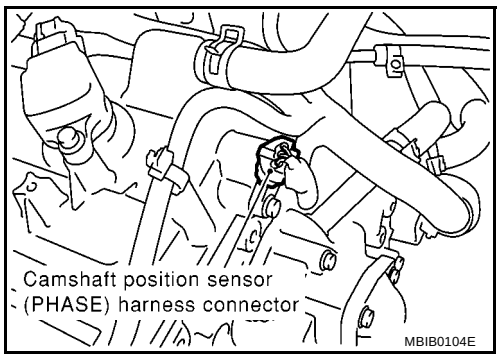
>> GO TO 3.



MBIB0095E

3. CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



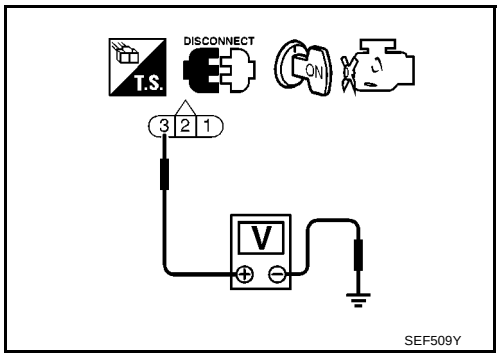
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

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

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and CMP sensor (PHASE) terminal 1.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-353, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor (PHASE).

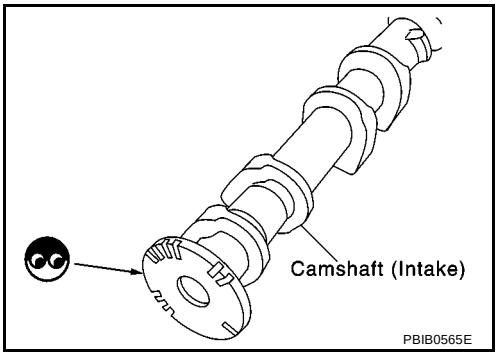
8. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 9.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

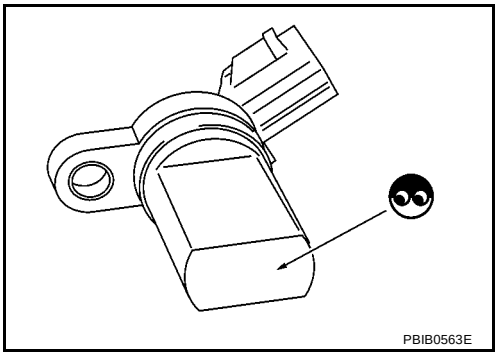
>> **INSPECTION END**

Component Inspection

EBS00QNM

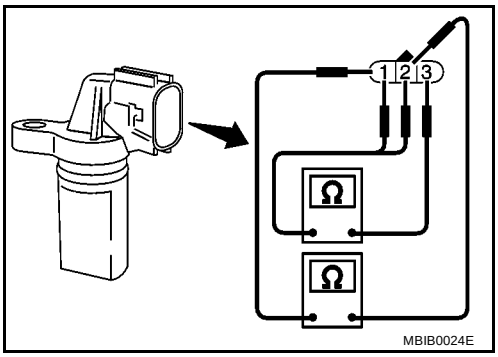
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation

EBS00QNN

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-32, "ROCKER COVER" .

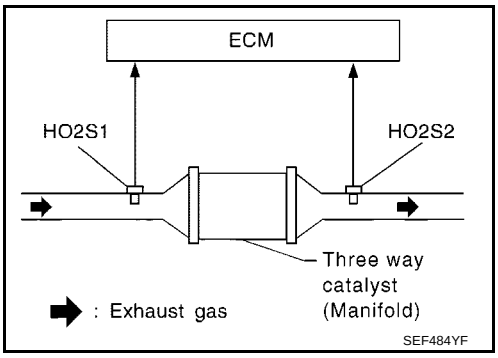
DTC P0420 THREE WAY CATALYST FUNCTION (M/T MODELS)

PFP:208A0

On Board Diagnosis Logic

EBS00QNO

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 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 sensors 1 and 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 0420	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 injectors ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

EBS00QNP

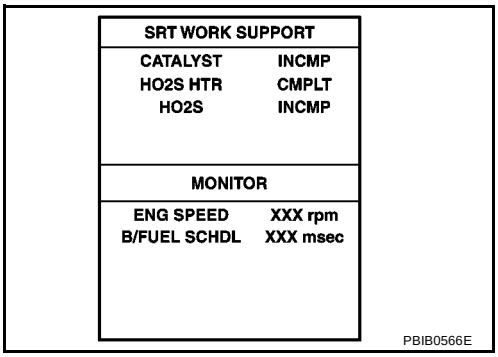
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:

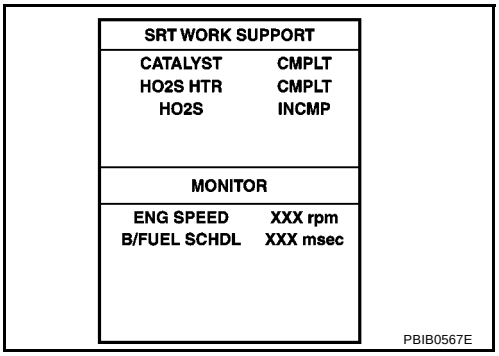
- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
6. Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 9
7. Wait 5 seconds at idle.



8. 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).
   If not “CMPLT”, perform the following.

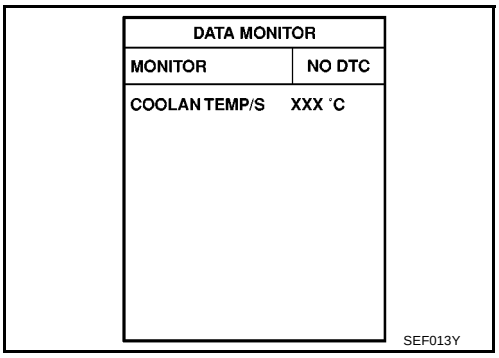
a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).



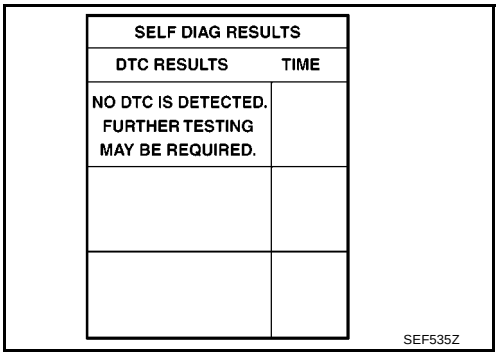
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II.

c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.

d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to step 3.



9. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
10. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-357, "Diagnostic Procedure" .



Overall Function Check

EBS00QNQ

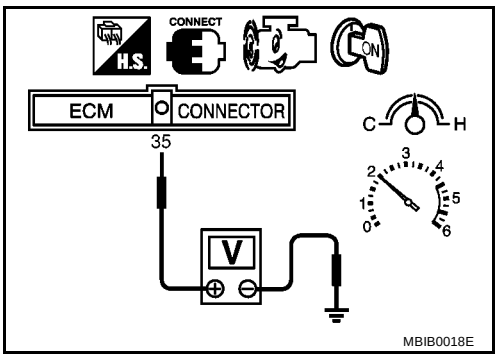
Use this procedure to check the overall function of the three way catalyst (Manifold). During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

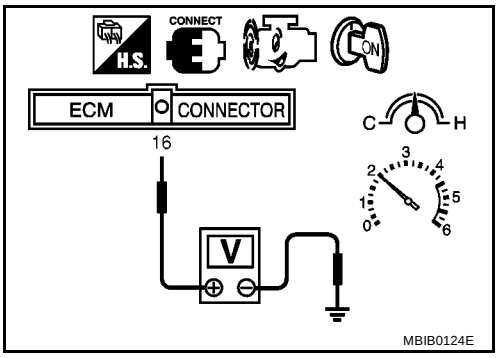
WITH GST

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 one minute under no load.
4. Let engine idle for one minute.

5. Set voltmeters probes between ECM terminal 35 (HO2S1 signal) and engine ground, and ECM terminal 16 (HO2S2 signal) and engine ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminal 16 and engine ground is very less than that of ECM terminal 35 and engine ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to EC-357, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 35 does not switch periodically more than 5 times within 10 seconds at step 7, perform trouble diagnosis for “DTC P0133” first. (See EC-208 .)

Diagnostic Procedure

EBS00QNR

1. CHECK EXHAUST SYSTEM

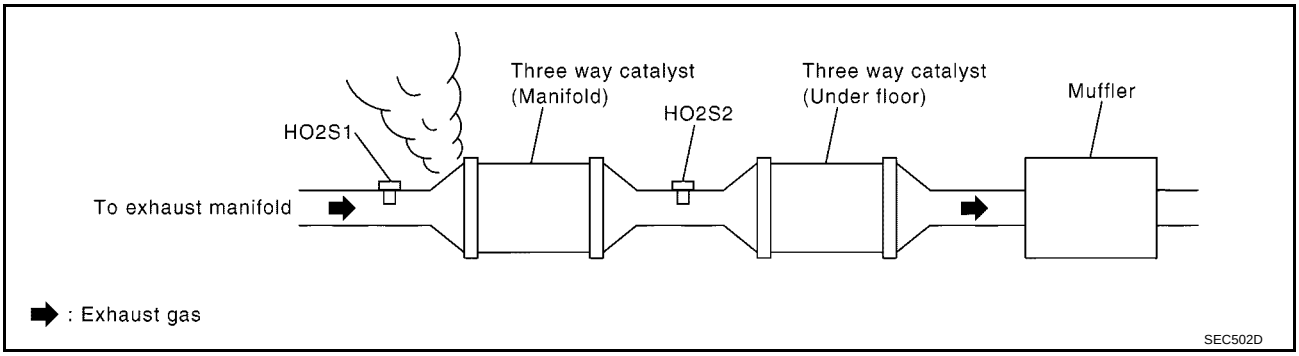
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> 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).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-87, "Basic Inspection" .

Items	Specifications
Ignition timing	8° ± 5° BTDC (in “Neutral” position)
Target idle speed	700 ± 50 rpm (in “Neutral” position)

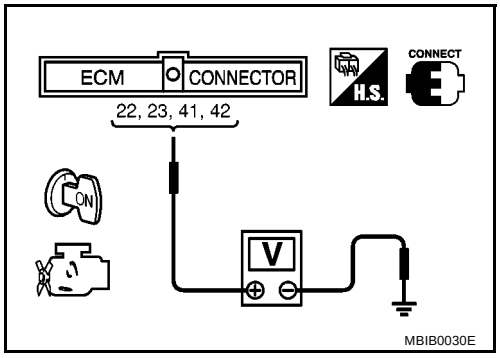
OK or NG

OK >> GO TO 5.
NG >> Follow the “Basic Inspection”.

5. CHECK INJECTORS

1. Stop engine and then turn ignition switch “ON”.
2. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.
   Refer to Wiring Diagram for Injectors, EC-525 .

   Battery voltage should exist.

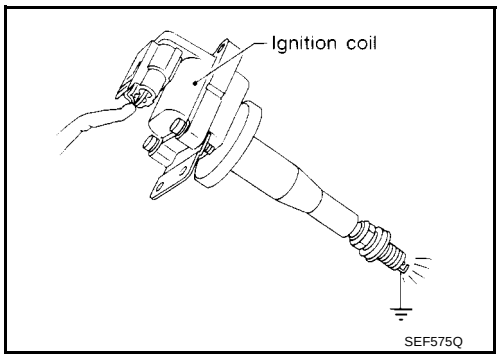


OK or NG

OK >> GO TO 6.
NG >> Perform EC-526, "Diagnostic Procedure" .

6. CHECK IGNITION SPARK

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known-good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



OK or NG

OK >> GO TO 7.
NG >> Check ignition coil with power transistor and their circuit.
Refer to EC-514, "IGNITION SIGNAL" .

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly.
   Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (Manifold).

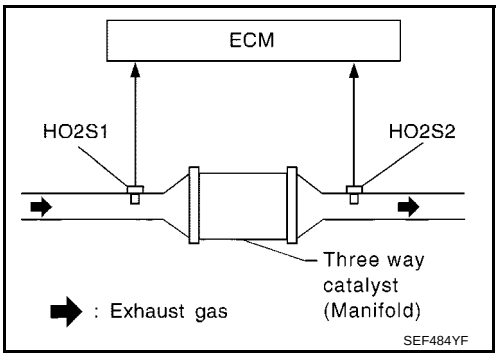
DTC P0420, P0430 THREE WAY CATALYST FUNCTION (A/T MODELS)

PFP:208A0

On Board Diagnosis Logic

EBS00QNS

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 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 sensors 1 and 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 0420 (Bank 1)	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 injectors ● Fuel injector leaks ● Spark plug ● Improper ignition timing
P0430 0430 (Bank 2)			

DTC Confirmation Procedure

EBS00QNT

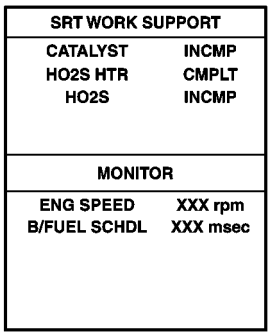
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

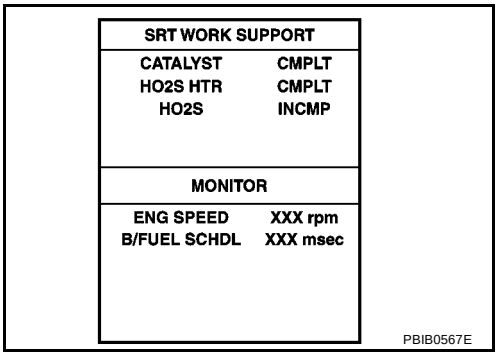
TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

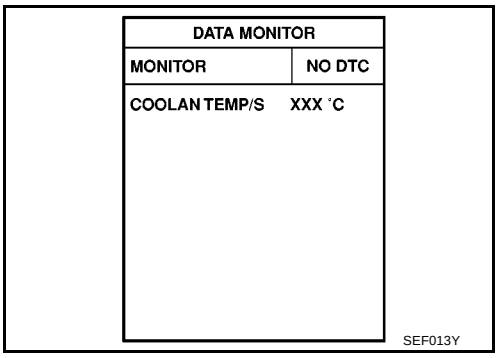
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
6. Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 9
7. Wait 5 seconds at idle.



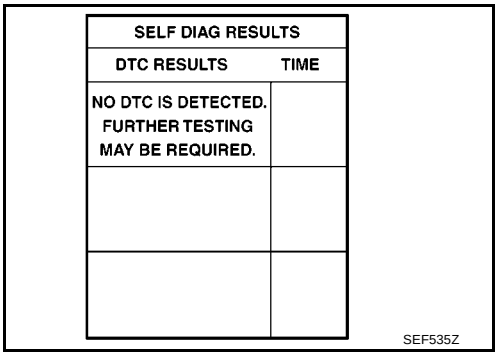
8. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
   If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
   a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).



   b. Turn ignition switch “ON” and select “COOLANTEMP/S”” in “DATA MONITOR” mode with CONSULT-II.
   c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
   d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to step 3.



9. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
10. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-362, "Diagnostic Procedure" .



Overall Function Check

EBS00QNU

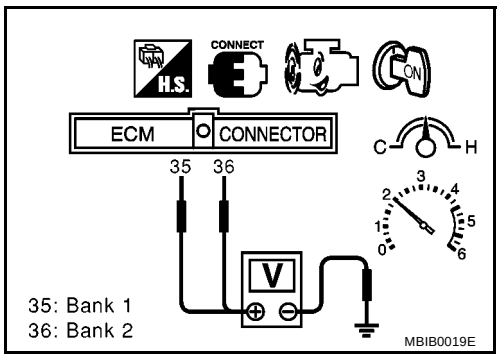
Use this procedure to check the overall function of the three way catalyst (Manifold). During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

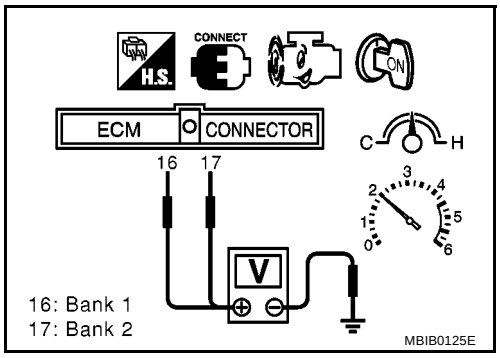
WITH GST

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 one minute under no load.
4. Let engine idle for one minute.

5. Set voltmeters probes between ECM terminals 35 [HO2S1 (B 1) signal], 36 [HO2S1 (B 2) signal] and engine ground, and ECM terminals 16 [HO2S2 (B 1) signal], 17 [HO2S2 (B 2) signal] and engine ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminals 16 and engine ground, or 17 and engine ground is very less than that of ECM terminals 35 and engine ground, or 36 and engine ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 voltage switching frequency
   B: Heated oxygen sensor 1 voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to EC-362, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 35 or 36 does not switch periodically more than 5 times within 10 seconds at step 7, perform trouble diagnosis for “DTC P0133, P0153” first. (See EC-218 .)

Diagnostic Procedure

EBS00QNV

1. CHECK EXHAUST SYSTEM

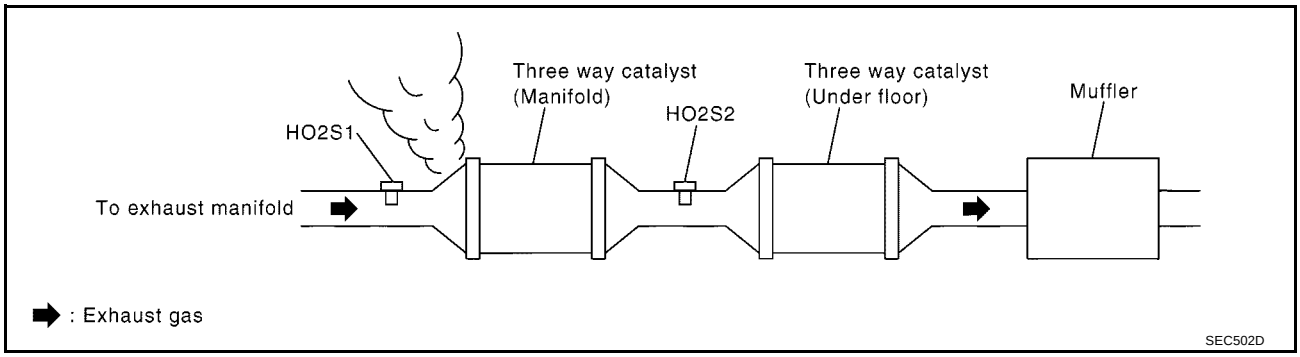
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> 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).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-87, "Basic Inspection" .

Items	Specifications
Ignition timing	10° ± 5° BTDC (in “P” or “N” position)
Target idle speed	800 ± 50 rpm (in “P” or “N” position)

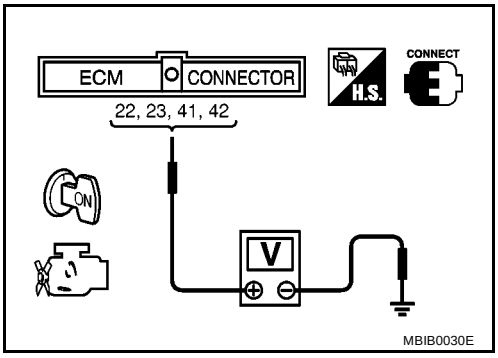
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-87, "Basic Inspection" .

5. CHECK INJECTORS

1. Stop engine and then turn ignition switch “ON”.
2. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.
   Refer to Wiring Diagram for Injectors, EC-525 .

Battery voltage should exist.

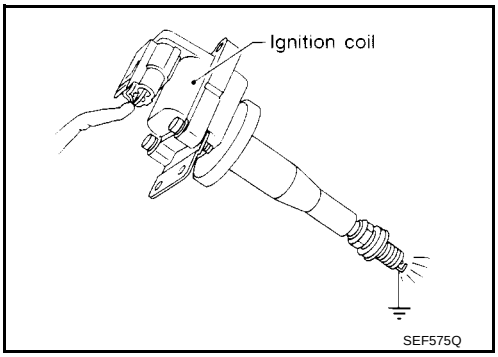


OK or NG

OK >> GO TO 6.
NG >> Perform EC-526, "Diagnostic Procedure" .

6. CHECK IGNITION SPARK

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



OK or NG

OK >> GO TO 7.
NG >> Check ignition coil with power transistor and their circuit. Refer to EC-514, "IGNITION SIGNAL" .

7. CHECK INJECTOR

1. Turn ignition switch “OFF”.
2. Remove injector assembly.
   Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (Manifold).

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

EBS00QNW

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2	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*2		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed signal*1	Vehicle speed		

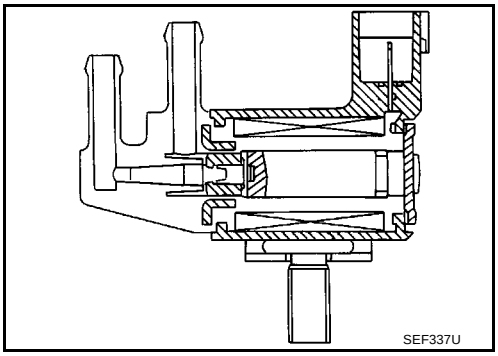
*1: This signal is sent to the ECM through CAN communication line.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QNX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	15 - 30%

On Board Diagnosis Logic

EBS00QNY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	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

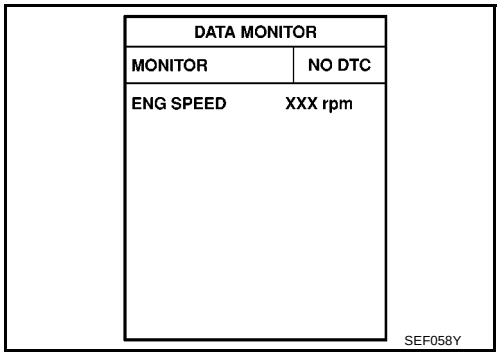
EBS00QNZ

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-368, "Diagnostic Procedure"
.



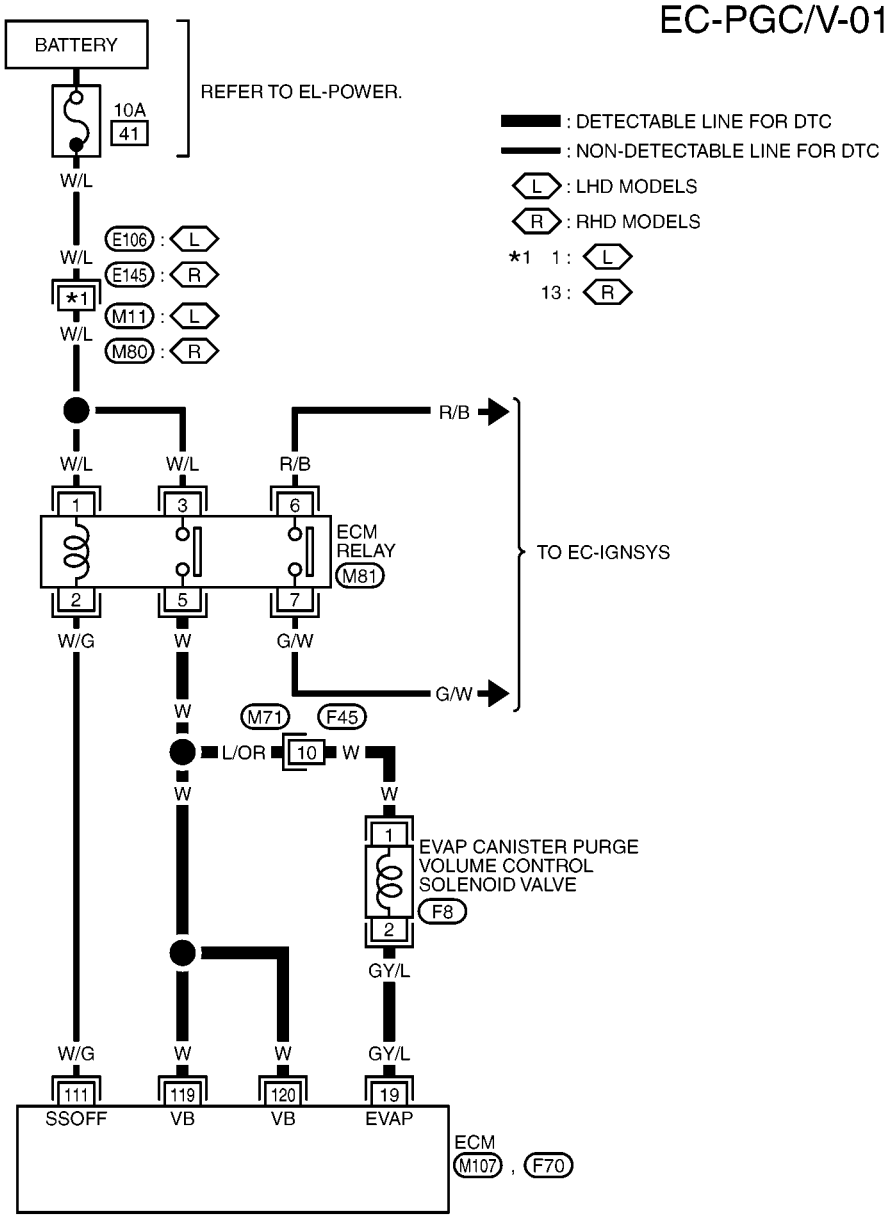
WITH GST

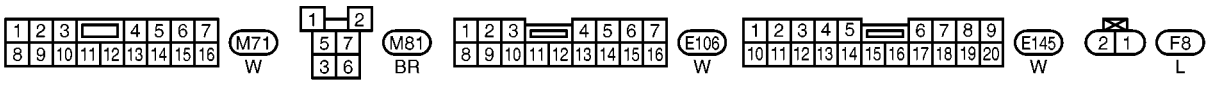
Follow the procedure “WITH CONSULT-II” above.

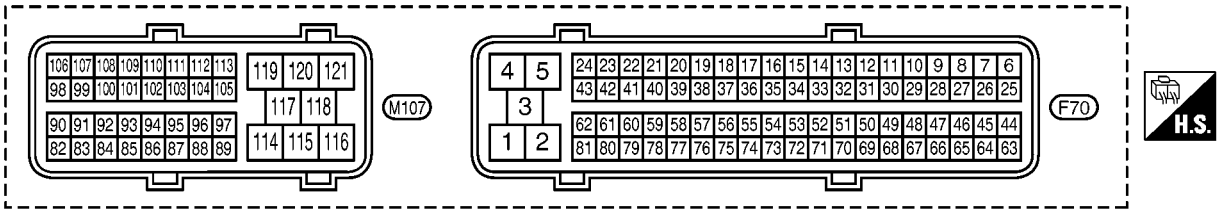
Wiring Diagram

EBS00QO0

EC-PGC/V-01





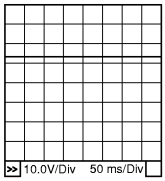
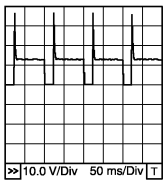


YEC459A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	Approximately 10V★  PBIB0520E

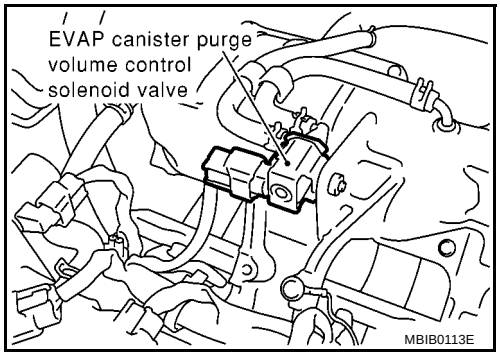
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QO1

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

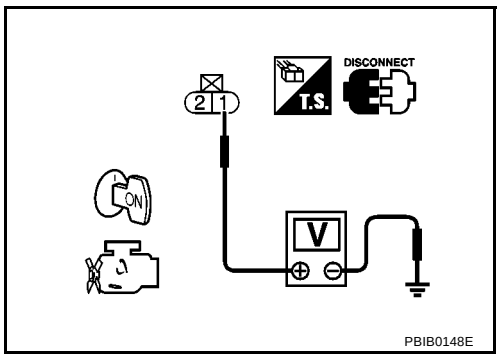
1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch “ON”.



MBIB0113E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



PBIB0148E

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay

>> 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 harness continuity between ECM terminal 19 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

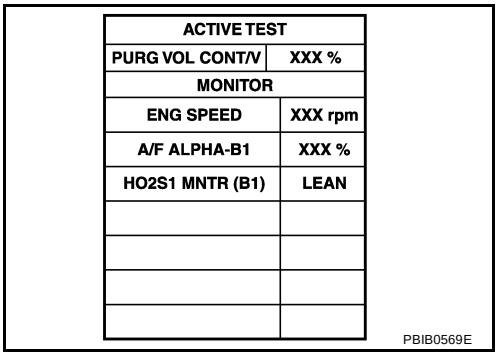
OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> 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-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-370, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

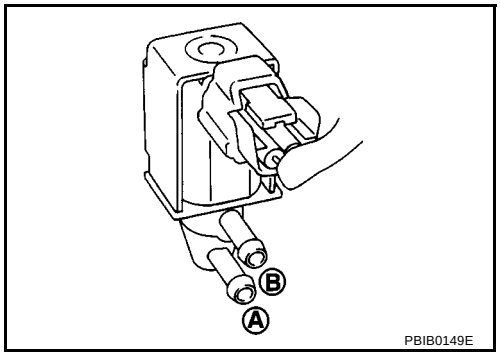
EBS00QO2

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

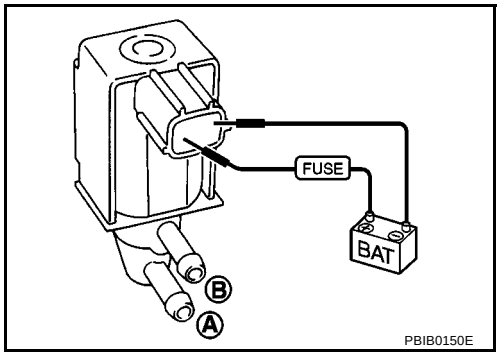
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

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	Yes
No supply	No



Removal and Installation

EBS00QO3

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P0500 VSS

PFP:32702

Description

EBS00QO4

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed signal is sent to the combination meter from ABS actuator and electric unit (control unit) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

EBS00QO5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	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.) ● Combination meter ● Vehicle speed signal ● ABS actuator and electric unit (control unit)

DTC Confirmation Procedure

EBS00QO6

CAUTION:
Always drive vehicle at a safe speed.

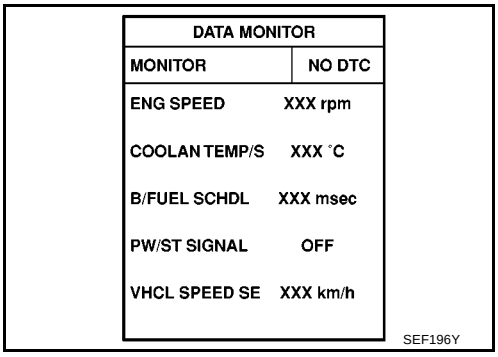
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 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-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-372, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 2,000 rpm (A/T models) More then 2,700 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More than 5.0 msec (A/T Models) More than 4.3 msec (M/T Models)
Selector lever	Suitable position
PW/ST SIGNAL	OFF



6. If 1st trip DTC is detected, go to EC-372, "Diagnostic Procedure" .

Overall Function Check

EBS00QO7

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in “MODE 1” with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-372, "Diagnostic Procedure" .

Diagnostic Procedure

EBS00QO8

1. CHECK DTC WITH OR ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Refer to “TROUBLE DIAGNOSIS-BASIC INSPECTION”, BR-70 (models without ESP) or “TROUBLE DIAGNOSIS”, BR-97 (models with ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to “METERS AND GAUGES”, EL-100.

>> **INSPECTION END**

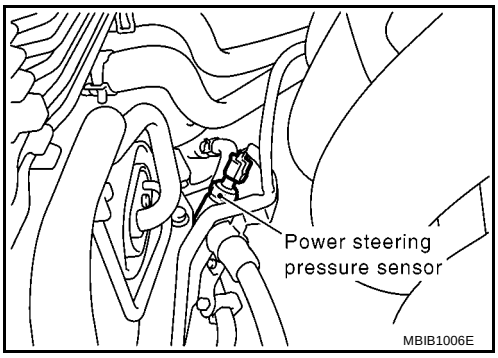
DTC P0550 PSP SENSOR

PFP:49763

Component Description

EBS00QO9

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QOA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

On Board Diagnosis Logic

EBS00QOB

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Power steering pressure sensor

DTC Confirmation Procedure

EBS00QOC

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-375, "Diagnostic Procedure" .

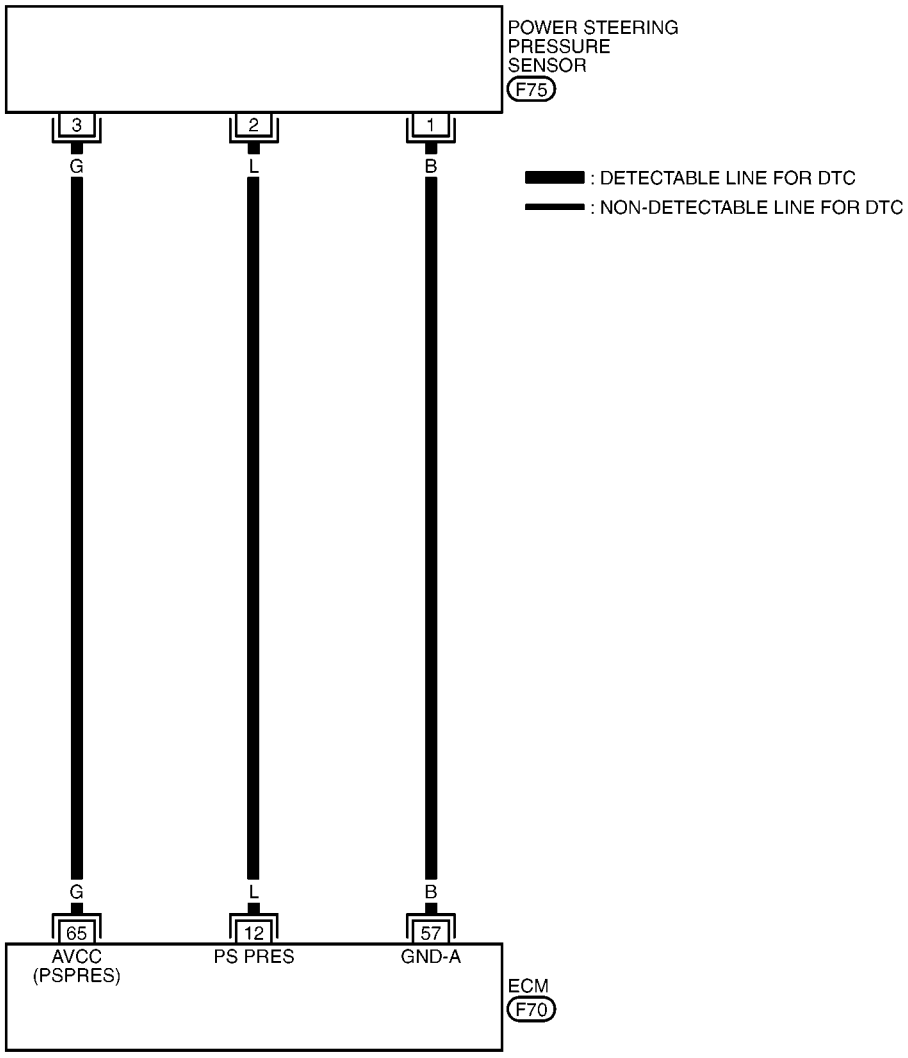
WITH GST

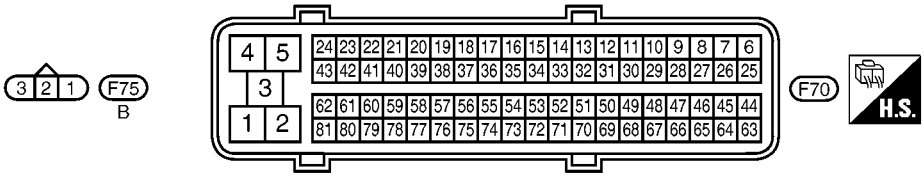
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QOD

EC-PS/SEN-01





YEC460A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
57	B	Sensors' ground (Power steering pressure sensor/ Refrigerant pressure sensor)	**[Engine is running]** ● Idle speed	Approximately 0V
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V

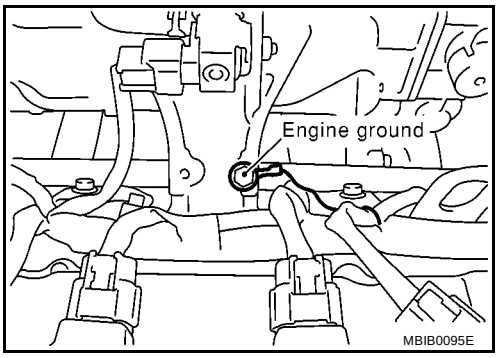
Diagnostic Procedure

EBS00QOE

1. RETIGHTEN GROUND SCREWS

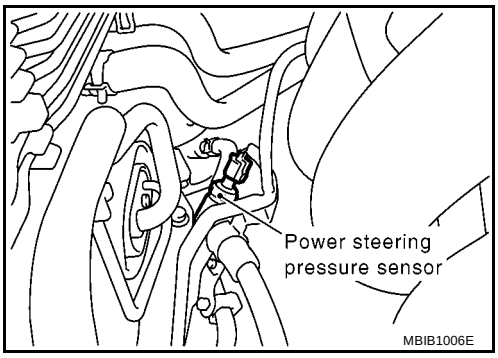
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch "ON".

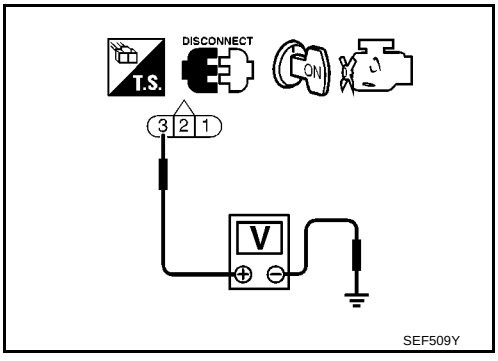


3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 57 and PSP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-376, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

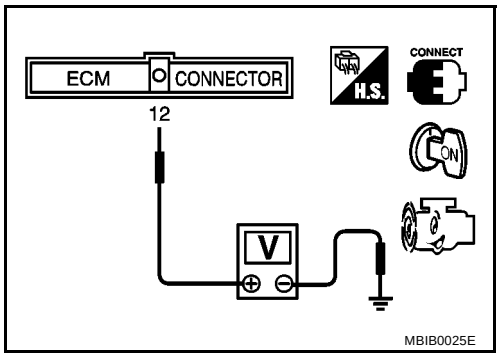
Component Inspection

EBS00QOF

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned fully.	0.5 - 4.0V
Steering wheel is not being turned.	0.4 - 0.8V



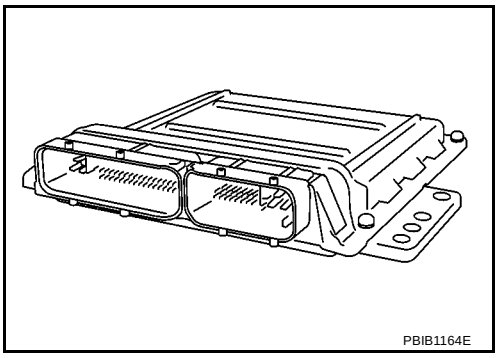
DTC P0605 ECM

PFP:23710

Component Description

EBS00QOG

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

EBS00QOH

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	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.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

EBS00QOI

Perform “PROCEDURE FOR MALFUNCTION A” first. If the DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”. If there is no malfunction on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.

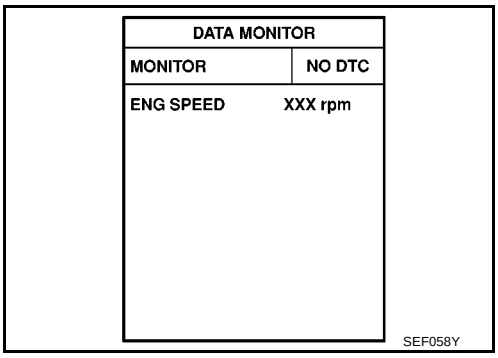
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-378, "Diagnostic Procedure" .



SEF058Y

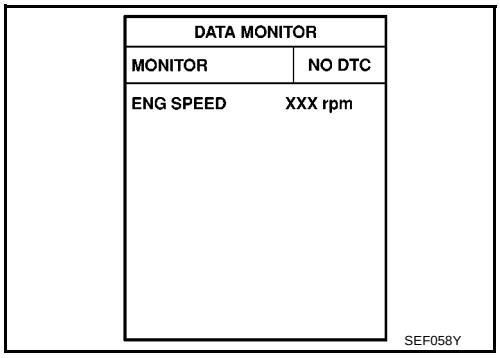
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
4. If 1st trip DTC is detected, go to EC-378, "Diagnostic Procedure" .



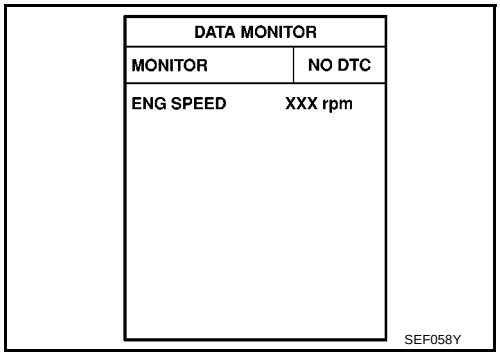
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-378, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

EBS00QOJ

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-377 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-377 .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-70, "NATS (Nissan Anti-theft System)" .
3. Perform EC-49, "Accelerator Pedal Released Position Learning" .
4. Perform EC-49, "Throttle Valve Closed Position Learning" .
5. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

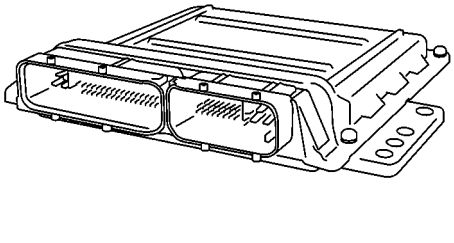
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

EBS00QOK

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

EBS00QOL

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

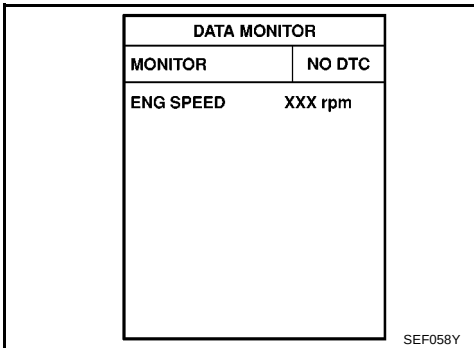
DTC Confirmation Procedure

EBS00QOM

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-382, "Diagnostic Procedure"
.



SEF058Y

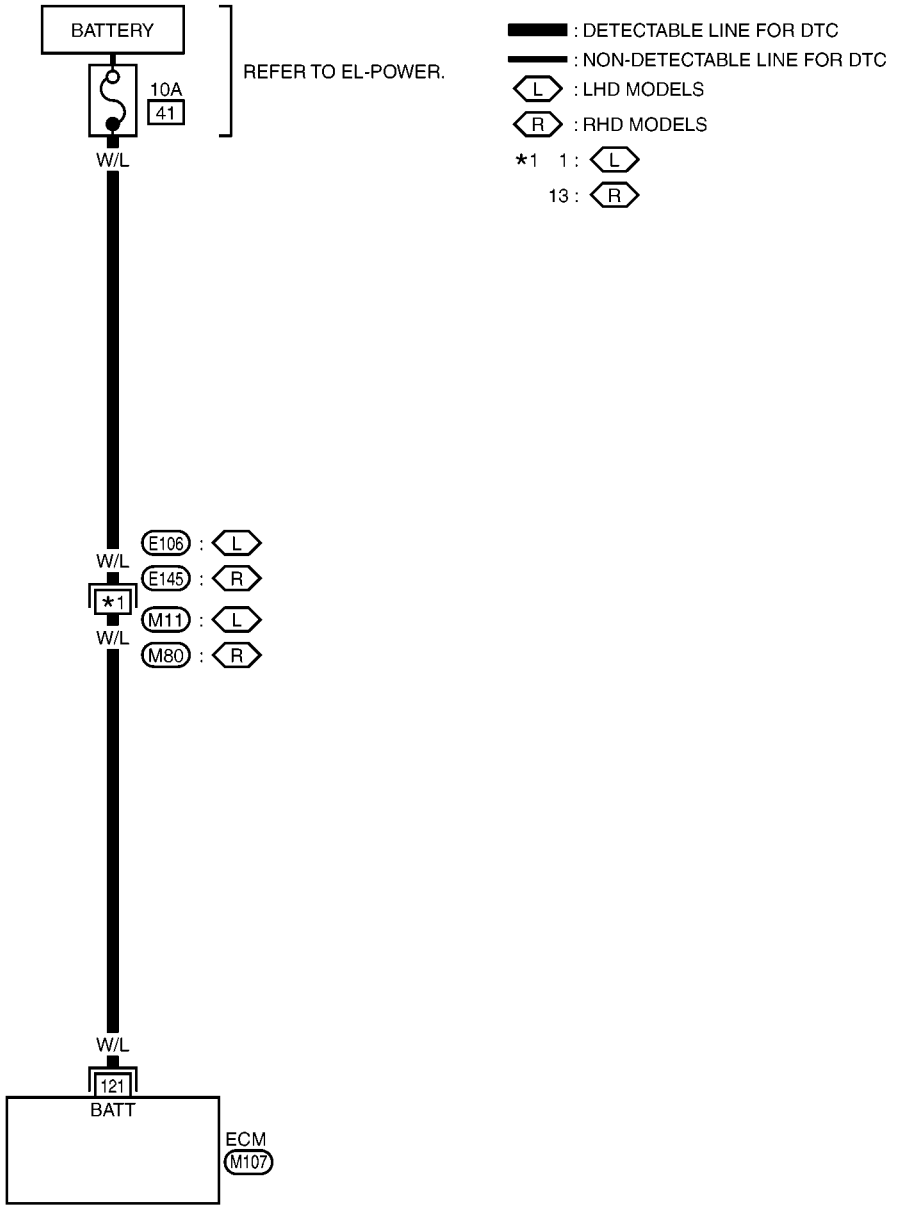
WITH GST

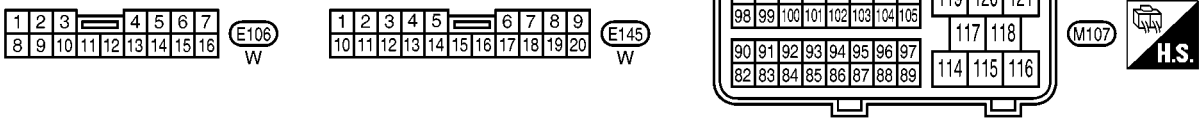
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QON

EC-ECM/PW-01





YEC461A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

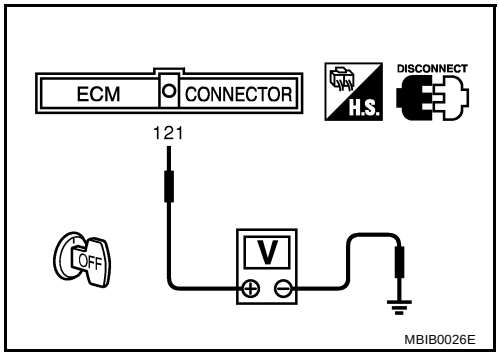
Diagnostic Procedure

EBS00QOO

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- Harness for open or short between ECM and battery

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

3. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-380 .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-380 .
5. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-70, "NATS (Nissan Anti-theft System)" .
3. Perform EC-49, "Accelerator Pedal Released Position Learning" .
4. Perform EC-49, "Throttle Valve Closed Position Learning" .
5. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

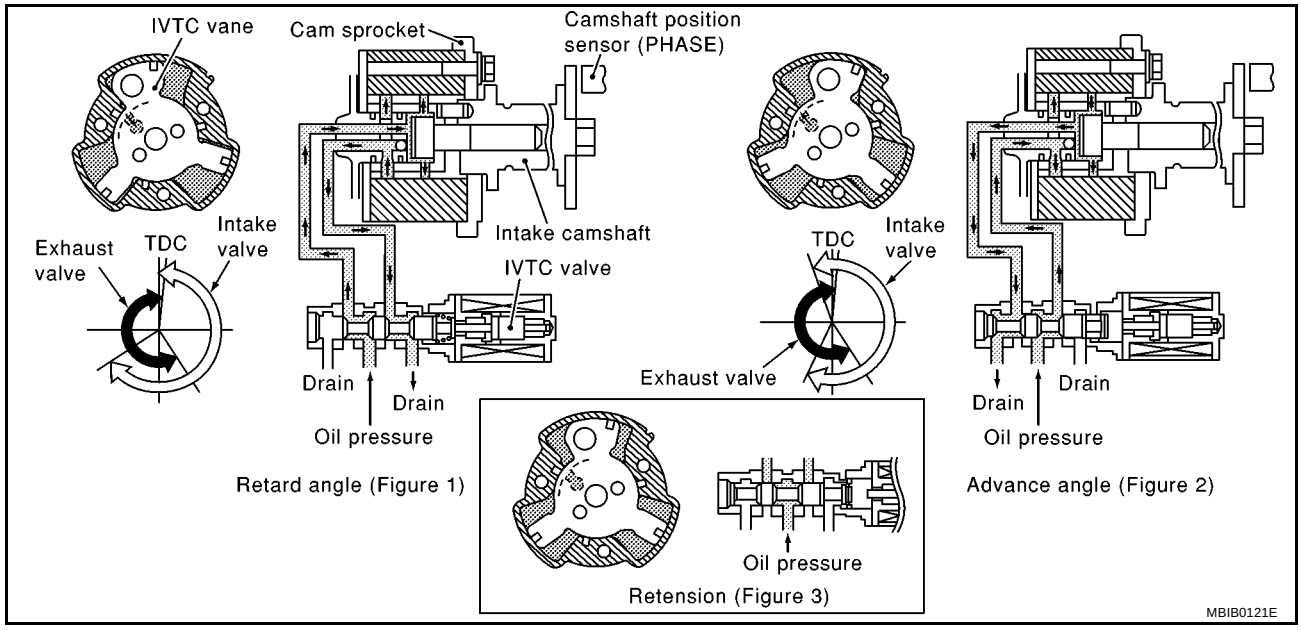
Description

EBS00QOP

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed signal*	Vehicle speed		

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



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 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 DESCRIPTION

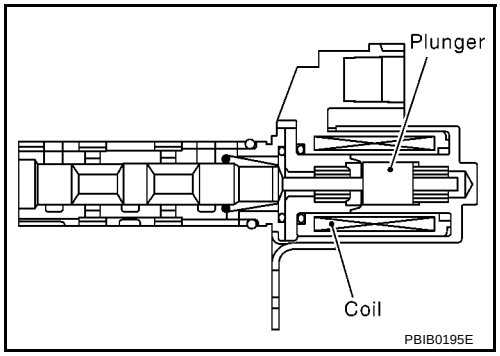
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QOQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 60%

On Board Diagnosis Logic

EBS00QOR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	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 (Solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

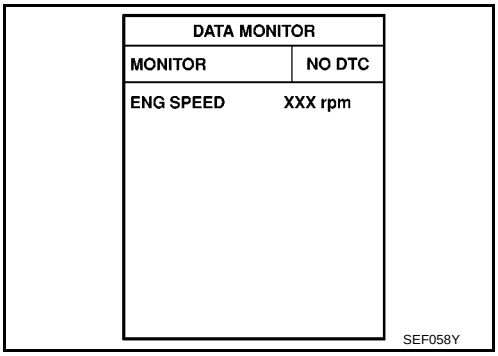
DTC Confirmation Procedure

EBS00QOS

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-387, "Diagnostic Procedure"
.



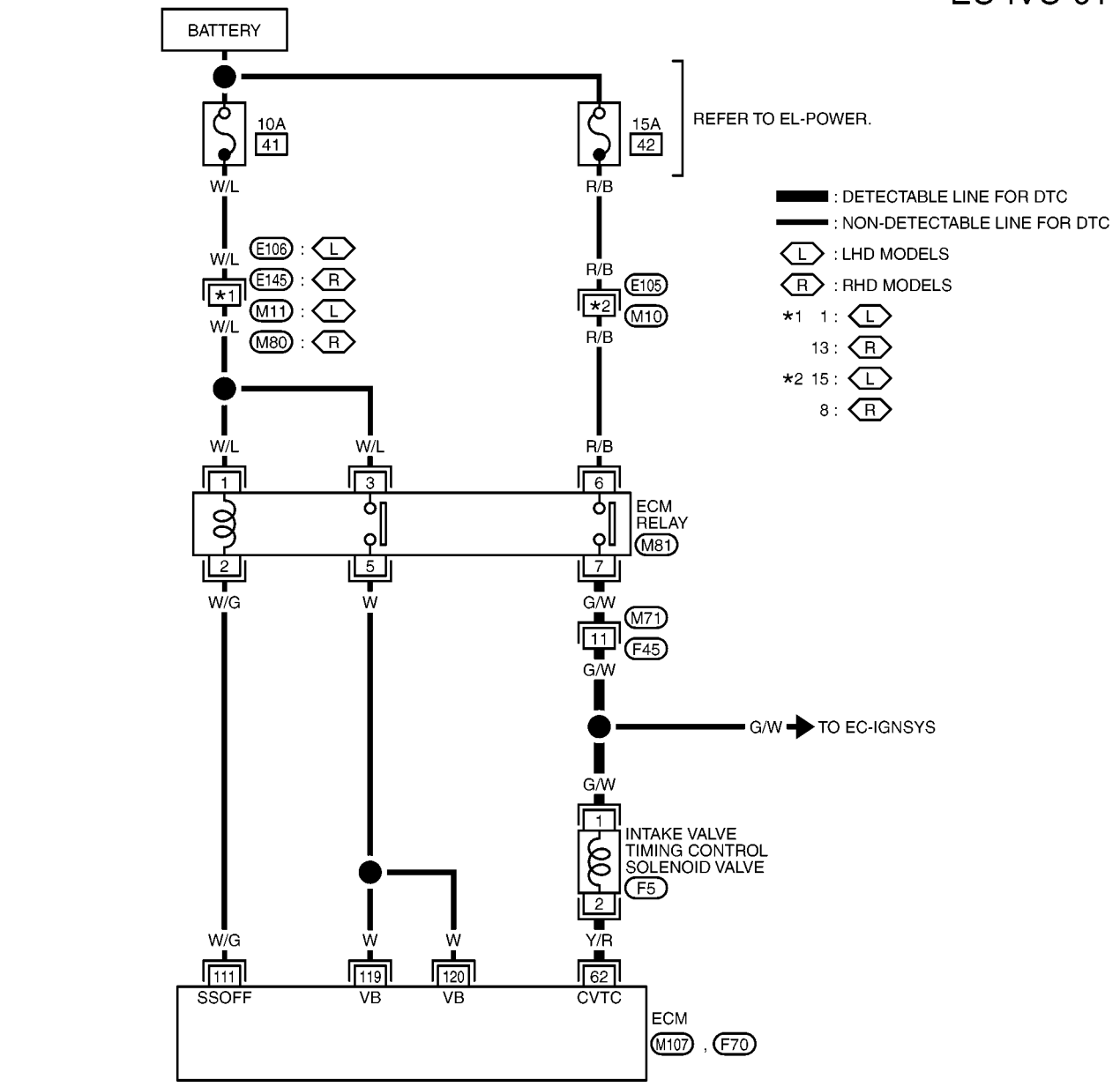
WITH GST

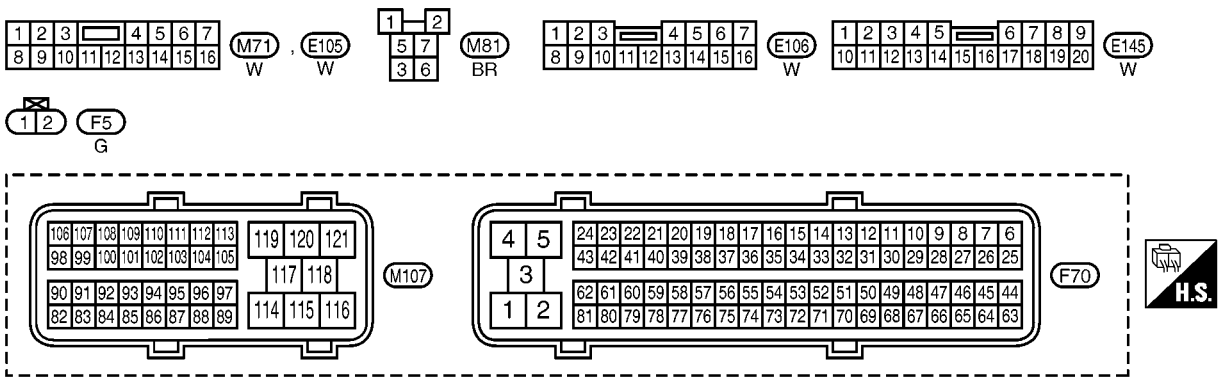
Following the procedure "WITH CONSULT-II" above.

Wiring Diagram

EBS00QOT

EC-IVC-01



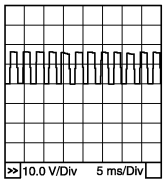


YEC462A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly	Approximately 7 - 10V★  PBIB0532E

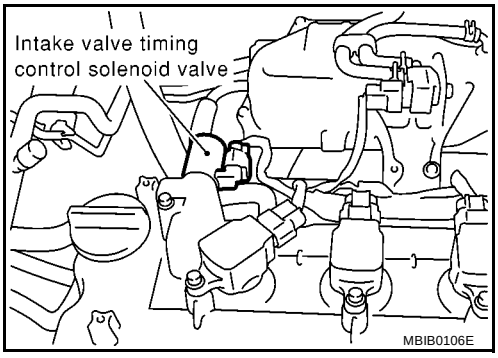
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QOU

1. CHECK IVT 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”.



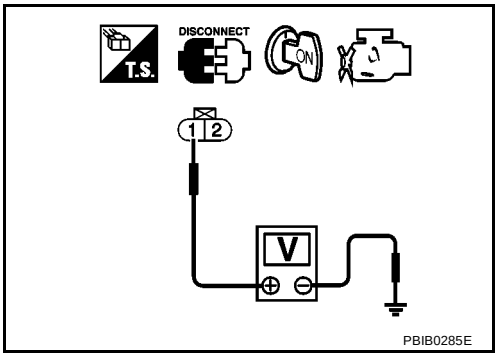
MBIB0106E

4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



PBIB0285E

2. DETECT MALFUNCTION PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between intake valve timing control solenoid valve and ECM relay

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

3. CHECK IVT CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 62 and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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-388, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

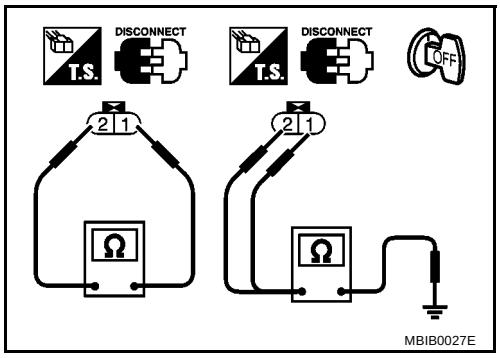
Component Inspection

EBS00QOV

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals 1 and 2 under the following conditions.

Terminals	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

EBS00QOW

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-50, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

EBS00QOX

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.

On Board Diagnosis Logic

EBS00QOY

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	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. **This self-diagnosis has the one trip detection logic.**	

FAIL-SAFE MODE

When the malfunction A or B is detected in the two consecutive trips, the ECM enters fail-safe mode and the MI light up when the malfunction C is detected even in the 1st trip, the ECM enters fail-safe mode and the MI light up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The 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.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	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” position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

EBS00QOZ

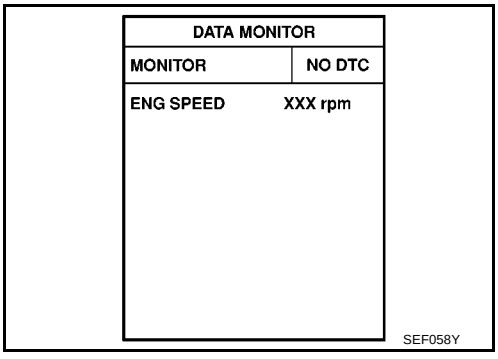
NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A AND B” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION C”.**
  If there is no malfunction on “PROCEDURE FOR MALFUNCTION A AND B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition witch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T), “1st” position (M/T) and wait at least 2 seconds.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. If 1st trip DTC is detected, go to EC-390, "Diagnostic Procedure"
   .



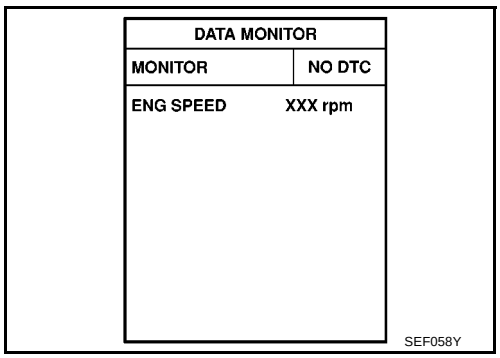
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T), “1st” position (M/T) and wait at least 2 seconds.
4. Shift selector lever to “N” or “P” position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-390, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

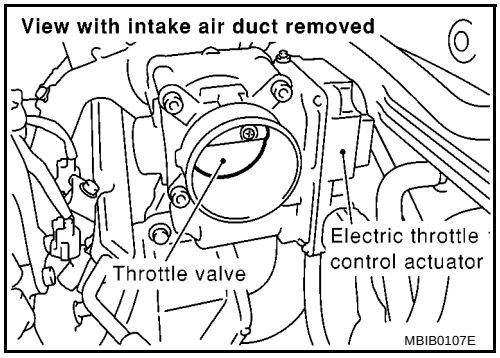
EBS00QP0

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00QP1

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

EBS00QP2

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-389 or EC-398 .
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.

On Board Diagnosis Logic

EBS00QP3

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted.) ● Harness or connectors (Throttle control motor relay circuit is open or shorted.) ● Electric throttle control actuator ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

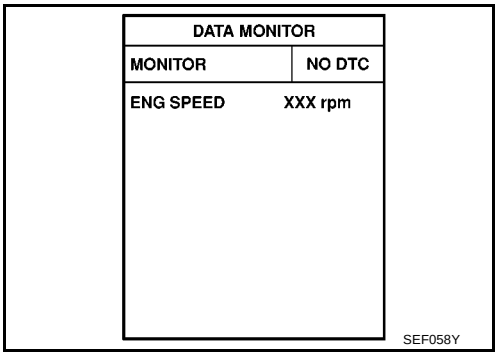
DTC Confirmation Procedure

EBS00QP4

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-393, "Diagnostic Procedure" .



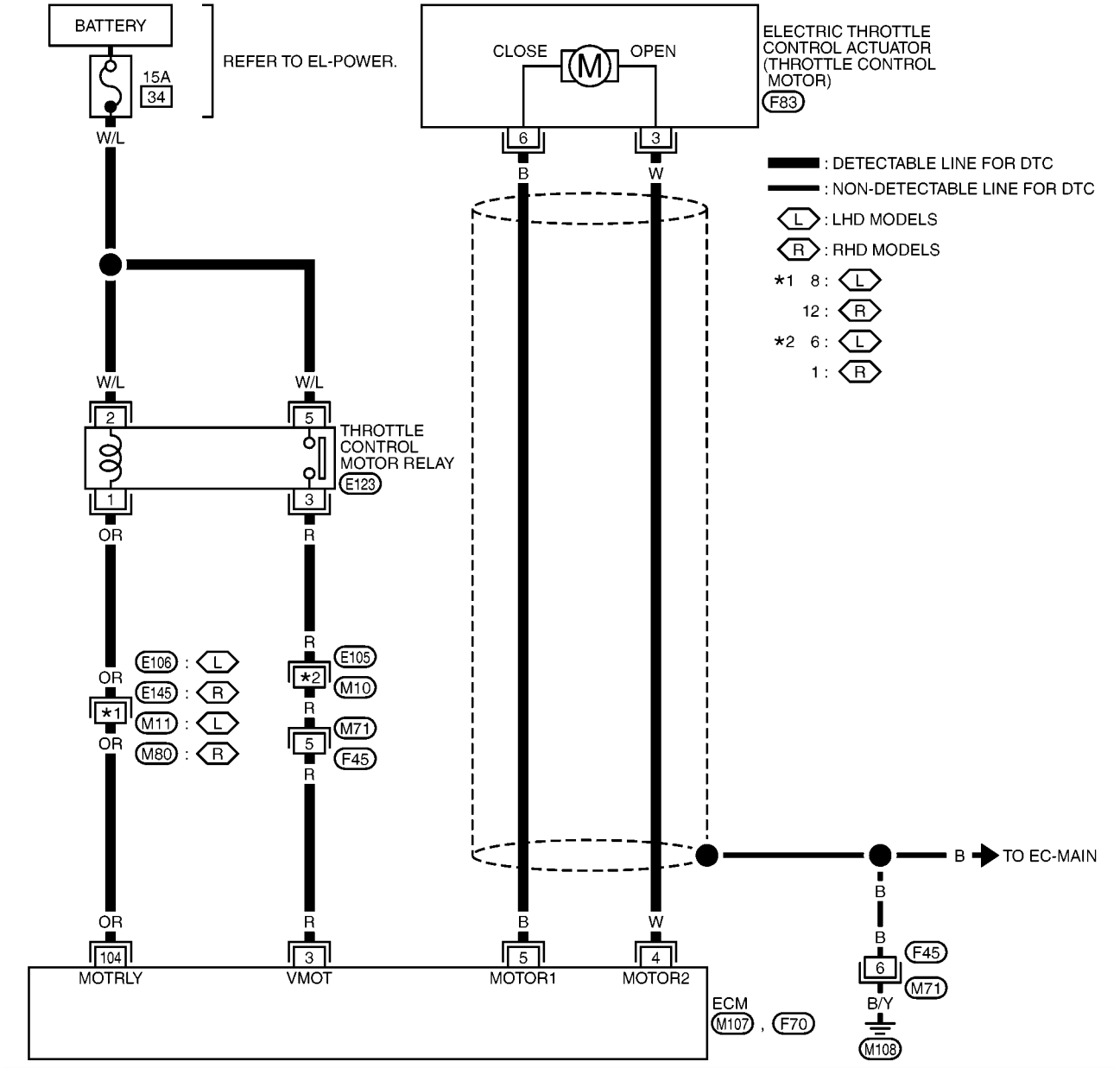
WITH GST

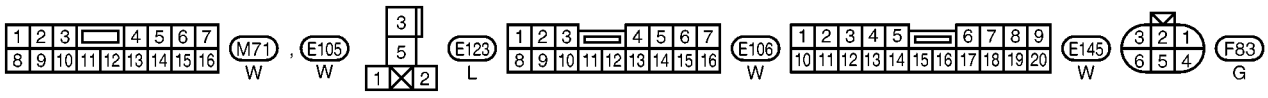
Follow the procedure “WITH CONSULT-II” above.

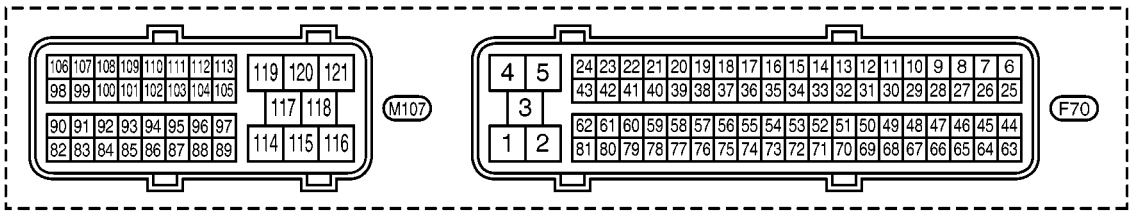
Wiring Diagram

EBS00QP5

EC-ETC1-01





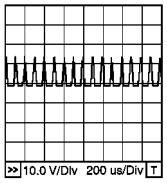
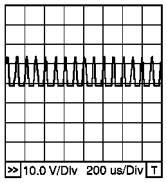


YEC463A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

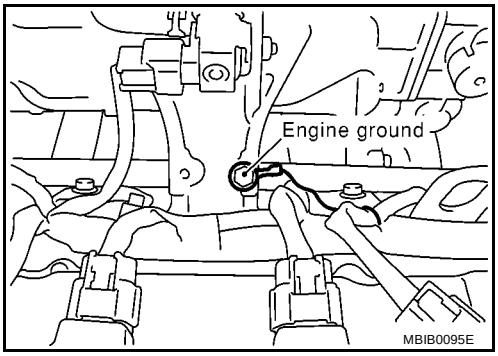
Diagnostic Procedure

EBS00QP6

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.

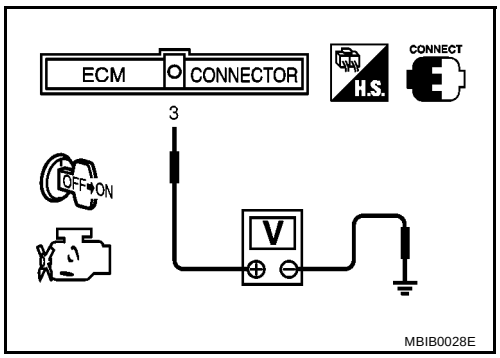


MBIB0095E

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

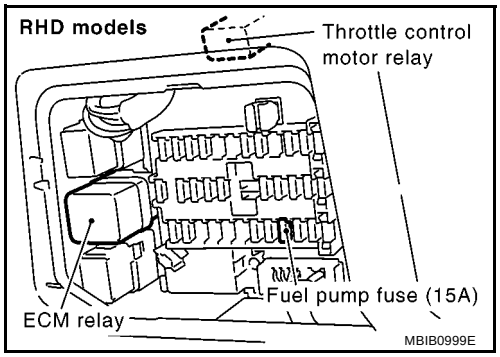


OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

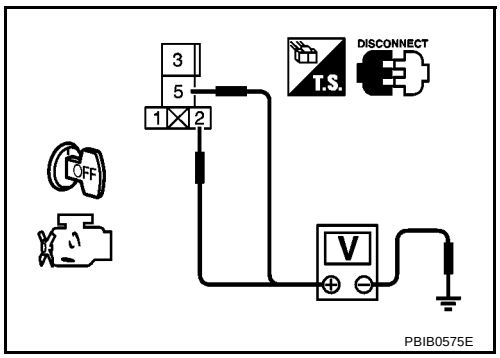
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

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

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors M71, F45
- Harness for open or short between ECM and throttle control motor relay

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

7. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between ECM and throttle control motor relay

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

9. CHECK THROTTLE CONTROL MOTOR RELAY

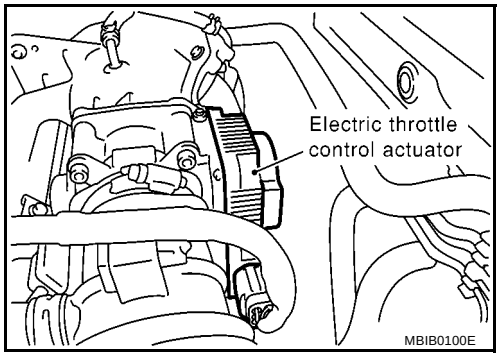
Refer to EC-397, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace throttle control motor relay.

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 harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

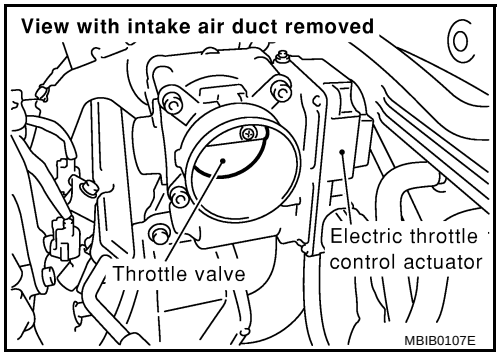
OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-397, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

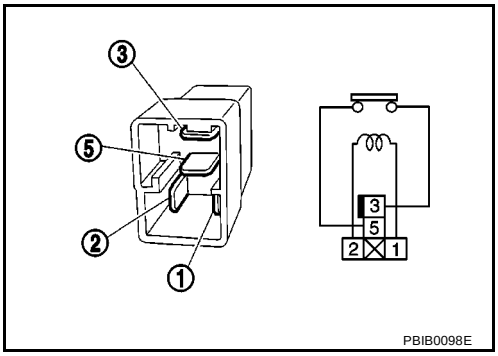
EBS00QP7

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



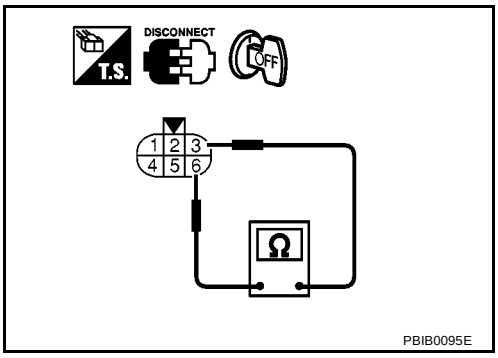
PBIB0098E

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-49, "Throttle Valve Closed Position Learning" .
5. Perform EC-49, "Idle Air Volume Learning" .



PBIB0095E

Remove and Installation

EBS00QP8

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

EBS00QP9

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS00QPA

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

EBS00QPB

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	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 1126	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

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

EBS00QPC

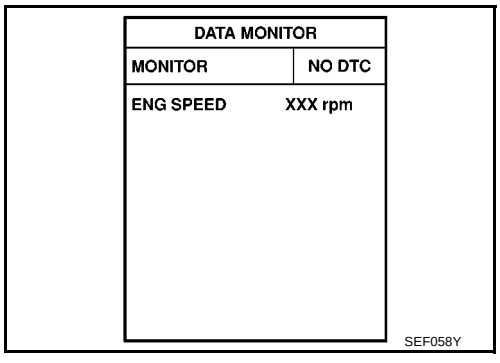
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-401, "Diagnostic Procedure" .



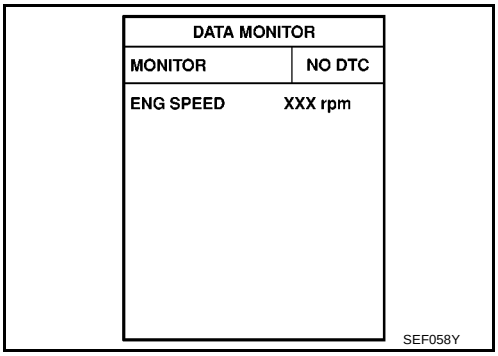
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-401, "Diagnostic Procedure" .



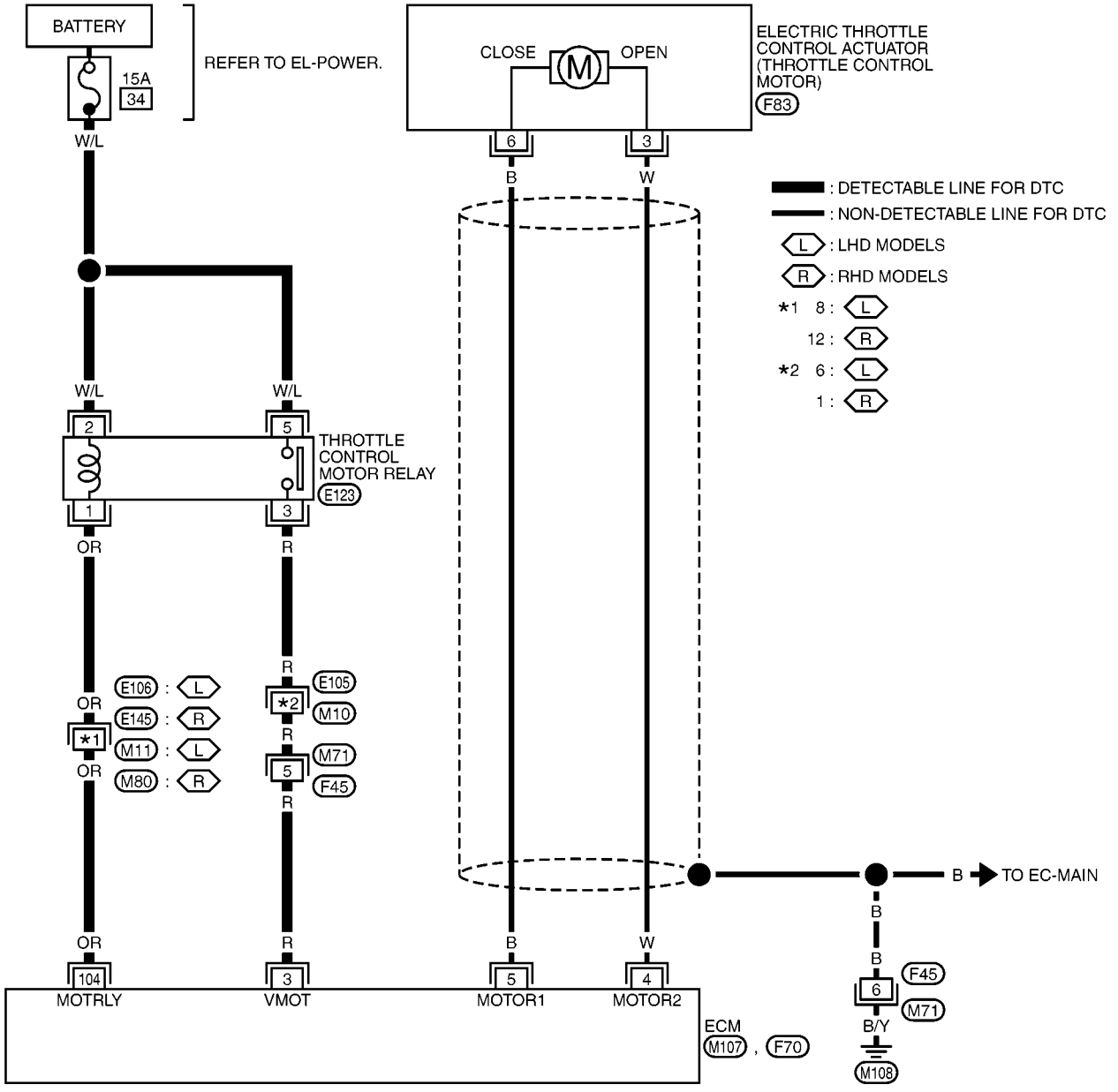
With GST

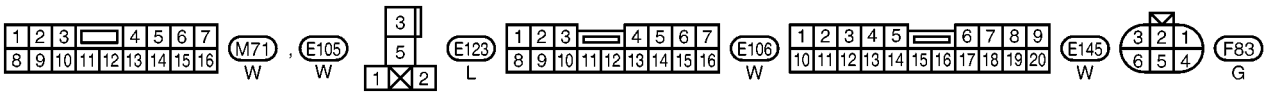
Follow the procedure “With CONSULT-II” above.

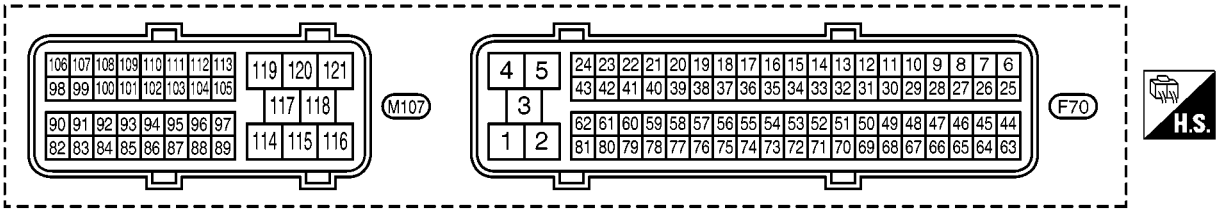
Wiring Diagram

EBS00QPD

EC-ETC2-01







YEC464A

Specification data are reference values and are measured between each terminal 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.

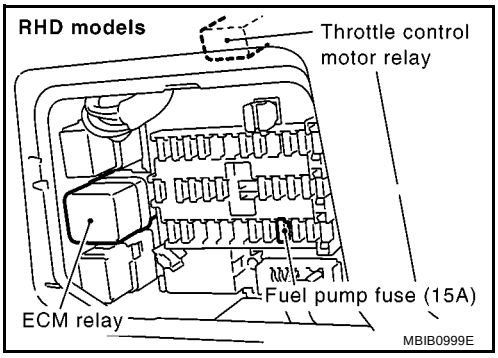
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

Diagnostic Procedure

EBS00QPE

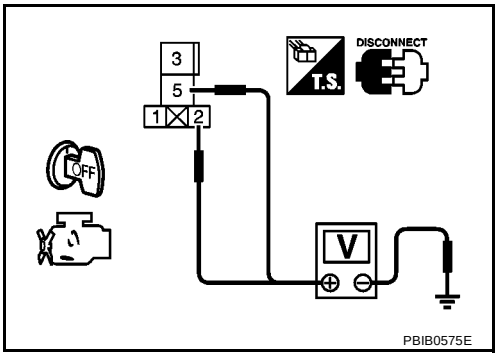
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

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

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors M71, F45
- Harness for open or short between ECM and throttle control motor relay

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

5. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between ECM and throttle control motor relay

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

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-403, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace throttle control motor relay.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

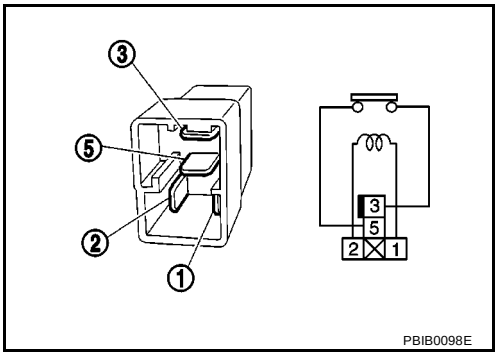
EBS00QPF

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



PBIB0098E

DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

EBS00QPG

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.

On Board Diagnosis Logic

EBS00QPH

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	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)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

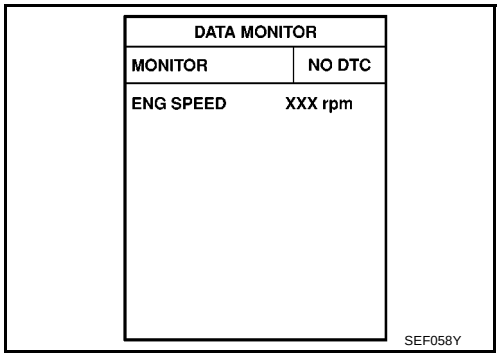
DTC Confirmation Procedure

EBS00QPI

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-406, "Diagnostic Procedure" .



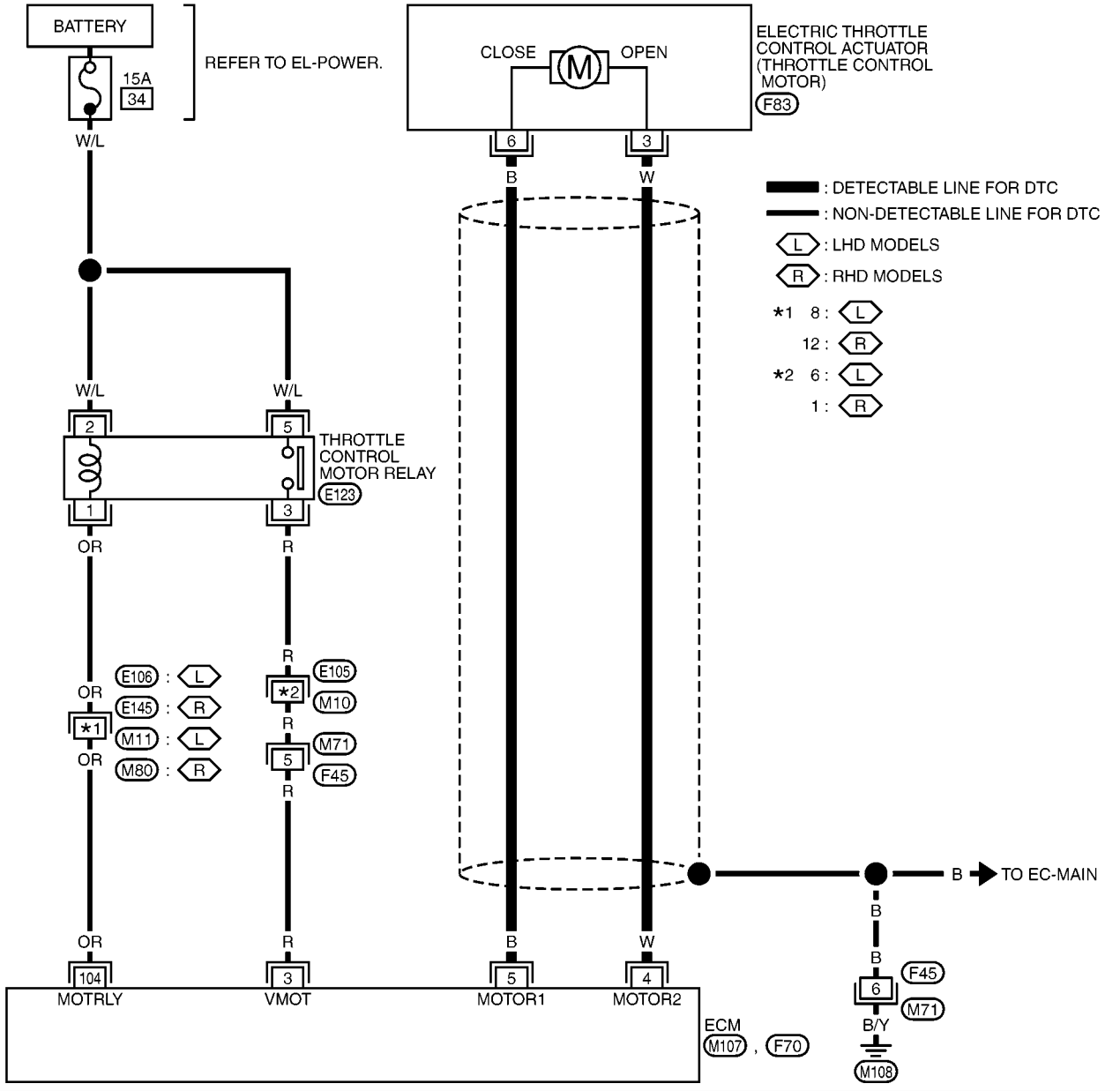
WITH GST

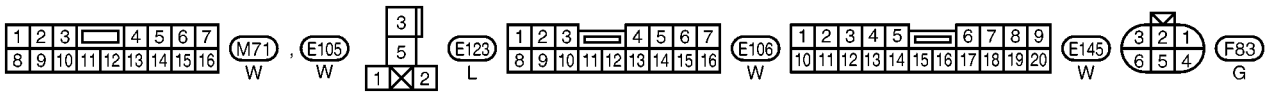
Follow the procedure “WITH CONSULT-II” above.

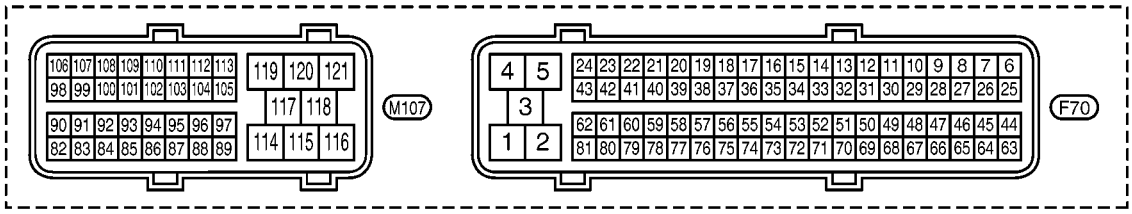
Wiring Diagram

EBS00QPJ

EC-ETC3-01





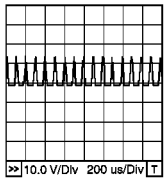
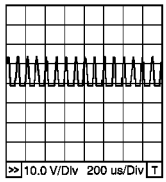


YEC465A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

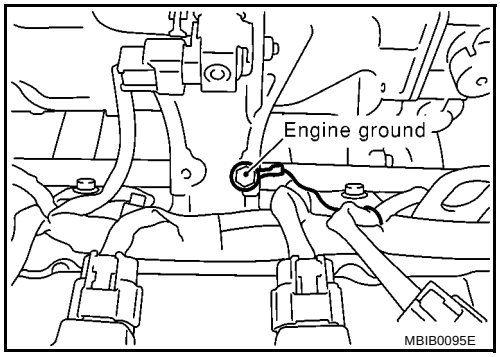
Diagnostic Procedure

EBS00QPK

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

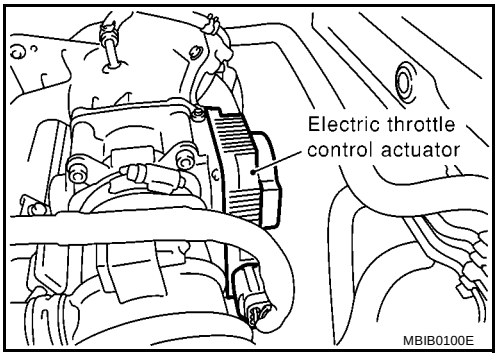
>> GO TO 2.



MBIB0095E

2. 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 harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-407, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

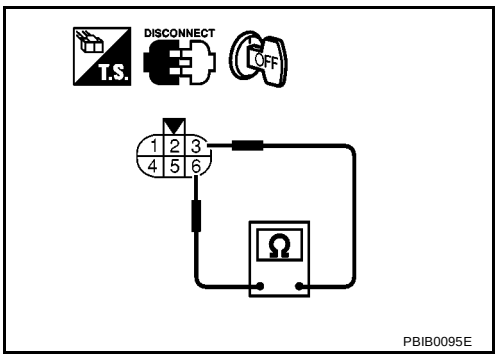
Component Inspection

EBS00QPL

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-49, "Throttle Valve Closed Position Learning" .
5. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QPM

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

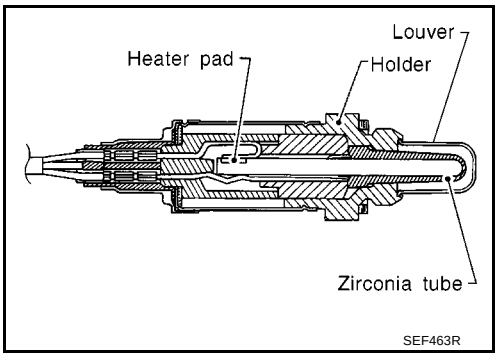
DTC P1143 HO2S1 (M/T MODELS)

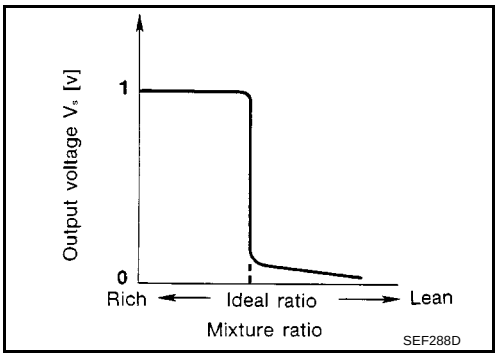
PFP:22690

Component Description

EBS00QPN

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QPO

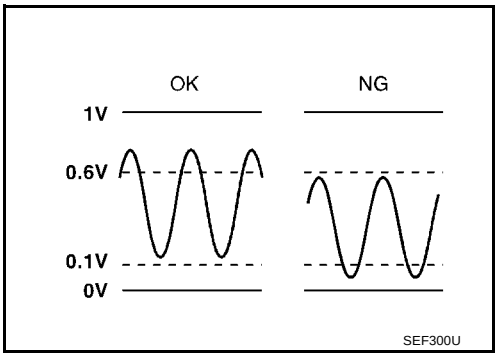
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QPP

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 1143	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 ● Injectors ● Intake air leaks

DTC Confirmation Procedure

EBS00QPQ

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

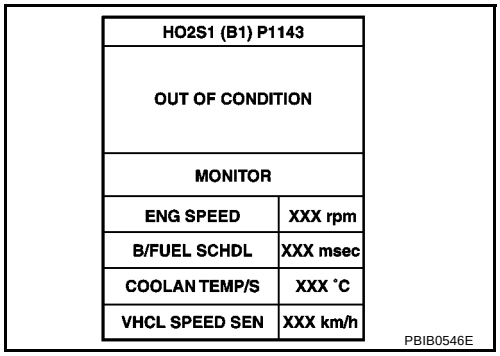
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

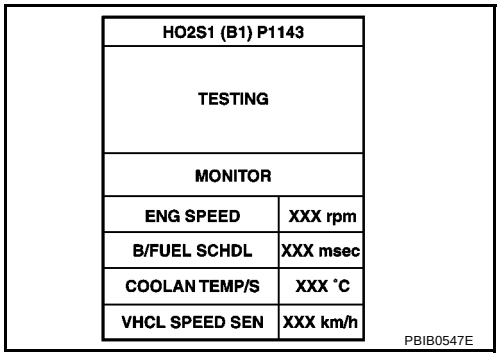
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



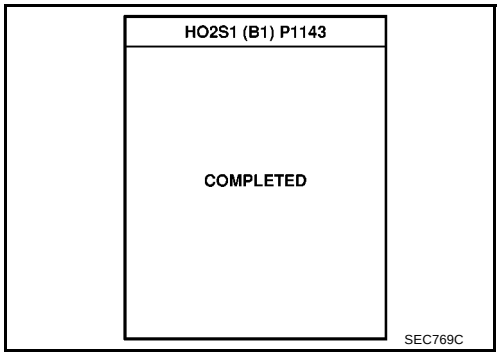
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,700 - 2,600 rpm
Vehicle speed	50 - 100 km/h (30 - 62 MPH)
B/FUEL SCHDL	3.0 - 5.2 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-411, "Diagnostic Procedure" .



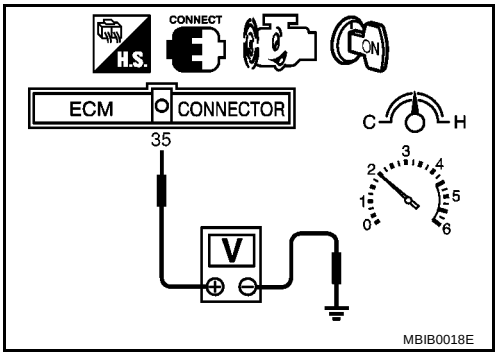
Overall Function Check

EBS00QPR

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is over 0.1V at least one time.
4. If NG, go to EC-411, "Diagnostic Procedure" .



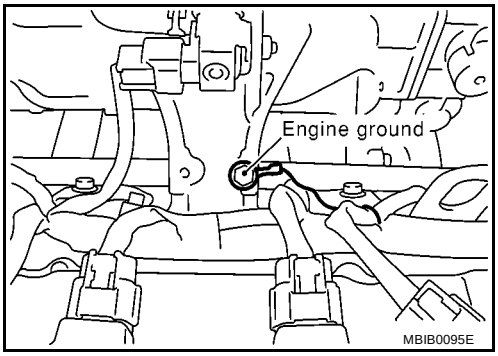
Diagnostic Procedure

EBS00QPS

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

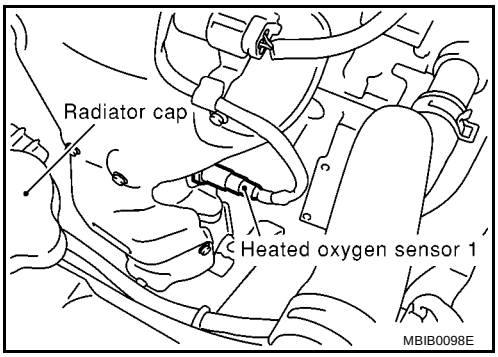


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

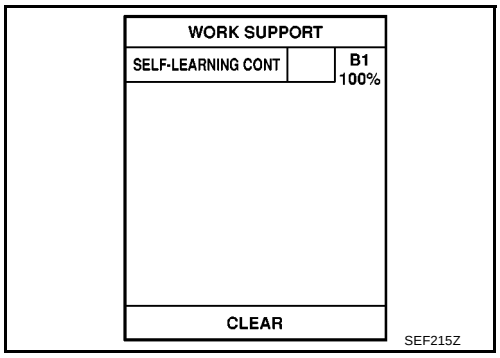
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

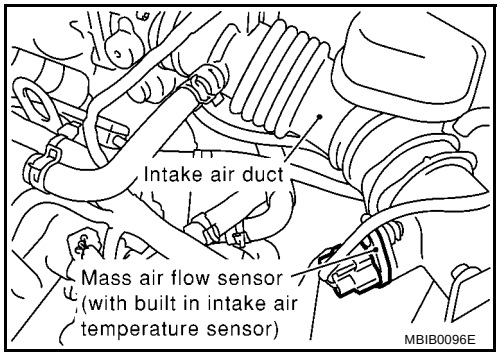
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-281 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-156, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-413, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-195, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS00QPT

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

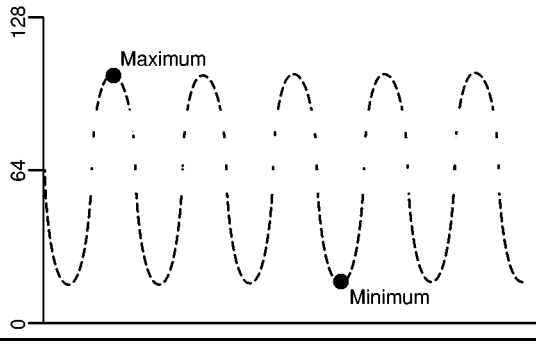
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



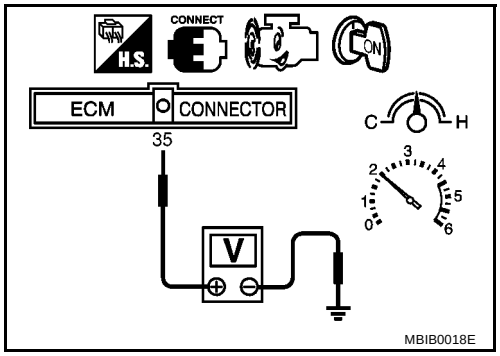
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QPU

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

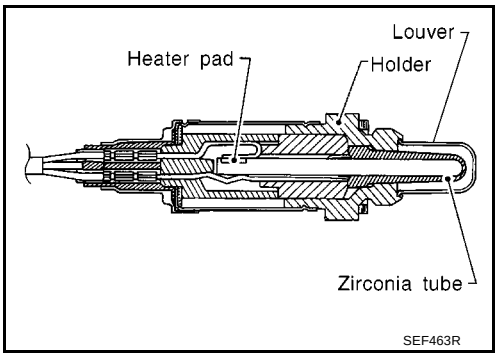
DTC P1143, P1163 HO2S1 (A/T MODELS)

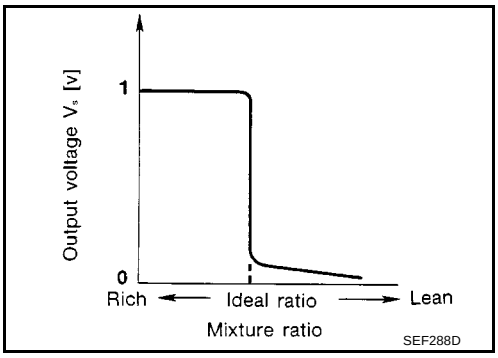
PFP:22690

Component Description

EBS00QPV

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QPW

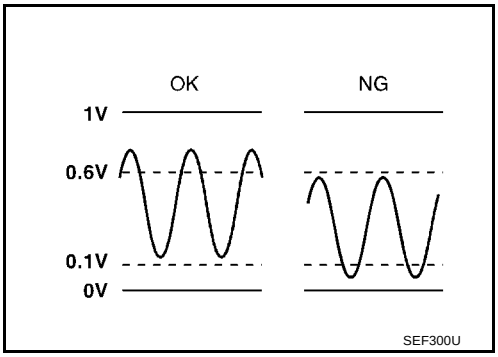
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QPX

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 1143 (Bank 1)	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 ● Injectors ● Intake air leaks
P1163 1163 (Bank 2)			

DTC Confirmation Procedure

EBS00QPY

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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:

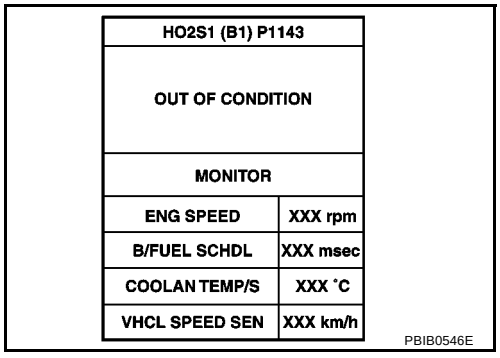
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

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” or “HO2S1 (B2) P1163” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

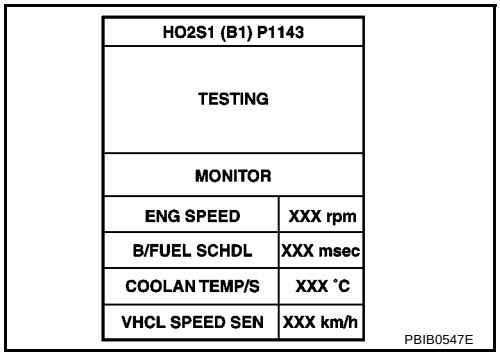
   NOTE:

   Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.



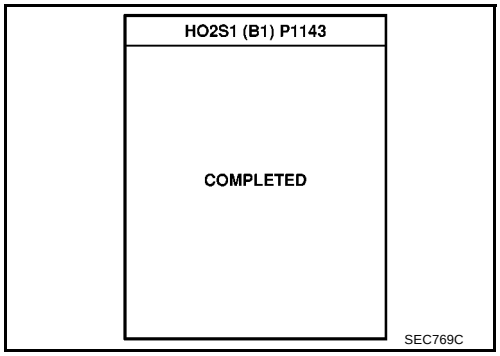
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	50 - 100 km/h (30 - 62 MPH)
B/FUEL SCHDL	3.0 - 6.5 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-417, "Diagnostic Procedure" .



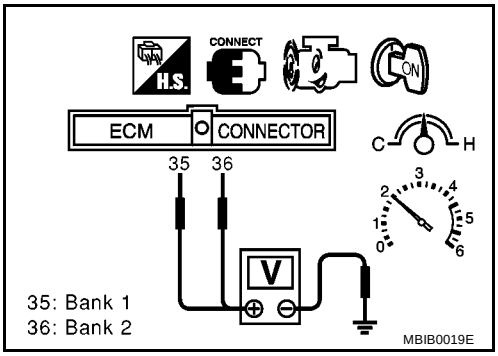
Overall Function Check

EBS00QPZ

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is over 0.6V at least one time.
   - The minimum voltage is over 0.1V at least one time.
4. If NG, go to EC-417, "Diagnostic Procedure" .



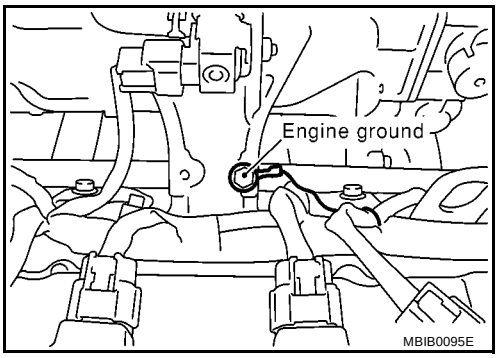
Diagnostic Procedure

EBS00QQ0

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

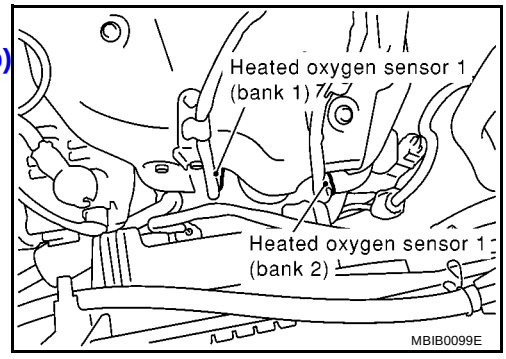


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

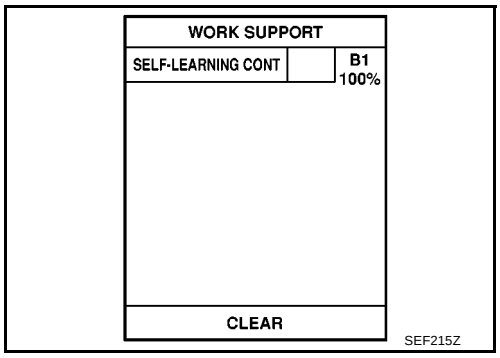
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

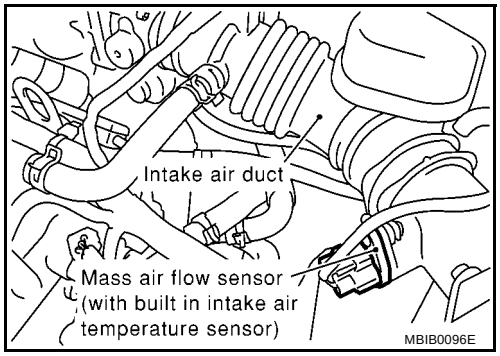
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-288 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-164, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-419, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-201, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS00QQ1

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

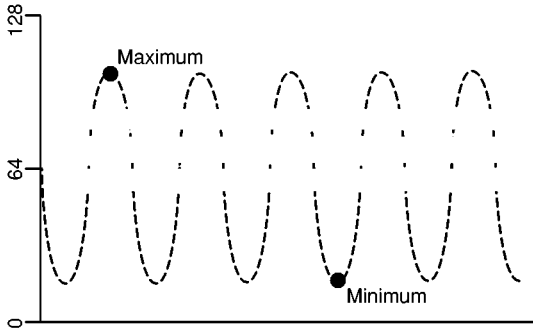
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



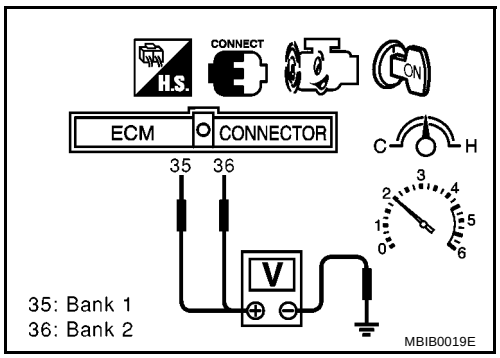
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QQ2

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

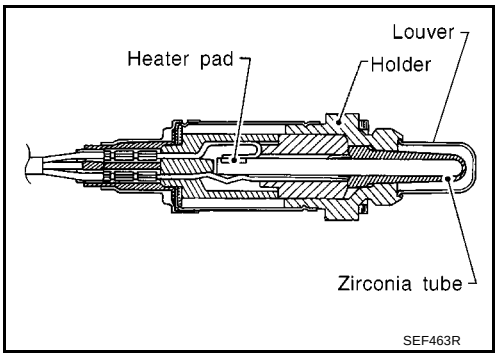
DTC P1144 HO2S1 (M/T MODELS)

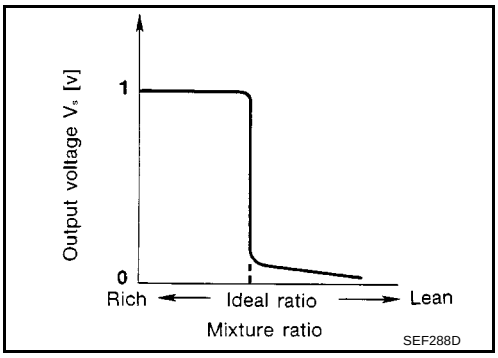
PFP:22690

Component Description

EBS00QQ3

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QQ4

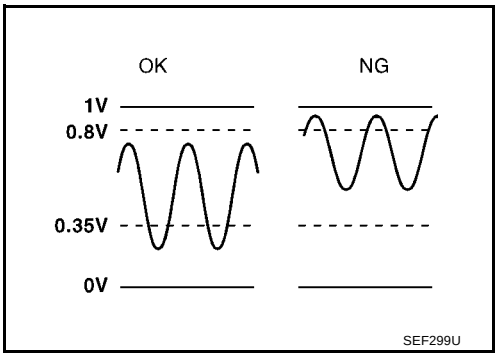
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QQ5

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 1144	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 ● Injectors

DTC Confirmation Procedure

EBS00QQ6

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

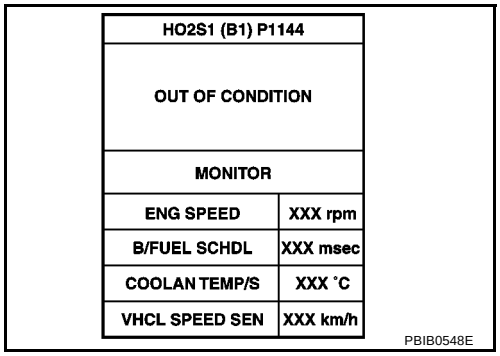
TESTING CONDITION:

- **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.**

WITH CONSULT-II

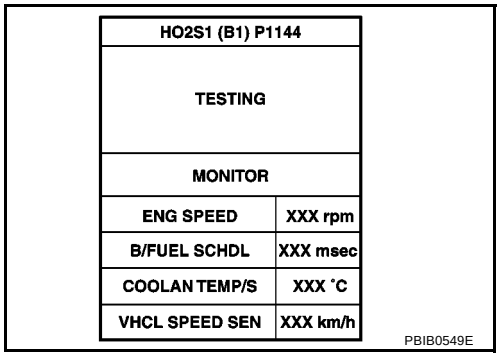
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



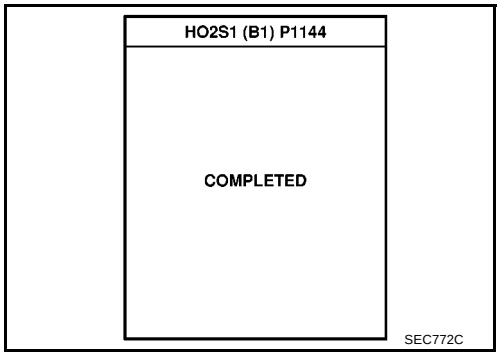
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,700 - 2,600 rpm
Vehicle speed	50 - 100 km/h (30 - 62 MPH)
B/FUEL SCHDL	3.0 - 5.2 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-423, "Diagnostic Procedure" .



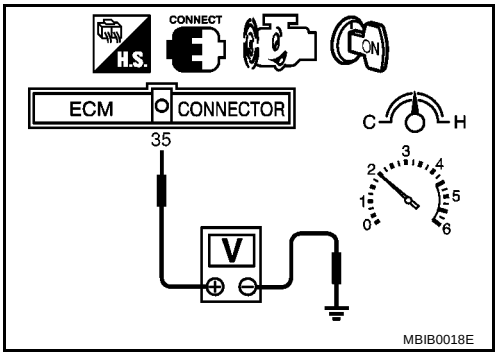
Overall Function Check

EBS00QQ7

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at least one time.
   - The minimum voltage is below 0.35V at least one time.
4. If NG, go to EC-423, "Diagnostic Procedure" .



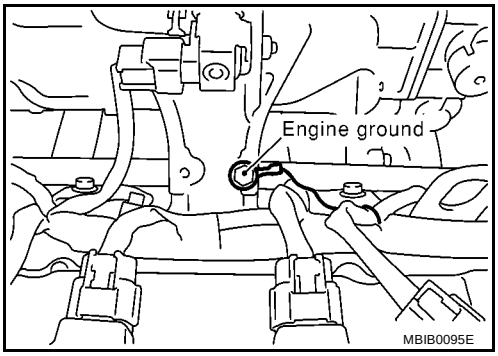
Diagnostic Procedure

EBS00QQ8

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

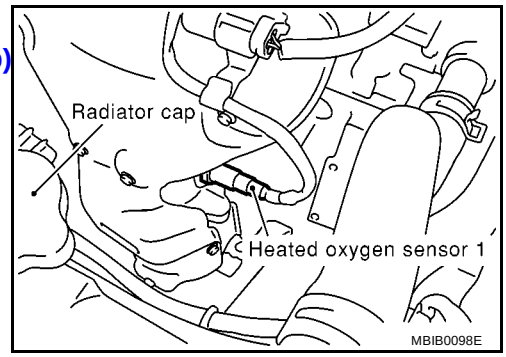


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

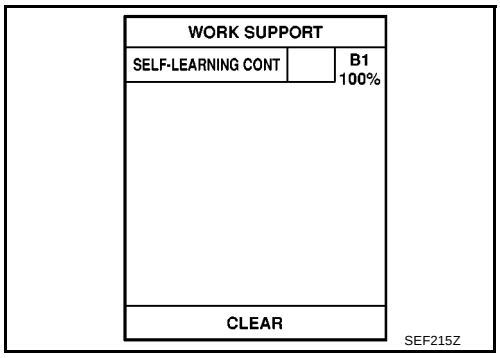
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

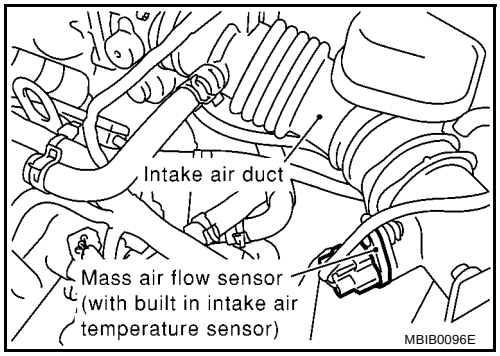
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



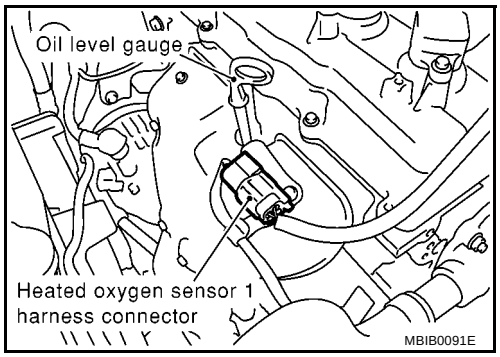
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-296 .
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.



OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-156, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-425, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-195, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS00QQ9

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

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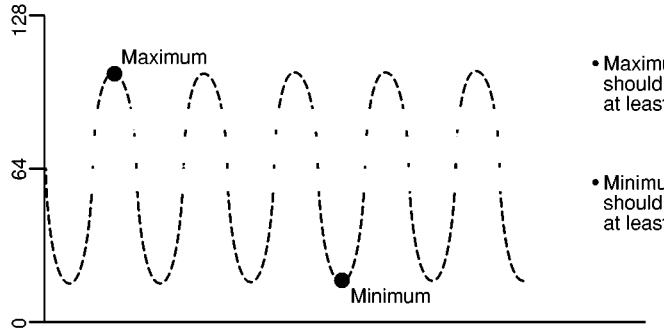
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

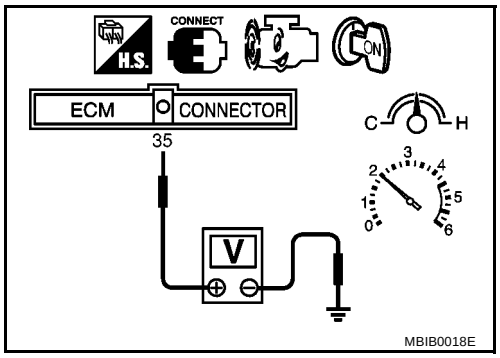
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QQA

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

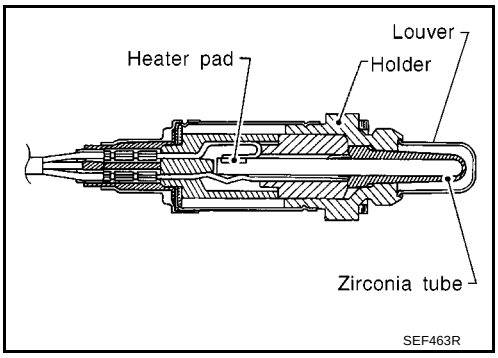
DTC P1144, P1164 HO2S1 (A/T MODELS)

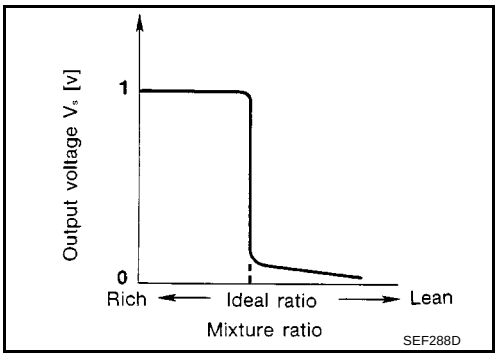
PFP:22690

Component Description

EBS00QQB

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QQC

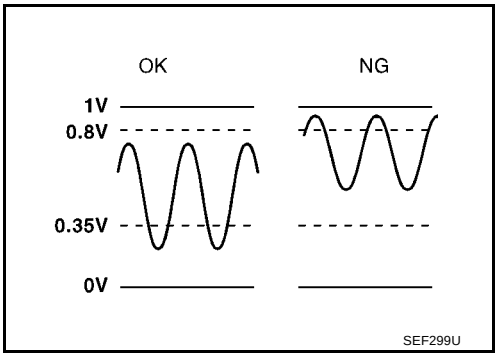
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QQD

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 1144 (Bank 1)	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 ● Injectors
P1164 1164 (Bank 2)			

DTC Confirmation Procedure

EBS00QQE

CAUTION:
Always drive vehicle at a safe speed.

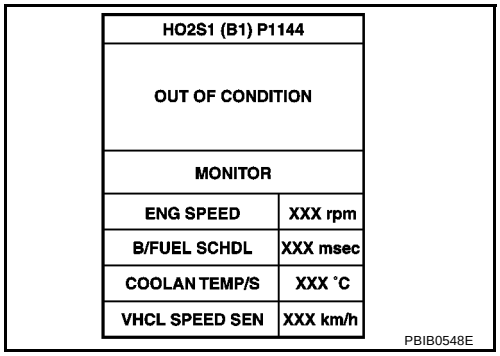
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

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.**

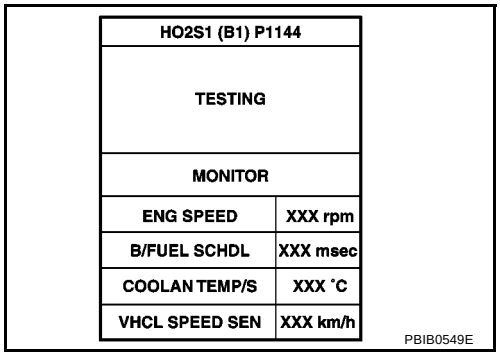
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch “ON” and select “HO2S1 (B1) P1144” or “HO2S1 (B2) P1164” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.



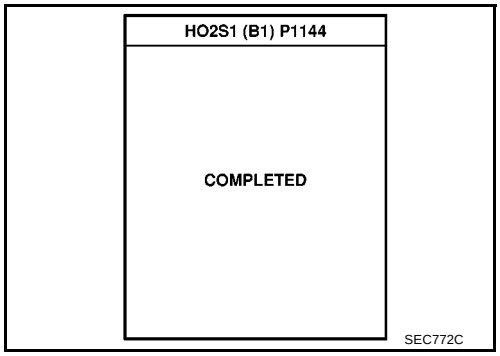
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	50 - 100 km/h (30 - 62 MPH)
B/FUEL SCHDL	3.0 - 6.5 msec
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-429, "Diagnostic Procedure" .



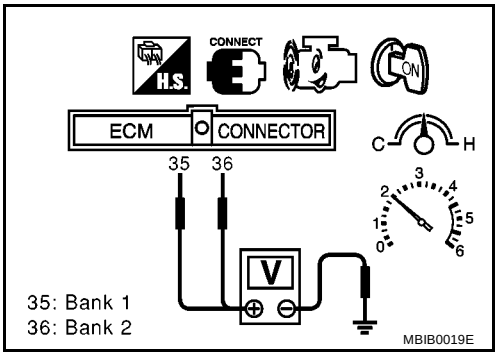
Overall Function Check

EBS00QQF

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at least one time.
   - The minimum voltage is below 0.35V at least one time.
4. If NG, go to EC-429, "Diagnostic Procedure" .



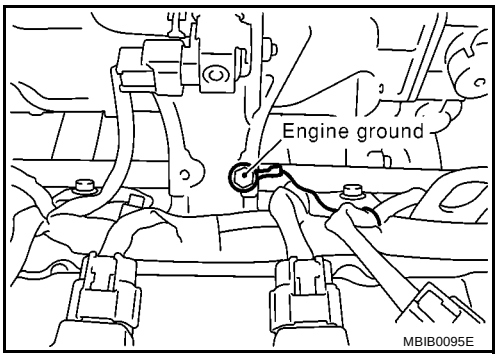
Diagnostic Procedure

EBS00QQG

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.

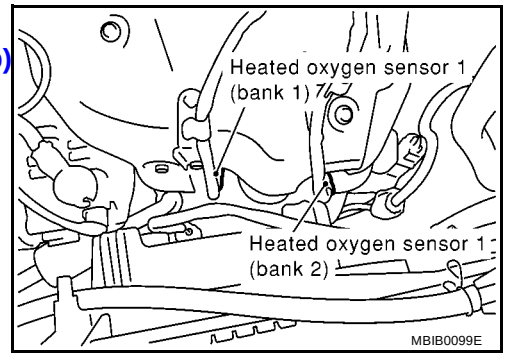


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

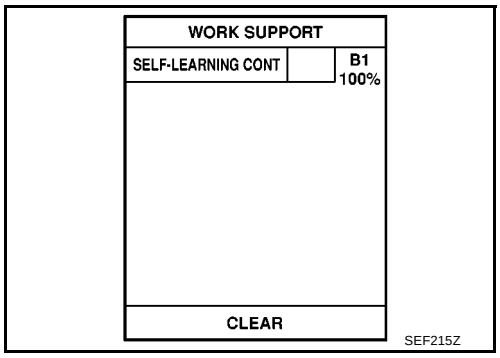
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

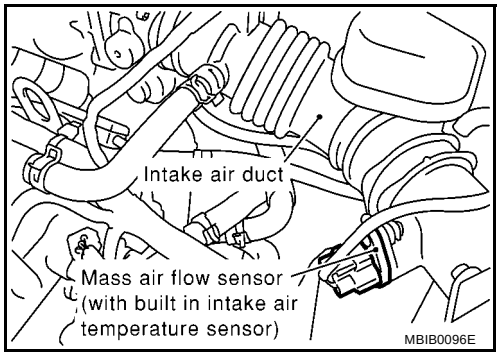
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302 .
No >> GO TO 4.

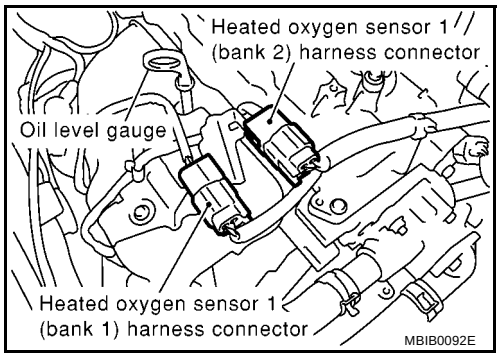
4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.



5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-164, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-431, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-201, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

EBS00QQH

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

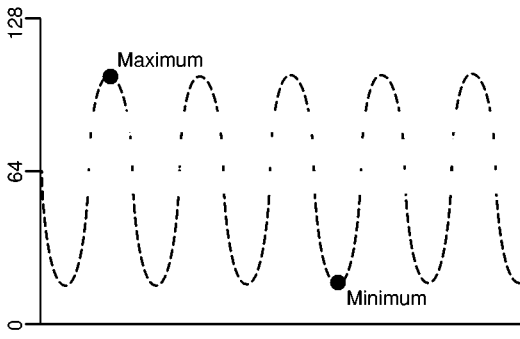
Bank 1						
cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					

Bank 2						
cycle	1	2	3	4	5	
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



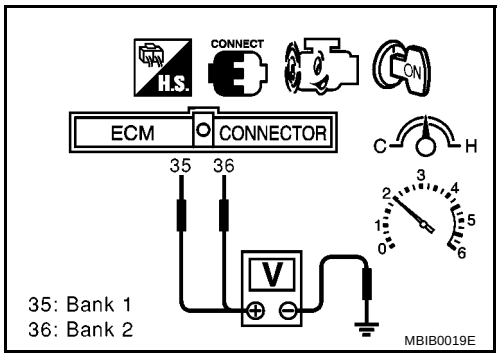
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QQI

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

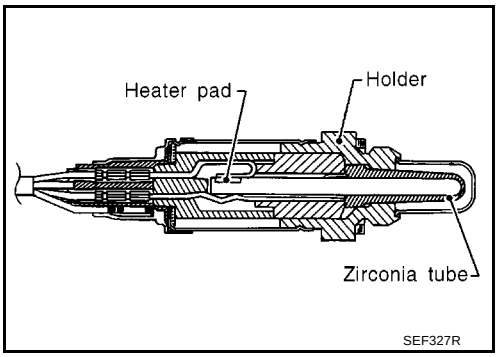
DTC P1146 HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00QQJ

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QQK

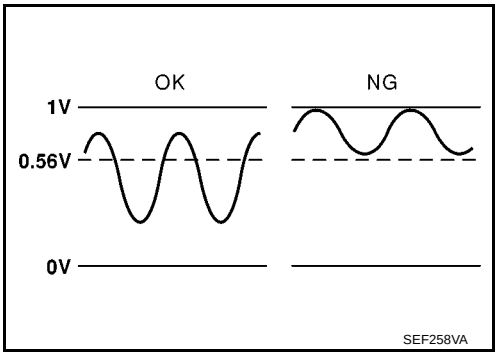
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QQL

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 minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146	Heated oxygen sensor 2 minimum voltage monitoring	The minimum 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 ● Injectors

DTC Confirmation Procedure

EBS00QQM

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II 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:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in "Procedure for COND1"

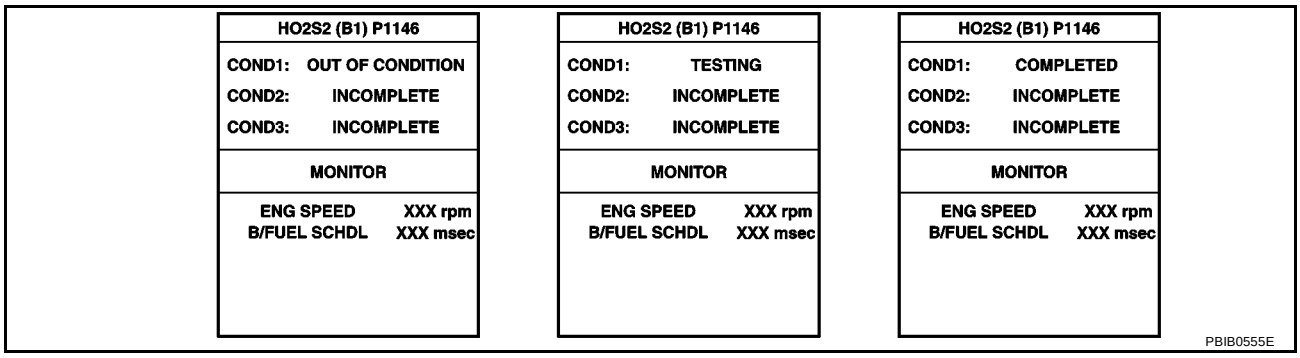
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

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 one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch START".
7. Let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position



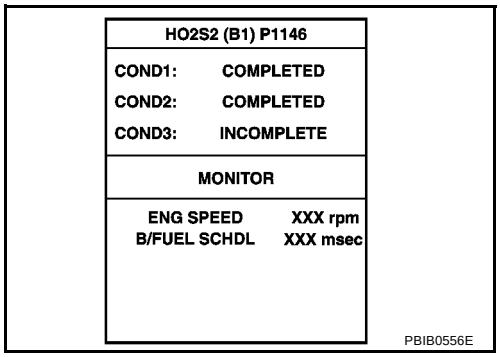
NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

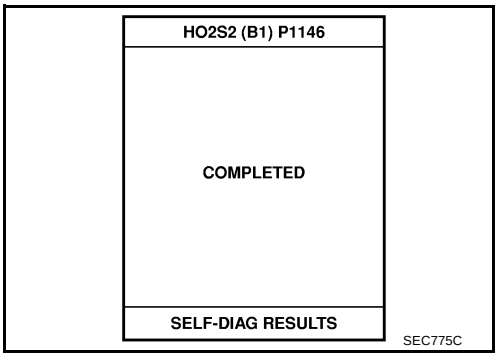
1. While driving, release accelerator pedal completed from the above condition [step 9] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED" (It will take approximately 4 seconds.)

   NOTE:
   If "COMPLETE" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-437, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.



a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II
c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.

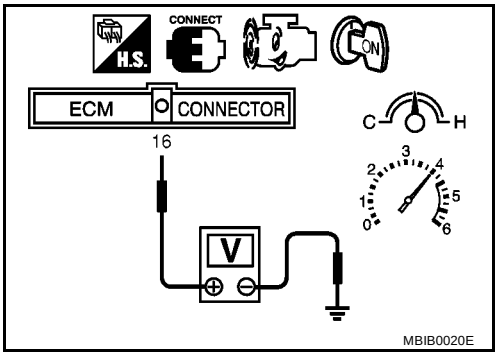
Overall Function Check

EBS00QQN

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

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 one minute under no load.
4. Let engine idle one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

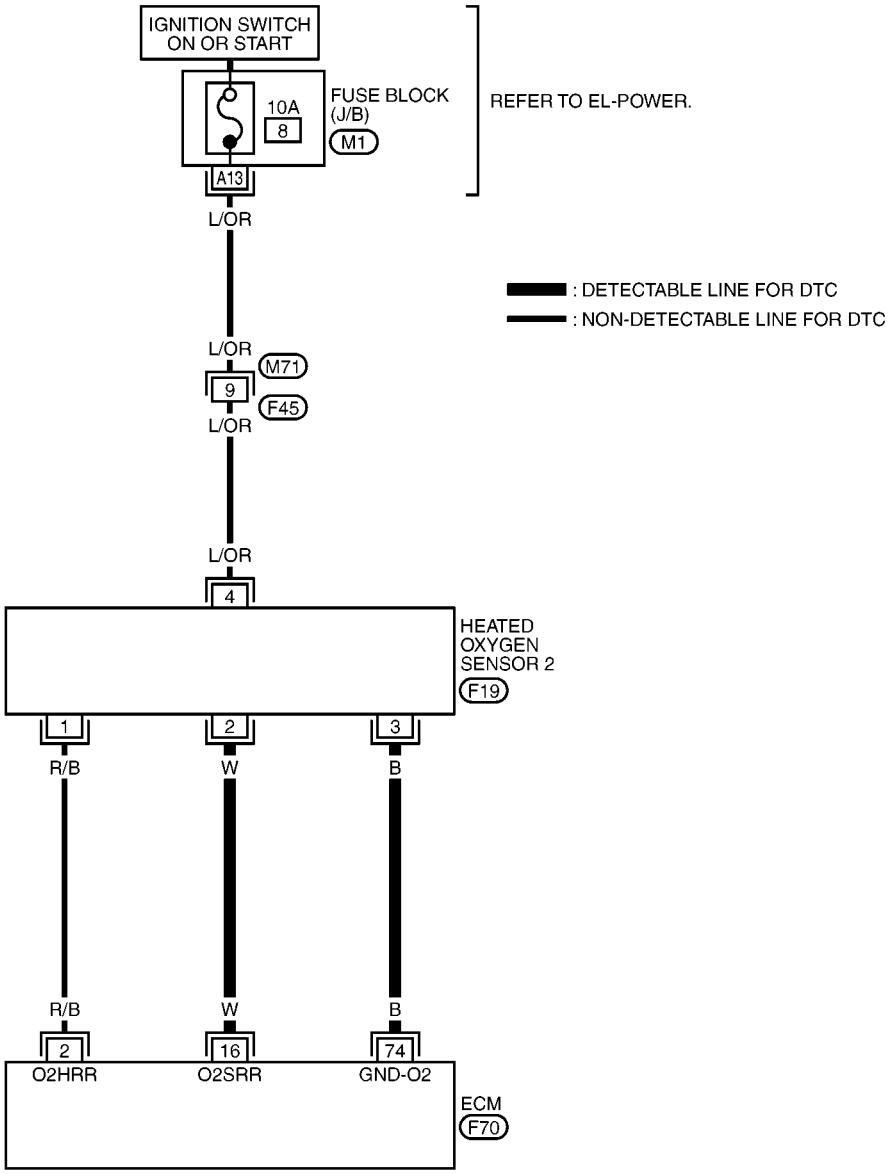


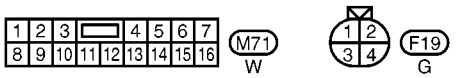
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, go to EC-437, "Diagnostic Procedure" .

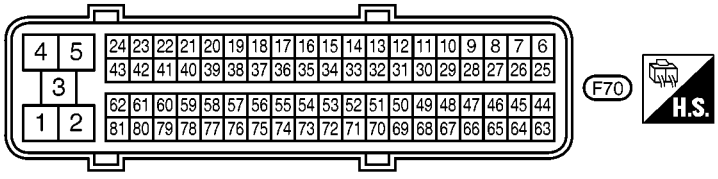
Wiring Diagram

EBS00QQO

EC-HO2S2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC446A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

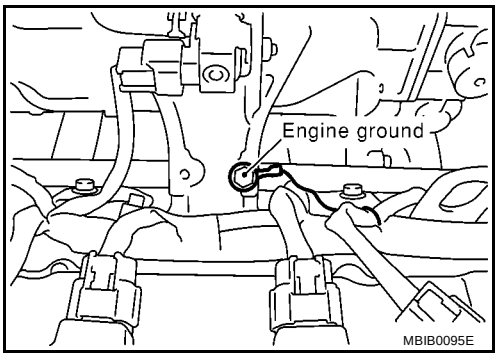
Diagnostic Procedure

EBS00QQP

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

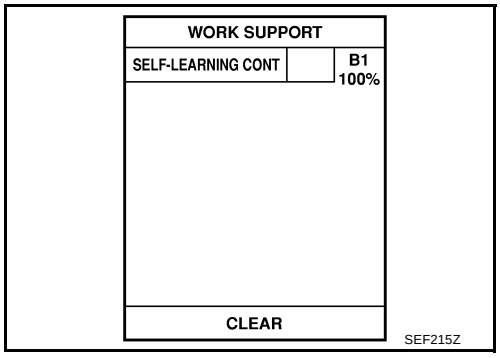
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

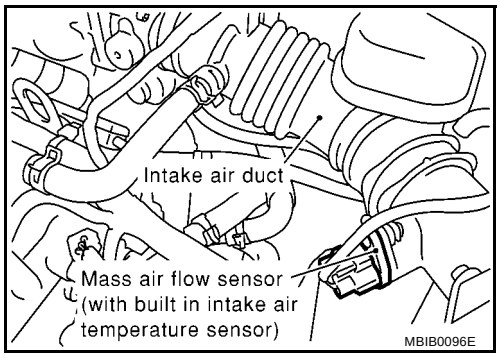
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-296 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

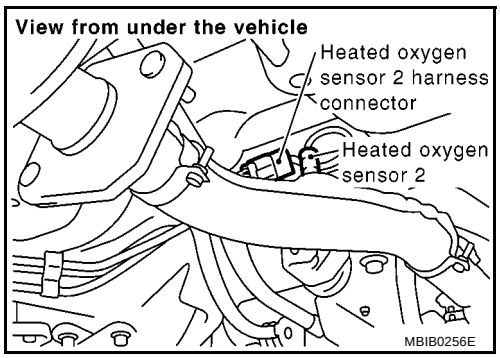
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-439, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QQQ

HEATED OXYGEN SENSOR 2

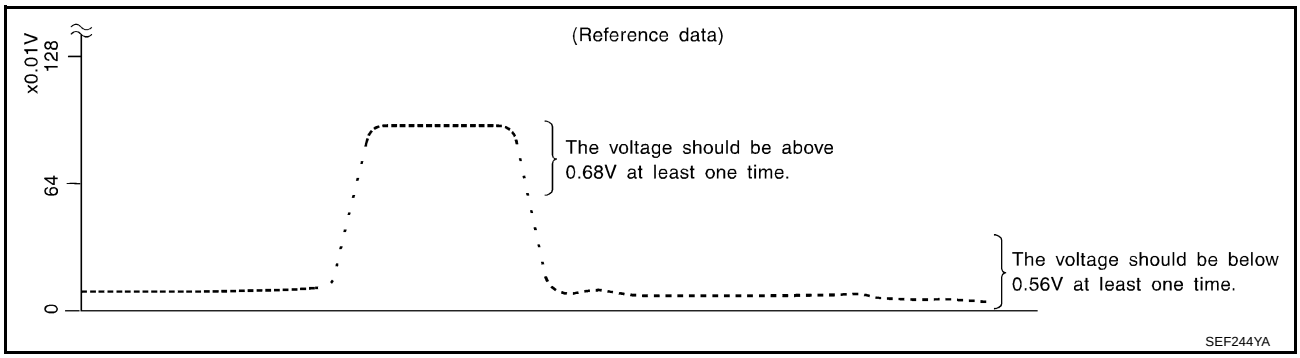
With CONSULT-II

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 one minute under no load.
4. Let engine idle and wait until 2 minutes have passed from starting the engine.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



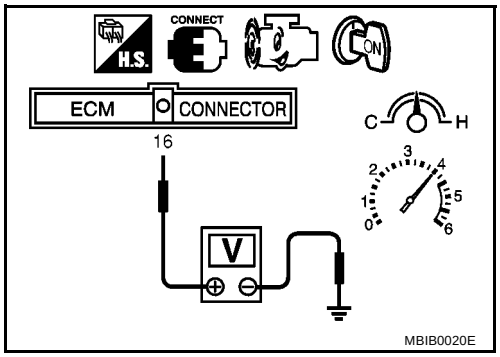
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QQR

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

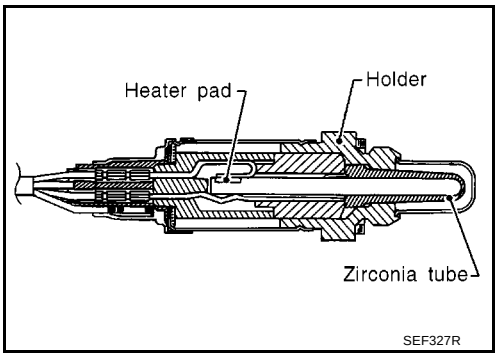
DTC P1146, P1166 HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00QQS

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QQT

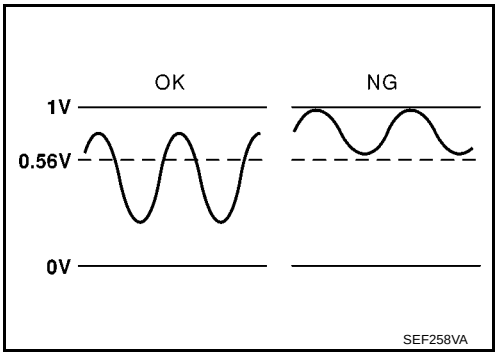
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QQU

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 minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146 (Bank 1)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum 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 ● Injectors
P1166 1166 (Bank 2)			

DTC Confirmation Procedure

EBS00QQV

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT-II 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:

Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in "Procedure for COND1"

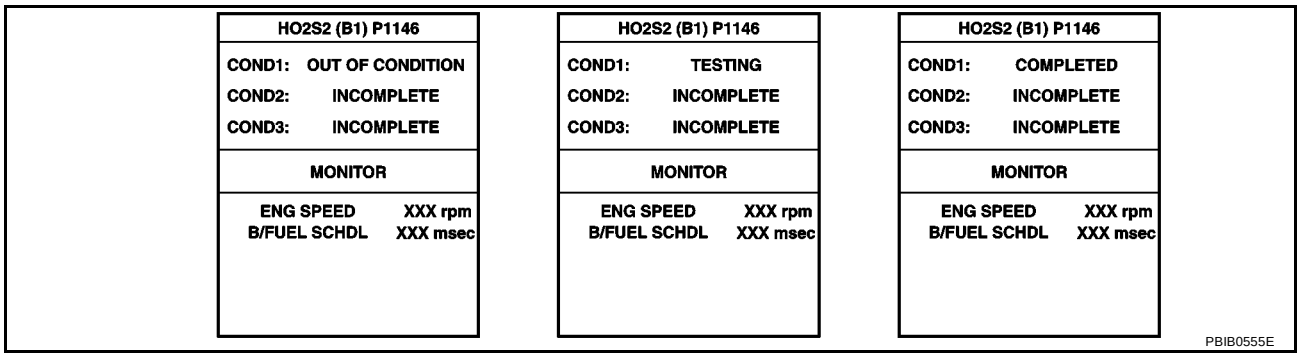
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

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 one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position



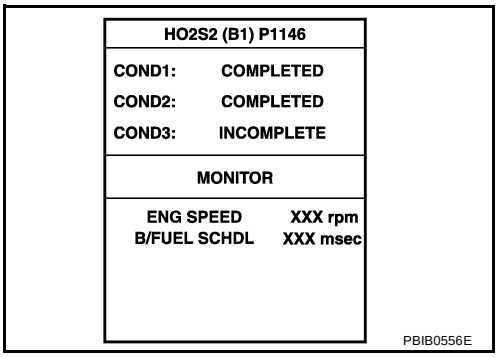
NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

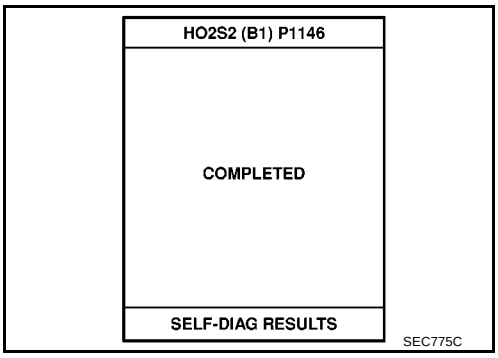
   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-447, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II
c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.



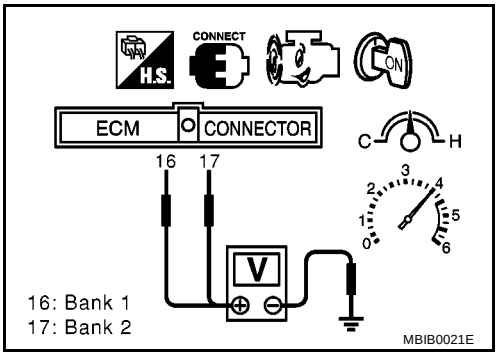
Overall Function Check

EBS00QQW

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

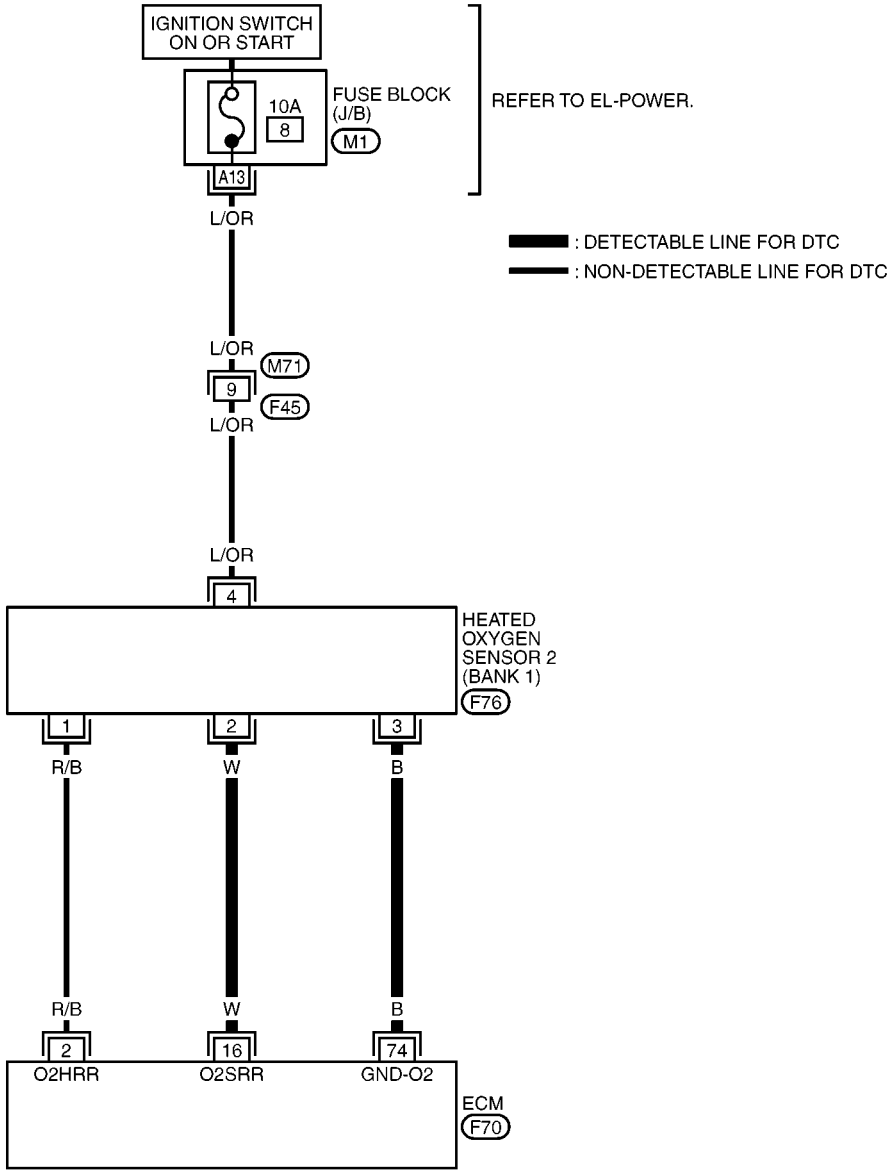
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, go to EC-447, "Diagnostic Procedure" .

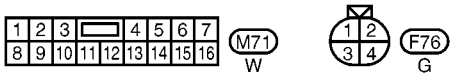


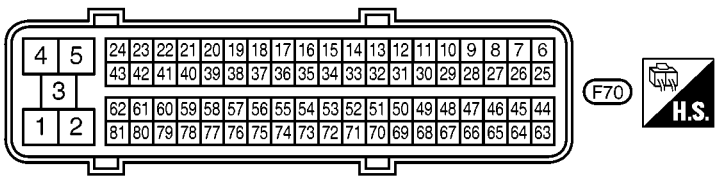
Wiring Diagram
BANK 1

EBS00QQX

EC-O2S2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC447A

Specification data are reference values and are measured between each terminal and ground.

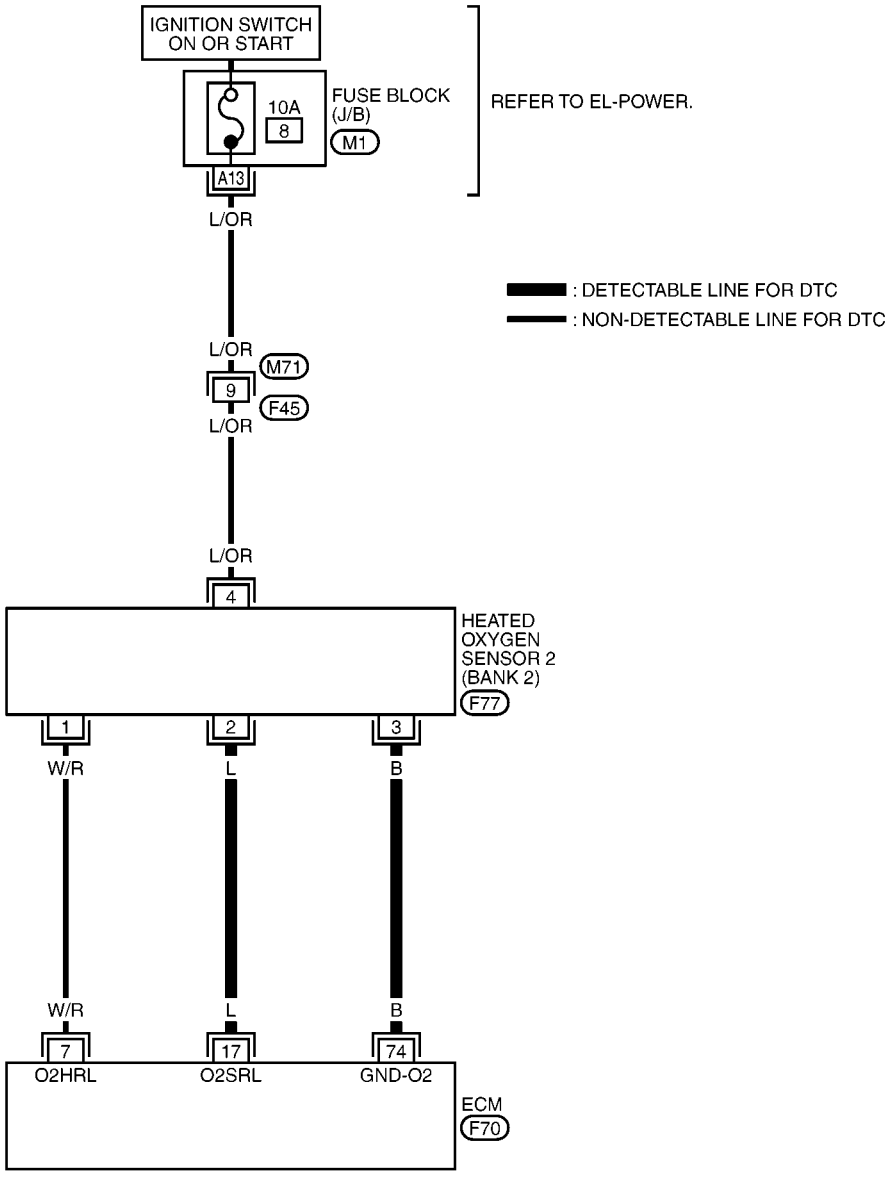
CAUTION:

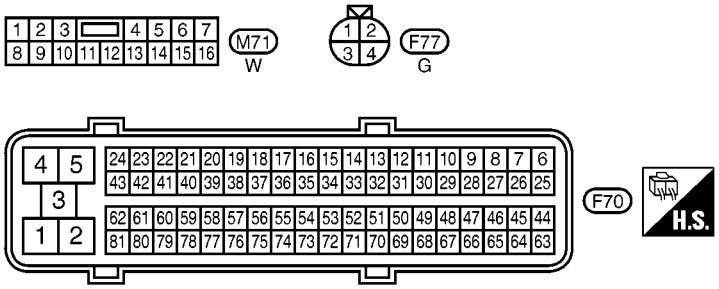
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC448A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

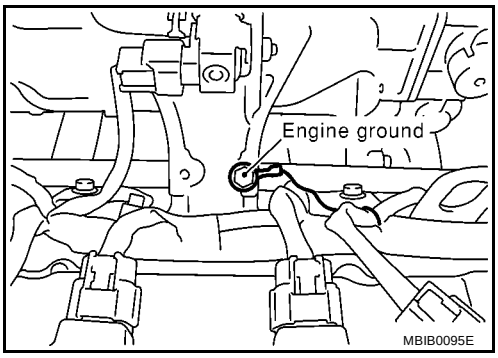
Diagnostic Procedure

EBS00QQY

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

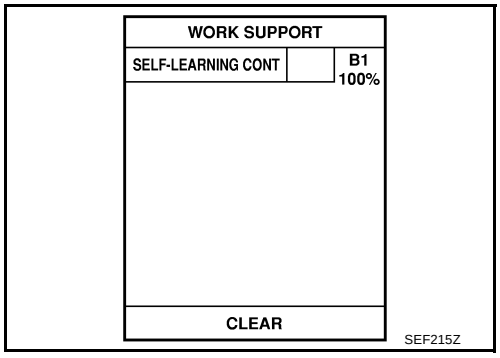
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

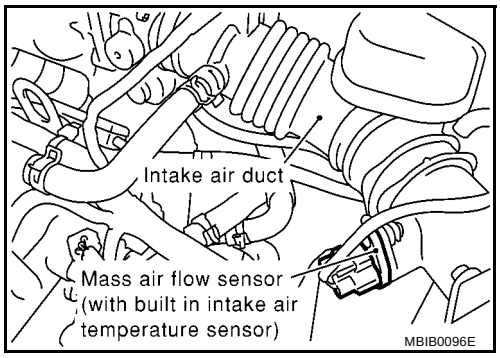
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

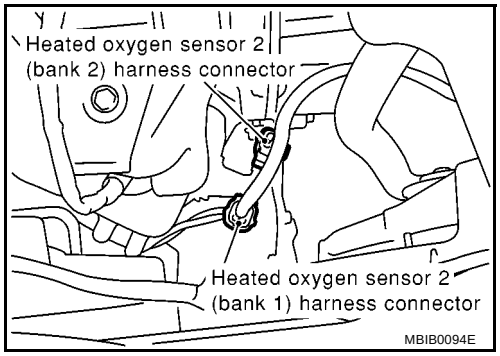
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	16	2	1
P1166	17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	16	2	1
P1166	17	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-449, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QQZ

HEATED OXYGEN SENSOR 2

With CONSULT-II

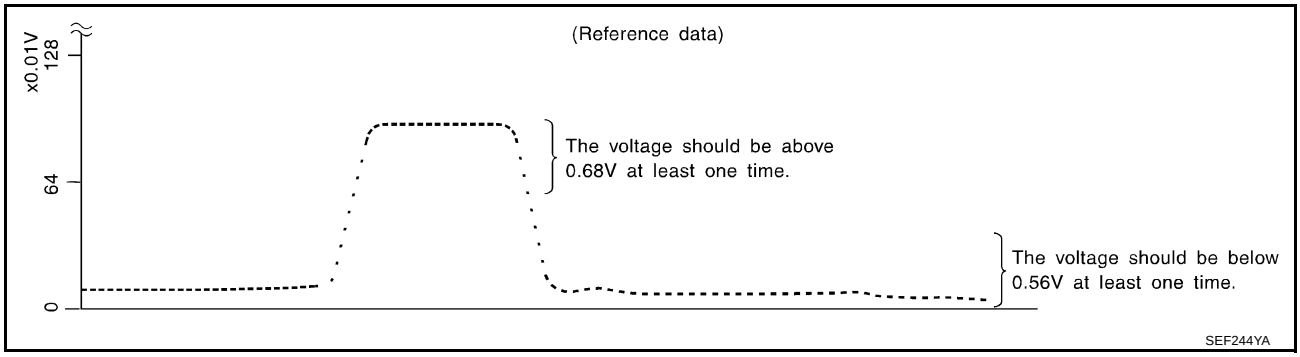
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle one minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



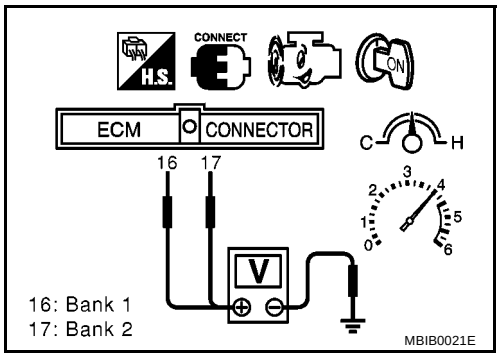
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QR0

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

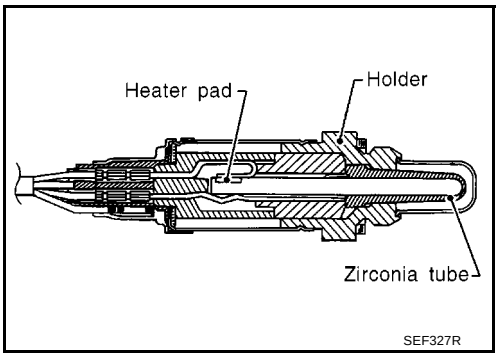
DTC P1147 HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00QR1

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QR2

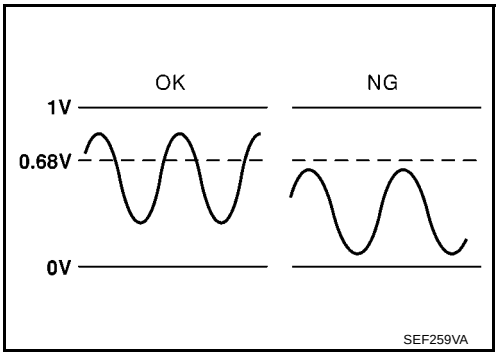
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QR3

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
P1147 1147	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

EBS00QR4

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II 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:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in "Procedure for COND1"

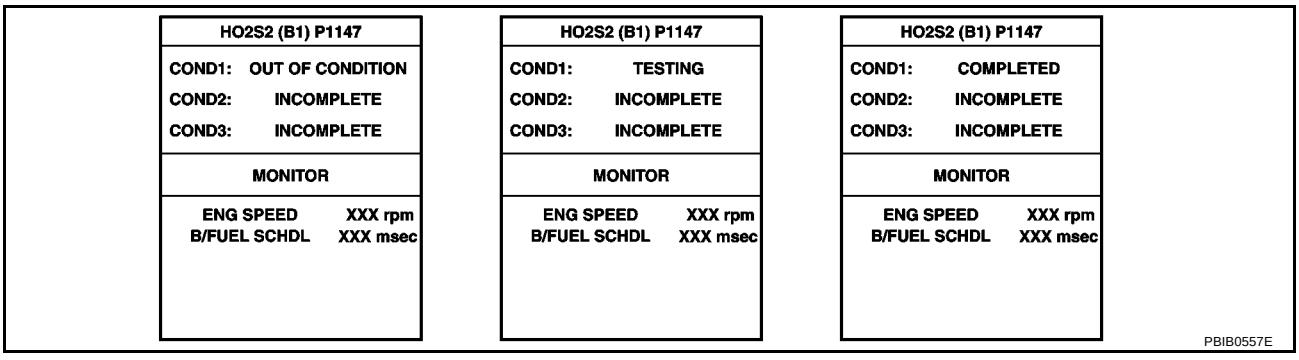
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

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 one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position

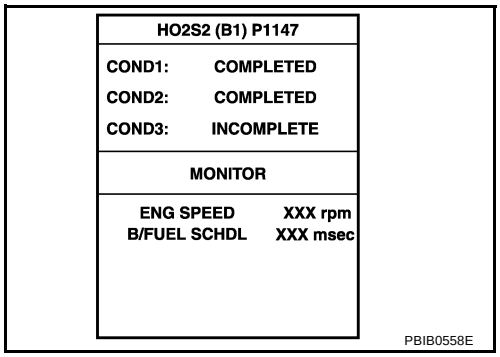


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

1. While driving, release accelerator pedal completed from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

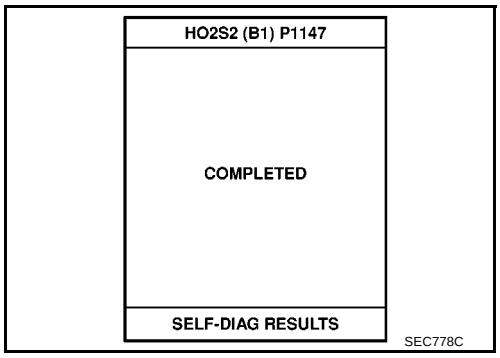
1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-456, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).

b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II

c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.

d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.



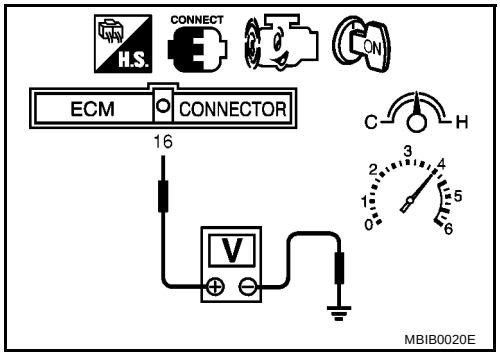
Overall Function Check

EBS00QR5

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

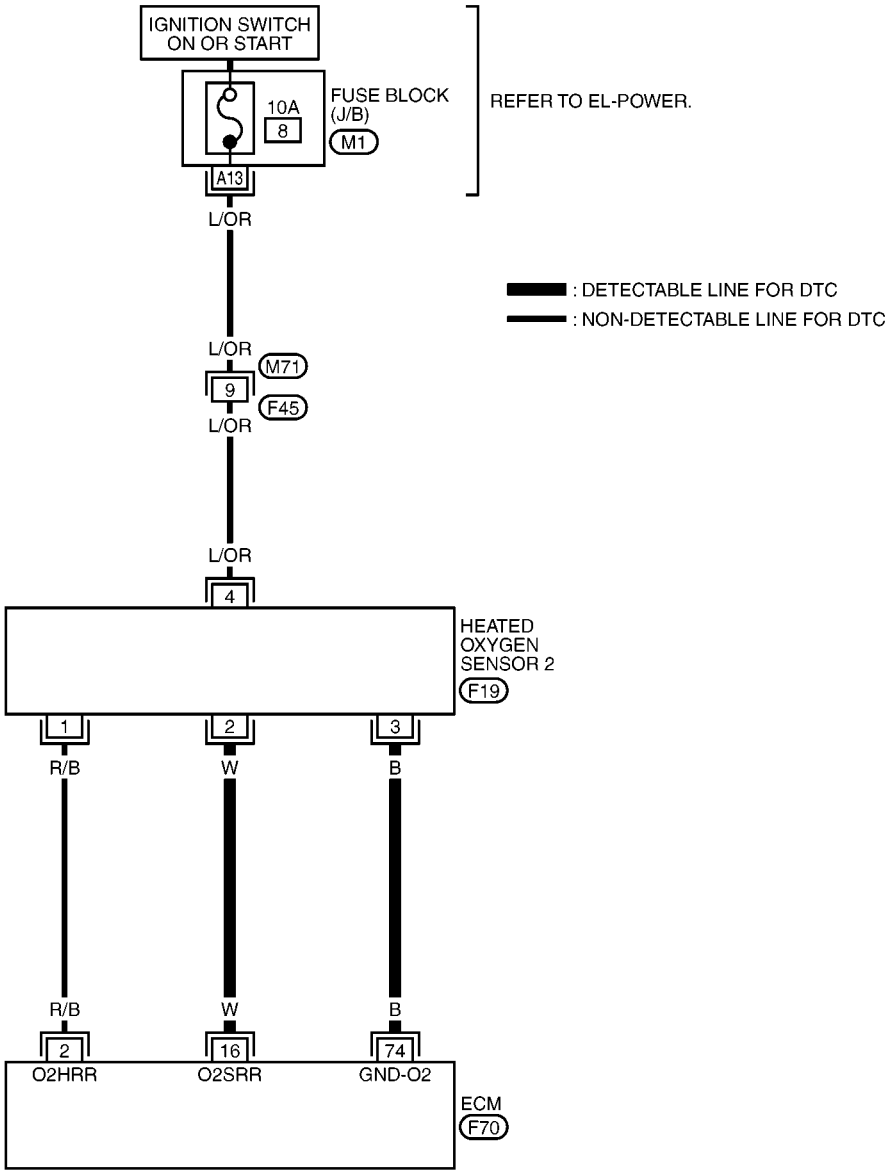
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-456, "Diagnostic Procedure" .

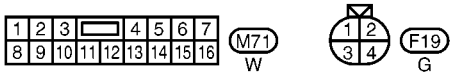


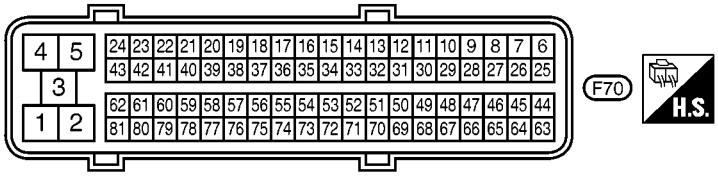
Wiring Diagram

EBS00QR6

EC-HO2S2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC446A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

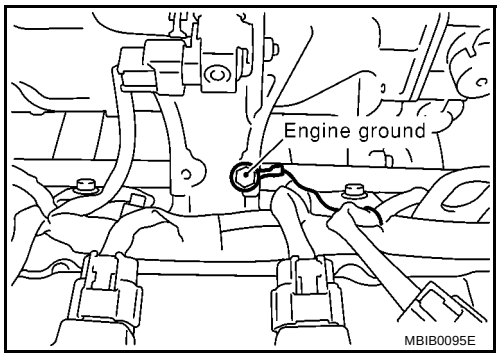
Diagnostic Procedure

EBS00QR7

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

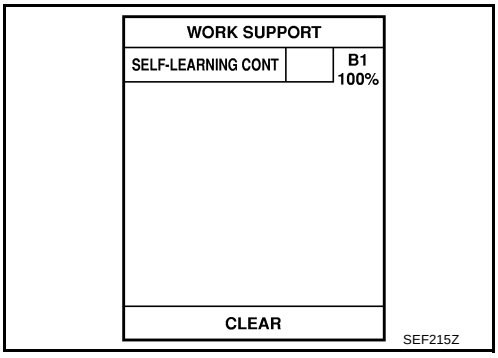
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

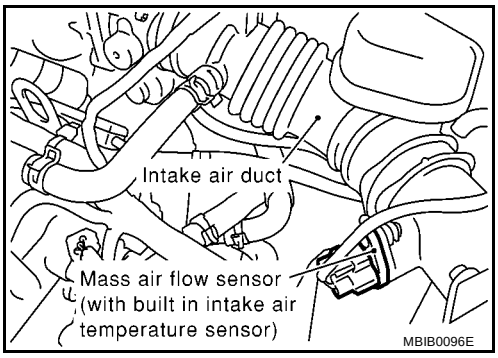
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-281 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

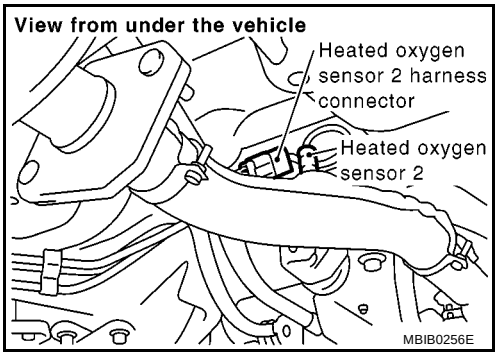
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-458, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QR8

HEATED OXYGEN SENSOR 2

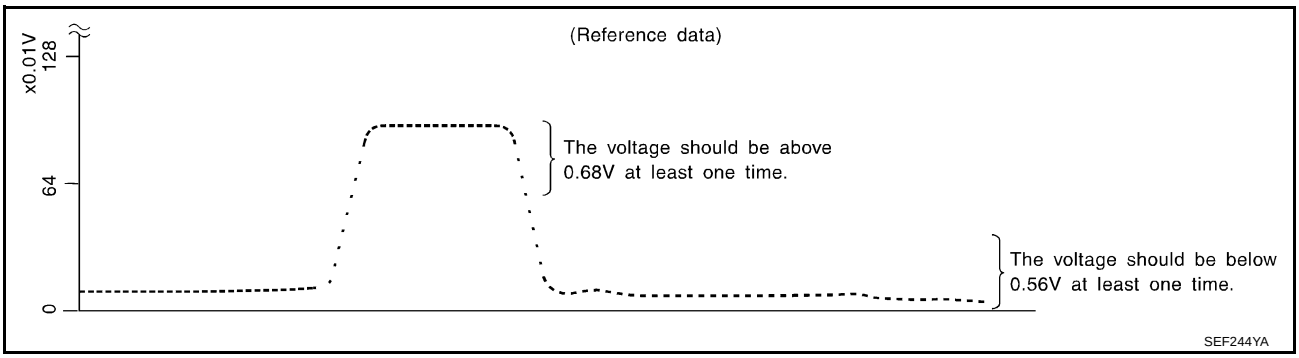
With CONSULT-II

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 one minute under no load.
4. Let engine idle one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



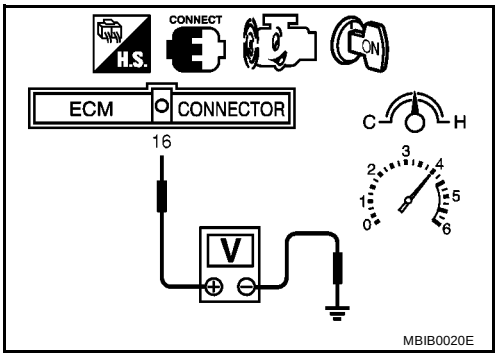
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QR9

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

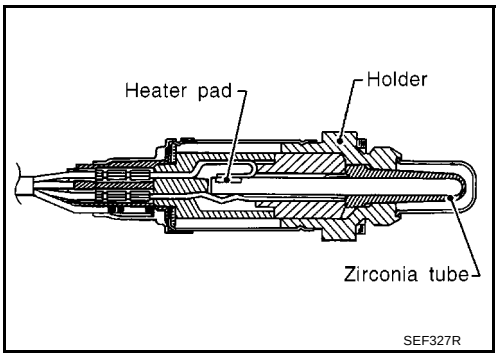
DTC P1147, P1167 HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00QRA

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QRB

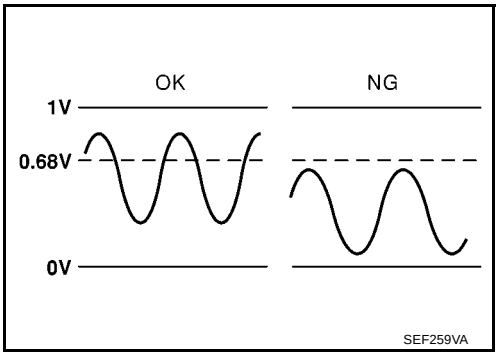
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QRC

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
P1147 1147 (Bank 1)	Heated oxygen sensor 2 maximum voltage monitoring	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 ● Injectors ● Intake air leaks
P1167 1167 (Bank 2)			

DTC Confirmation Procedure

EBS00QRD

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II 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:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in "Procedure for COND1"

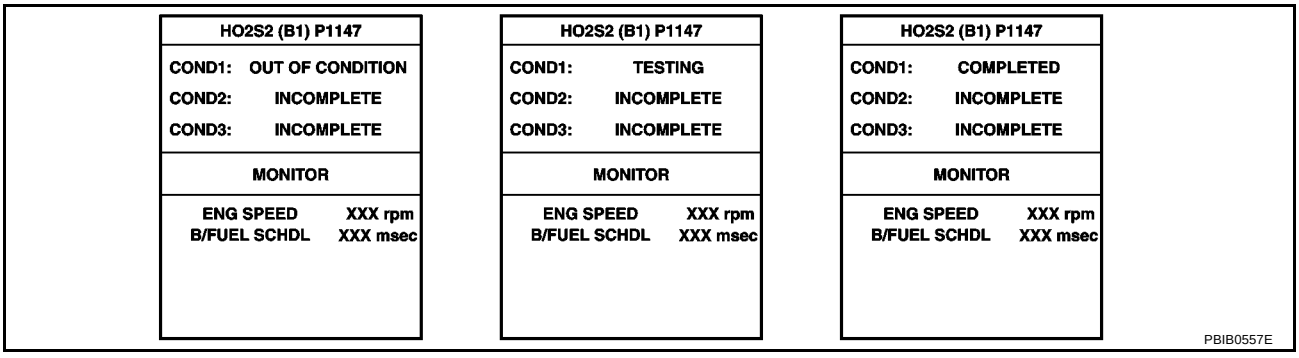
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

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 one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1147" or "HO2S2 (B2) P1167" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions 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
COOLANT TEMP/S	70 - 105°C
Selector lever	Suitable position

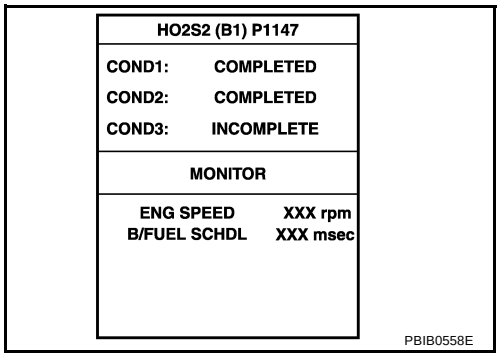


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND2".**

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

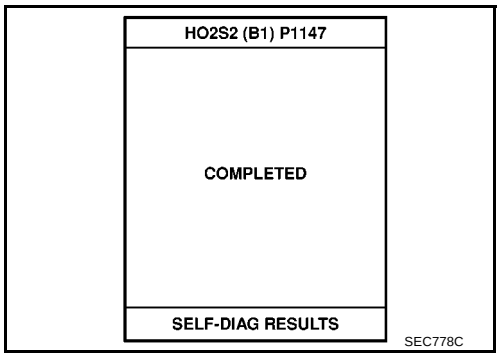
   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-466, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II
c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.
d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.



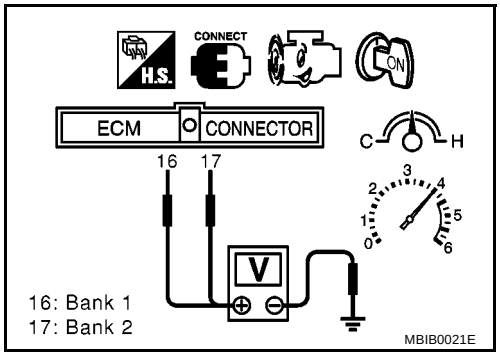
Overall Function Check

EBS00QRE

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

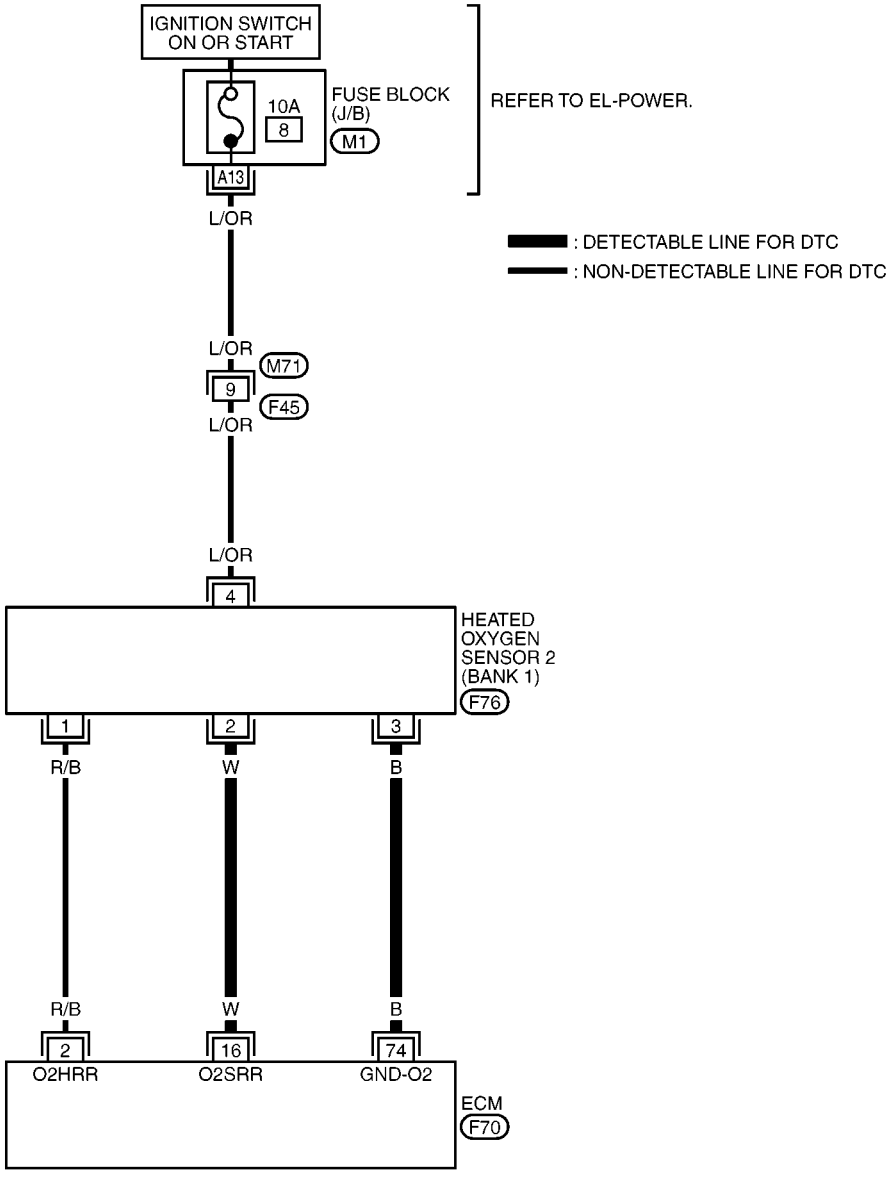
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-466, "Diagnostic Procedure" .

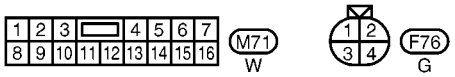


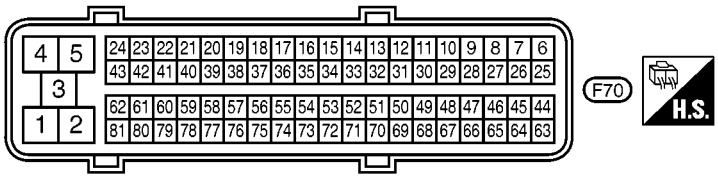
Wiring Diagram
BANK 1

EBS00QRF

EC-O2S2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC447A

Specification data are reference values and are measured between each terminal and ground.

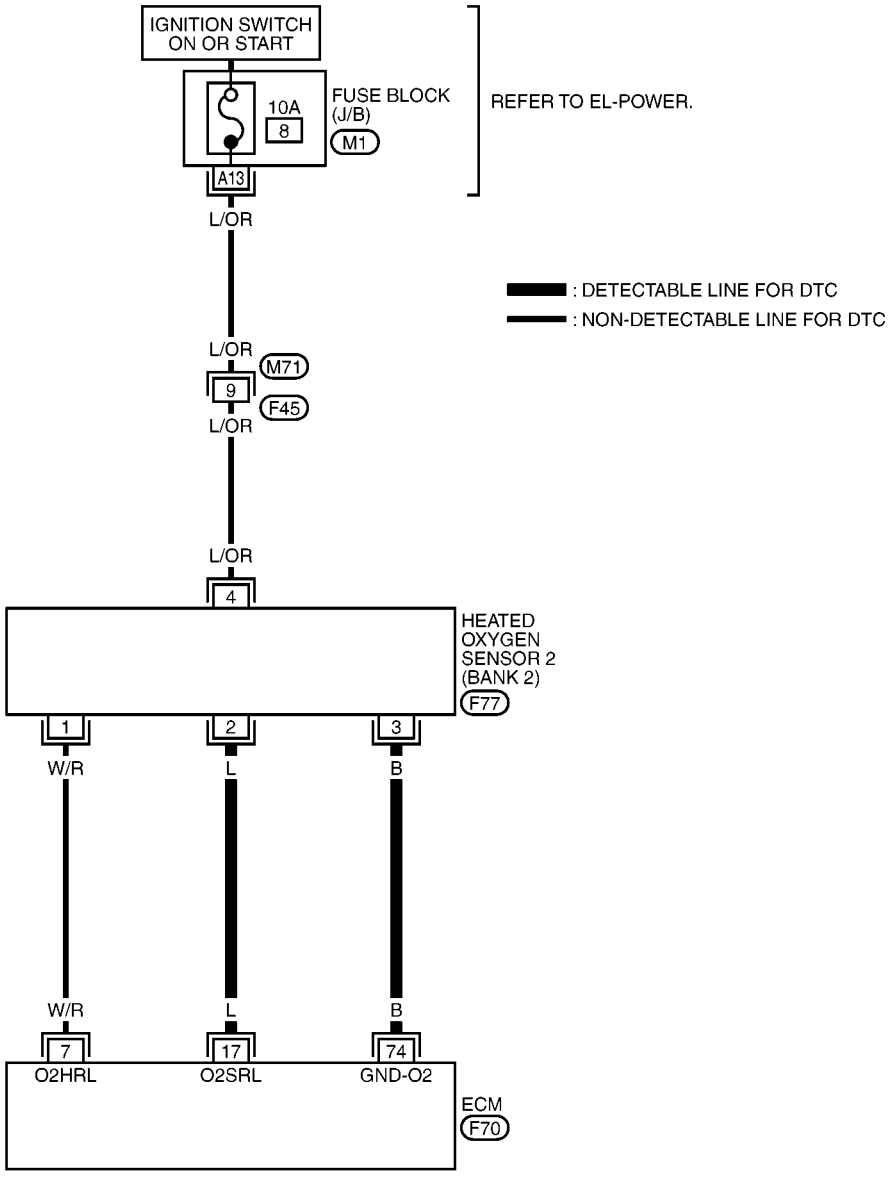
CAUTION:

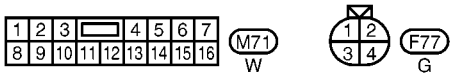
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

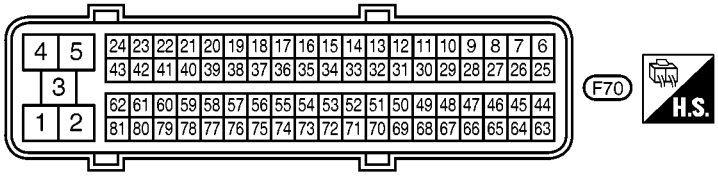
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC448A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

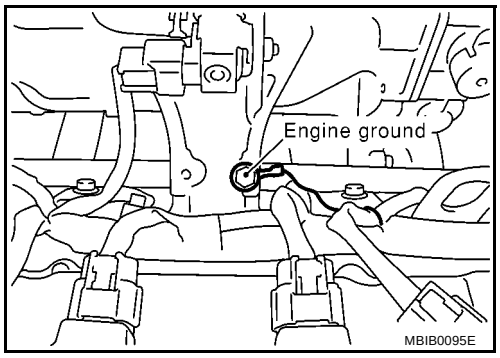
Diagnostic Procedure

EBS00QRG

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

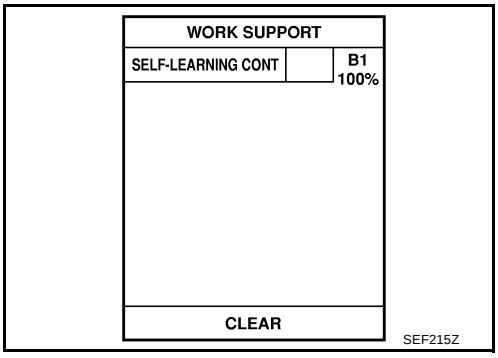
>> GO TO 2.



2. CLEAR THE SELF-LEARNING DATA

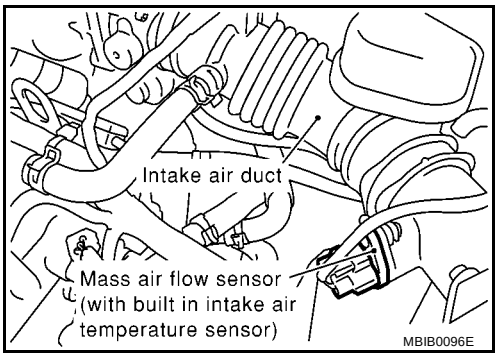
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Without CONSULT-II

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-68, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-288 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

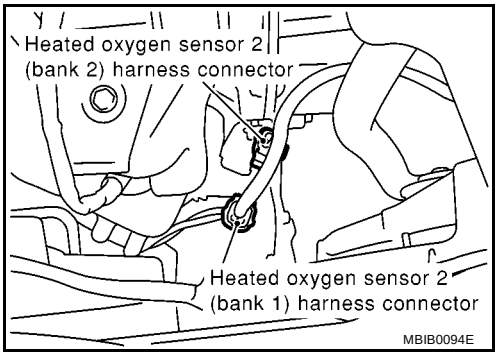
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	16	2	1
P1167	17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	16	2	1
P1167	17	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-468, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QRH

HEATED OXYGEN SENSOR 2

With CONSULT-II

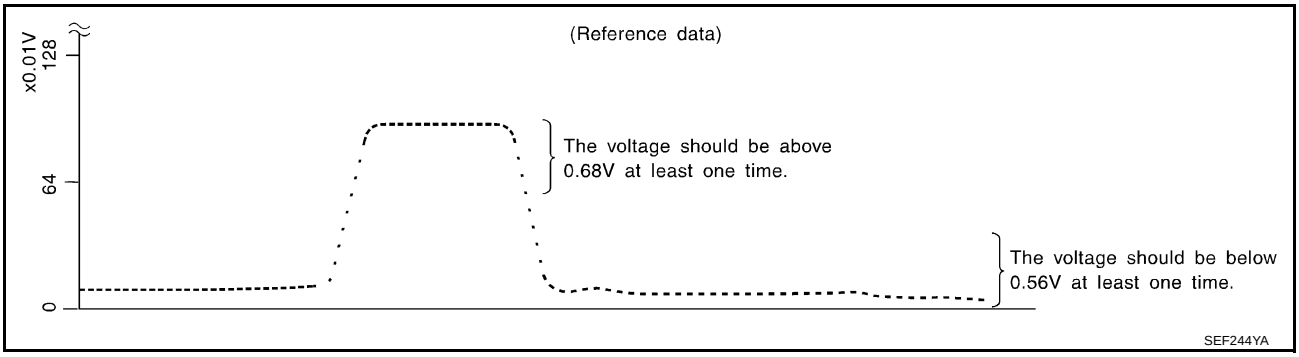
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



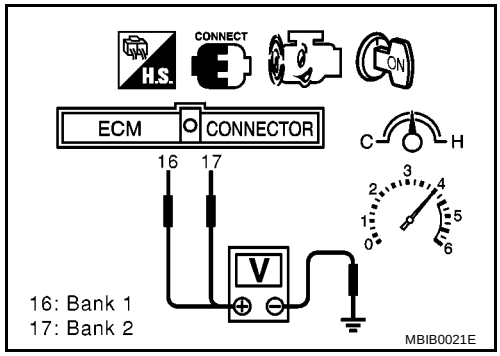
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is –25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QRI

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

EBS00QRJ

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.

On Board Diagnosis Logic

EBS00QRK

Freeze frame data is not stored in the ECM for this self-diagnosis. The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	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

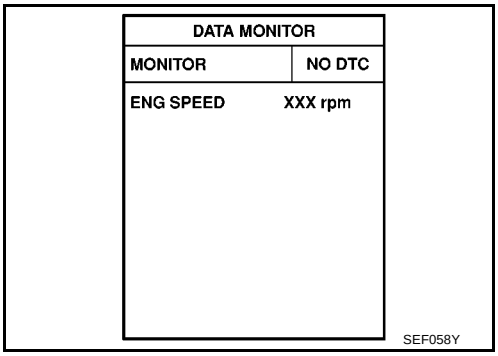
DTC Confirmation Procedure

EBS00QRL

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to EC-471, "Diagnostic Procedure"
.



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS00QRM

Go to “TROUBLE DIAGNOSIS-BASIC INSPECTION”, BR-70 or “TROUBLE DIAGNOSIS”, BR-97.

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

EBS00QRN

NOTE:
If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
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.

On Board Diagnosis Logic

EBS00QRO

Freeze frame data is not stored in the ECM for this self-diagnosis. The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	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

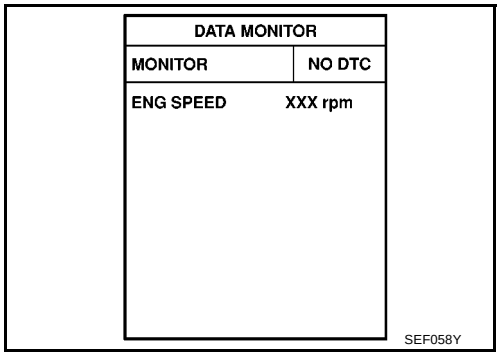
DTC Confirmation Procedure

EBS00QRP

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If a 1st trip DTC is detected, go to EC-472, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS00QRQ

1. CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) FUNCTION

Refer to “TROUBLE DIAGNOSIS”, BR-97 (models with ESP) or “TROUBLE DIAGNOSIS-BASIC INSPECTION”, BR-70 (models without ESP).

>> **INSPECTION END**

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

EBS00QRR

NOTE:
If DTC P1217 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-145, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

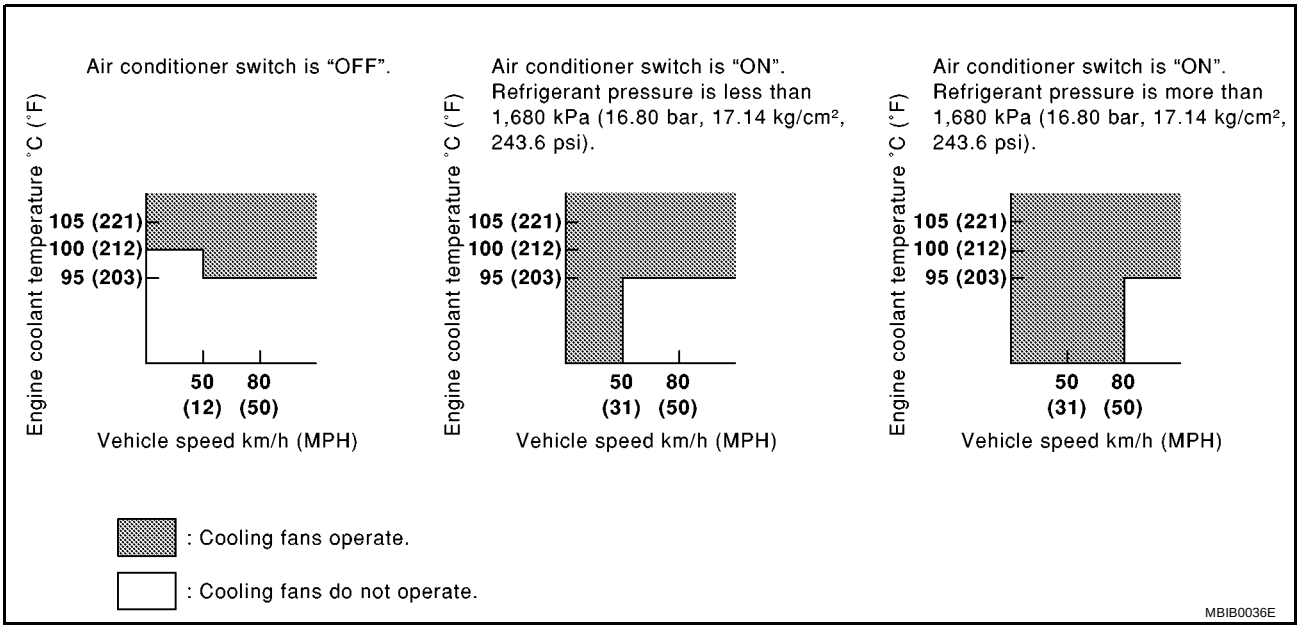
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	Cooling fan relay(s)
Battery	Battery voltage*1		
Vehicle speed signal	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	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: These signals are sent to the ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 2-step control [ON/OFF].
The ECM sends a cooling fan control signal to the smart entrance control unit through CAN communication line, and the smart entrance control unit controls cooling fan relays.

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

EBS00QRS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 99°C (210°F) or less	OFF
		Engine coolant temperature is 100°C (212°F) or more	ON

On Board Diagnosis Logic

EBS00QRT

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.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	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.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Harness or connectors (The CAN communication line is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-482, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to “Changing Engine Coolant”, LC-18. Also, replace the engine oil. Refer to “Changing Engine Oil”, LC-8.

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 “Engine Coolant Mixture Ratio”, MA-15.**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

EBS00QRU

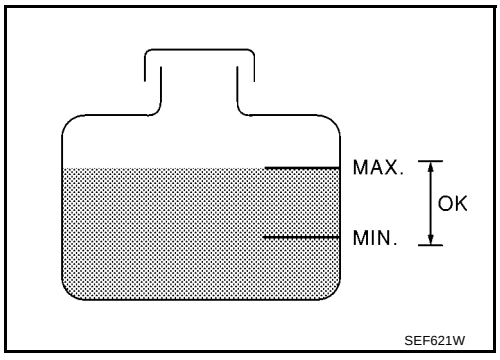
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

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.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-477, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-477, "Diagnostic Procedure" .
3. Turn ignition switch “ON”.



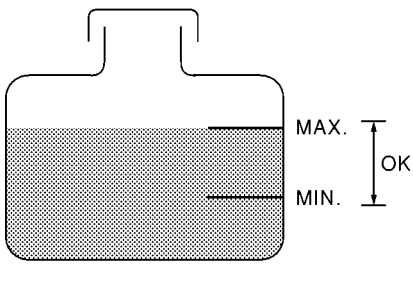
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-477, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	ON
MONITOR	
COOLAN TEMP/S	XXX °C

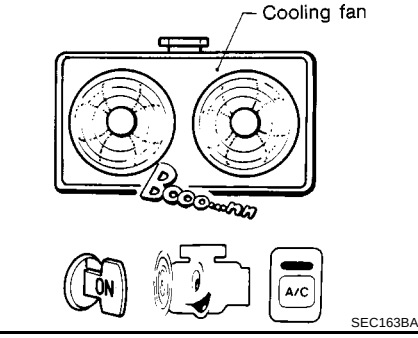
MBIB0037E

WITH GST

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-477, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-477, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.
6. Make sure that cooling fans operate.
   If NG, go to EC-477, "Diagnostic Procedure" .



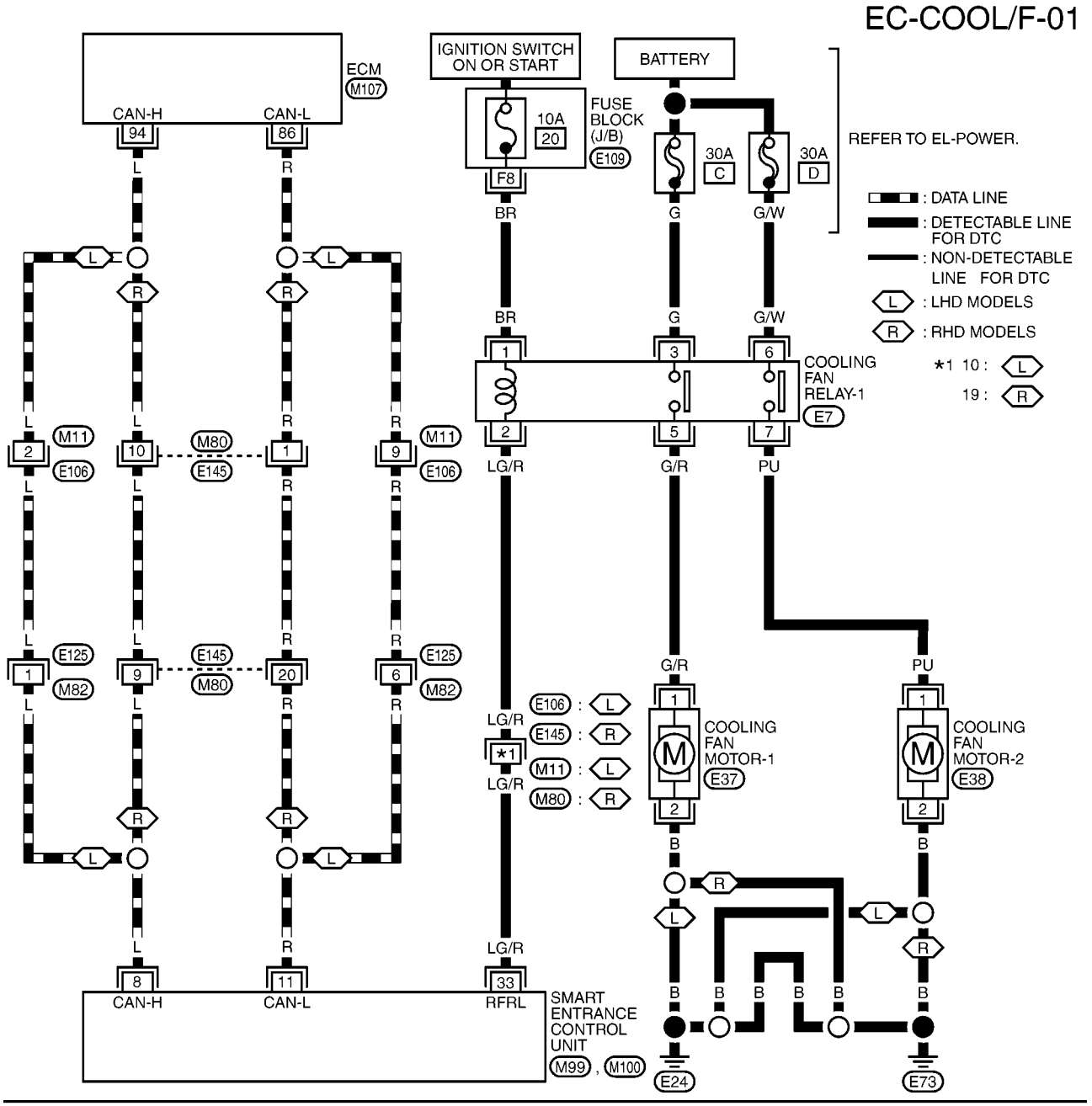
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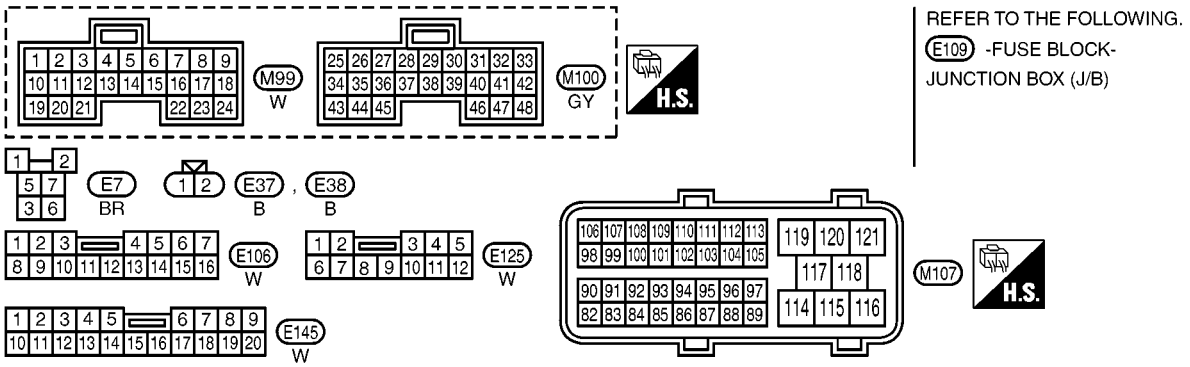


SEC163BA

Wiring Diagram

EBS00QRV





YEC466A

Diagnostic Procedure

EBS00QRW

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK COOLING FAN OPERATION

With CONSULT-II

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “ON” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-480, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	ON
MONITOR	
COOLAN TEMP/S	XXX °C

MBIB0037E

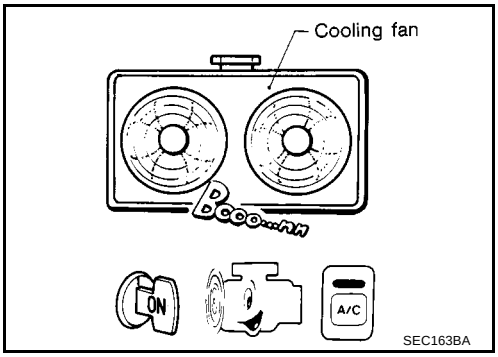
3. CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Start engine and let it idle.
2. Turn air conditioner switch “ON”.
3. Turn blower fan switch “ON”.
4. Make sure that cooling fans-1 and -2 operate.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-480, "PROCEDURE A" .)

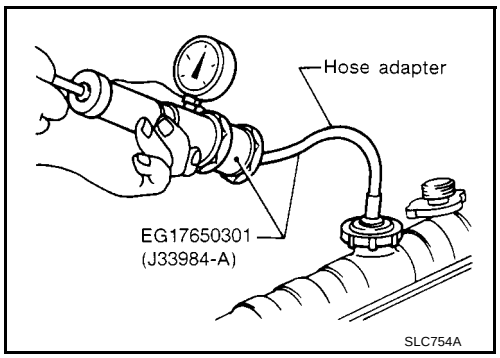


SEC163BA

4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)



CAUTION:
Higher than the specified pressure may cause radiator damage. Pressure should not drop.

OK or NG

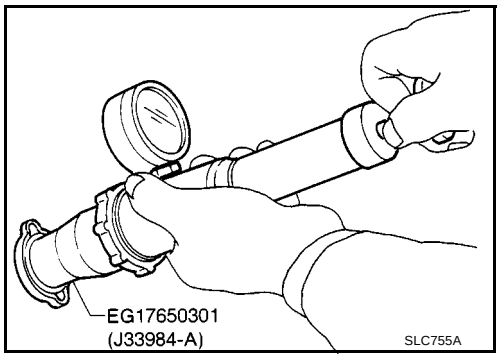
OK >> GO TO 5.
NG >> Check the following for leak

- Hose
- Radiator
- Water pump
  Refer to “Water Pump”, LC-14.

5. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

Radiator cap relief pressure: 59 - 98 kPa (0.59 - 0.98 bar, 0,6 - 1.0 kg/cm^2 , 9 - 14 psi)



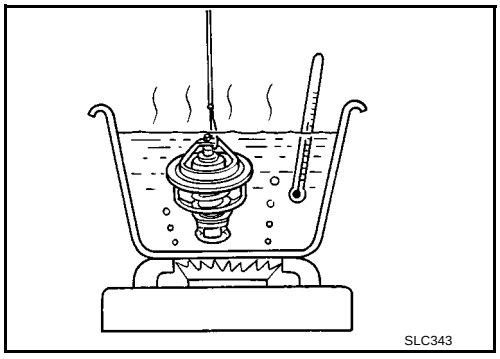
OK or NG

OK >> GO TO 6.
NG >> Replace radiator cap.

6. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature: 82°C (180°F) [standard]
Valve lift: More than 8 mm/95°C (0.31 in/203°F)



3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to “Thermostat”, LC-15.

OK or NG

OK >> GO TO 7.
NG >> Replace thermostat

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-192, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace engine coolant temperature sensor.

8. CHECK MAIN 12 CAUSES

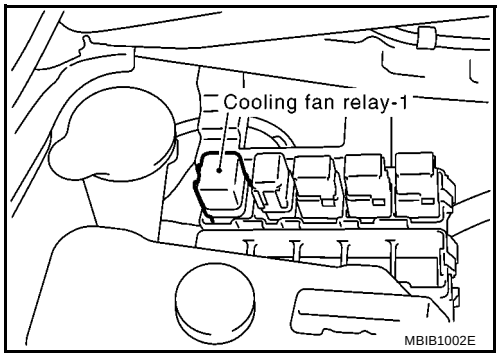
If the cause cannot be isolated, go to EC-482, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

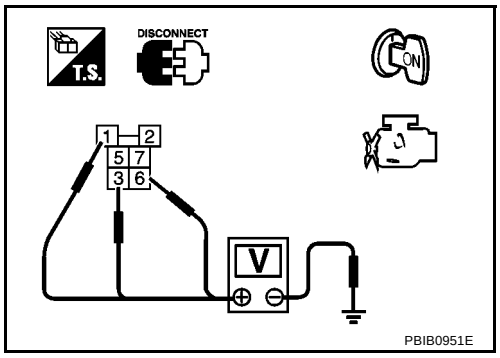
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.



4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- 10A fuse
- 30A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3. CHECK COOLING FAN MOTORS CIRCUIT

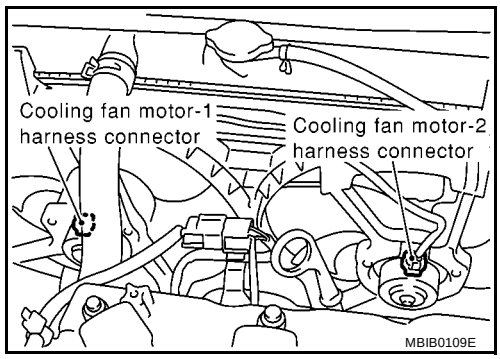
1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

6. Also check harness for short to ground and short to power.



OK or NG

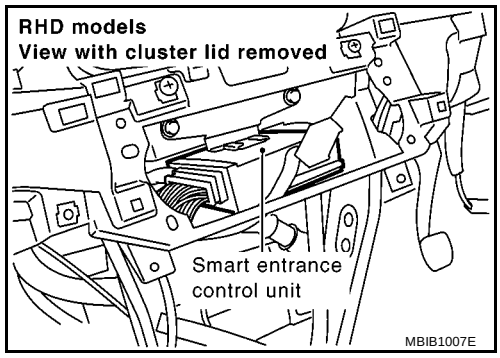
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect smart entrance control unit.
2. Check harness continuity between smart entrance control unit terminal 33 and cooling fan relay-1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between smart entrance control unit and cooling fan relay-1

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

6. CHECK COOLING FAN RELAY-1

Refer to EC-483, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS

Refer to EC-483, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK SMART ENTRANCE CONTROL UNIT

Refer to “SMART ENTRANCE CONTROL SYSTEM”, EL-341.

OK or NG

OK >> GO TO 9.
NG >> Replace smart entrance control unit.

9. CHECK INTERMITTENT INCIDENT

Perform EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

EBS00QRX

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	See “Engine Coolant Mixture Ratio”, MA-15.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, LC-18.
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See “CHENGING RADIATOR CAP”, LC-13.
ON*2	5	● Coolant leaks	● Visual	No leaks	See “CHENGING COOLING SYSTEM FOR LEAKS”, LC-13.
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat”, LC-15, and “Radiator”, LC-16.
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-473).
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	See “Changing Engine Coolant”, LC-18.
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See “Changing Engine Coolant”, LC-18.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-60, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-74, "CYLINDER BLOCK" .

*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 “Overheating Cause Analysis”, LC-20.

Component Inspection

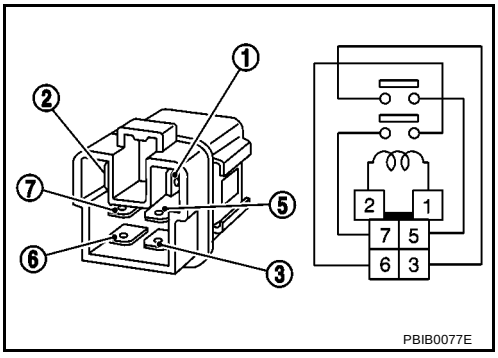
EBS00QRY

COOLING FAN RELAY-1

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace cooling fan relay.



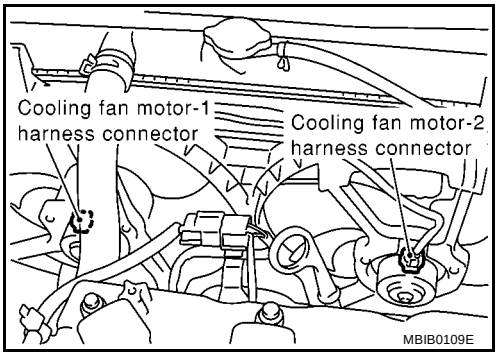
COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	1	2

Cooling fan motor should operate.

3. If NG, replace cooling fan motor.



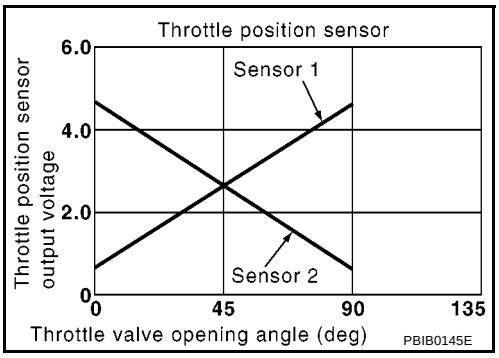
DTC P1223, P1224 TP SENSOR

PFP:16119

Component Description

EBS00QRZ

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QS0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T model) 1st (M/T model)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QS1

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1223 1223	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 2)
P1224 1224	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

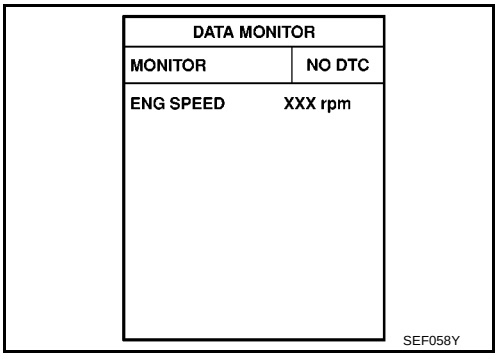
DTC Confirmation Procedure

EBS00QS2

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-487, "Diagnostic Procedure" .



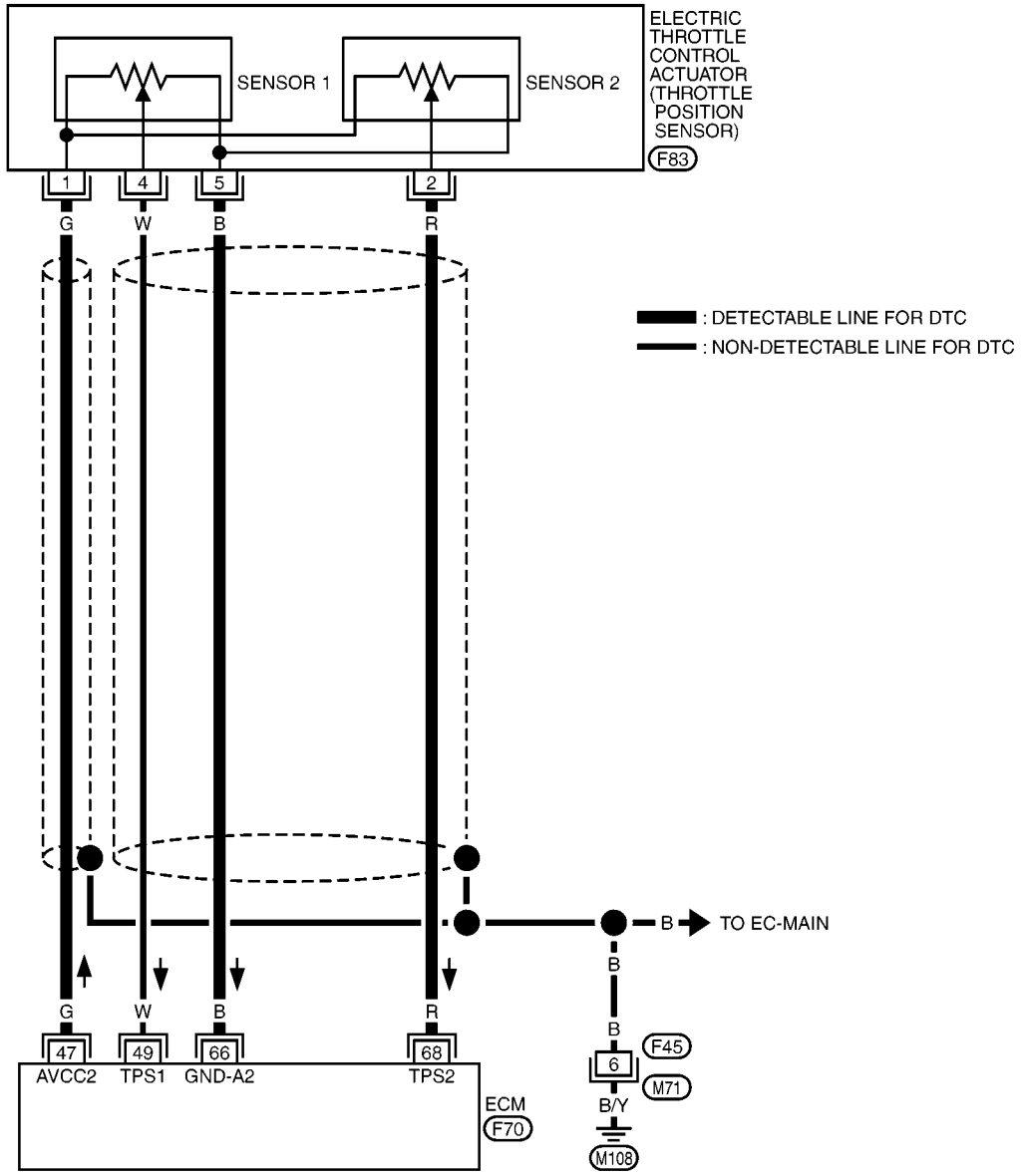
WITH GST

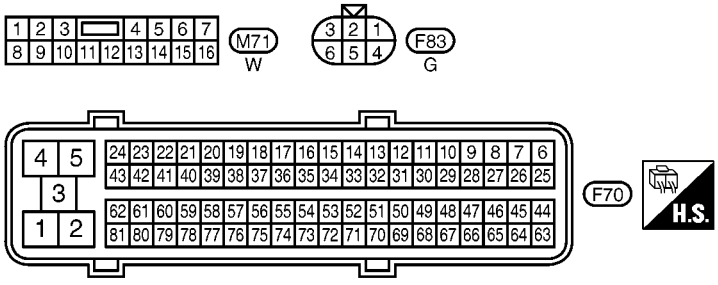
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QS3

EC-TPS2-01





YEC467A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

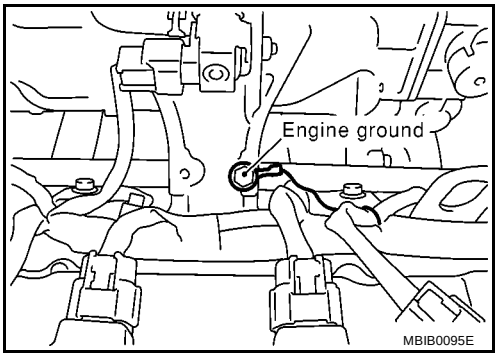
Diagnostic Procedure

EBS00QS4

1. RETIGHTEN GROUND SCREWS

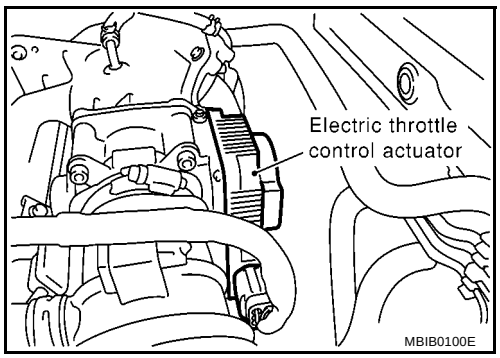
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

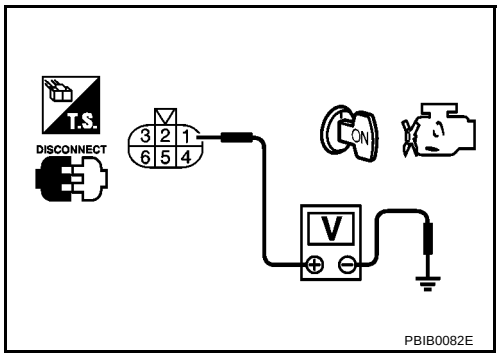


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 68 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-489, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

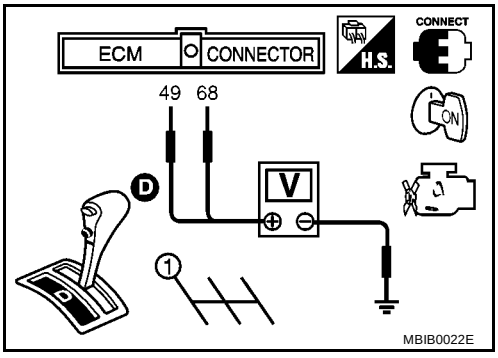
Component Inspection

EBS00QS5

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-49, "Throttle Valve Closed Position Learning" .
8. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QS6

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

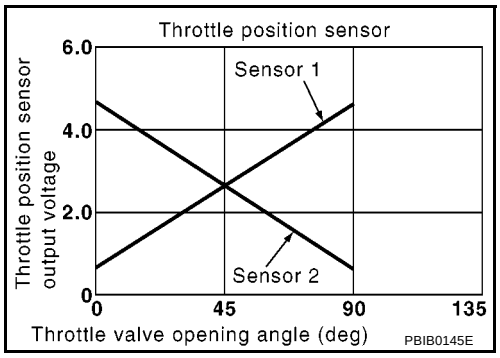
DTC P1225 TP SENSOR

PFP:16119

Component Description

EBS00QS7

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 the 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.



On Board Diagnosis Logic

EBS00QS8

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

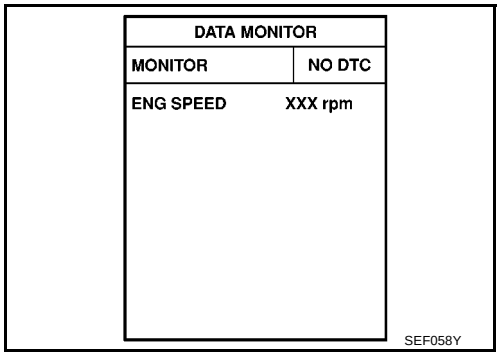
DTC Confirmation Procedure

EBS00QS9

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. If 1st trip DTC is detected, go to EC-491, "Diagnostic Procedure" .



WITH GST

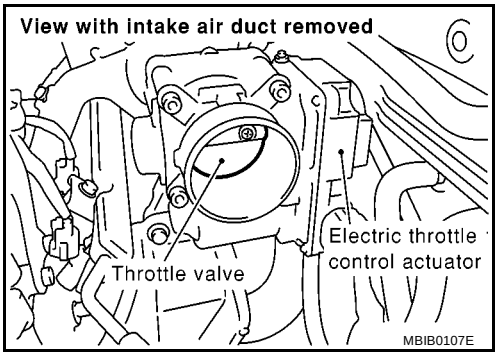
Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

EBS00QSA

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch “OFF”.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00QSB

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

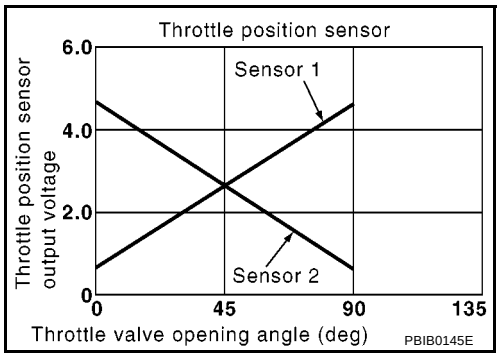
DTC P1226 TP SENSOR

PFP:16119

Component Description

EBS00QSC

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 the 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.



On Board Diagnosis Logic

EBS00QSD

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

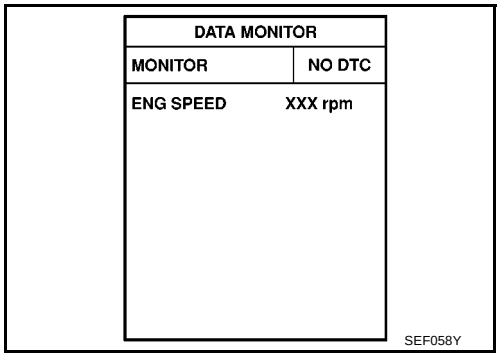
DTC Confirmation Procedure

EBS00QSE

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-493, "Diagnostic Procedure"
.



WITH GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

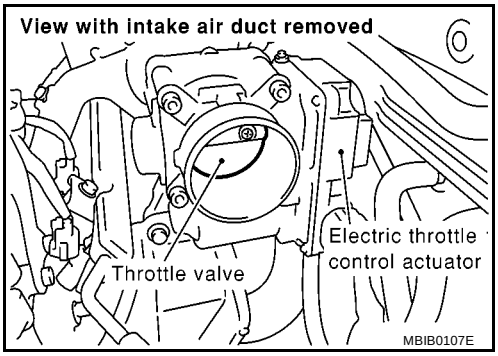
EBS00QSF

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch “OFF”.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00QSG

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

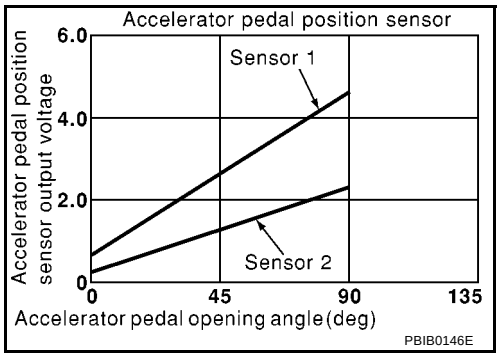
DTC P1227, P1228 APP SENSOR

PFP:18002

Component Description

EBS00QSH

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QSI

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signals converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QSJ

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P1228 1228	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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.

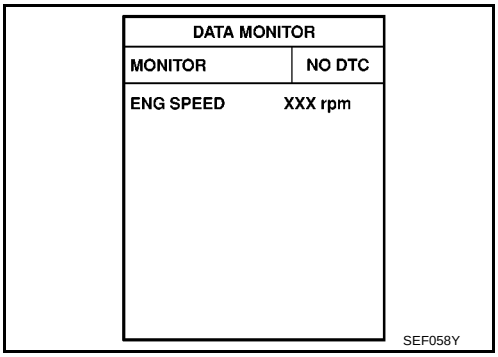
DTC Confirmation Procedure

EBS00QSK

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-497, "Diagnostic Procedure" .

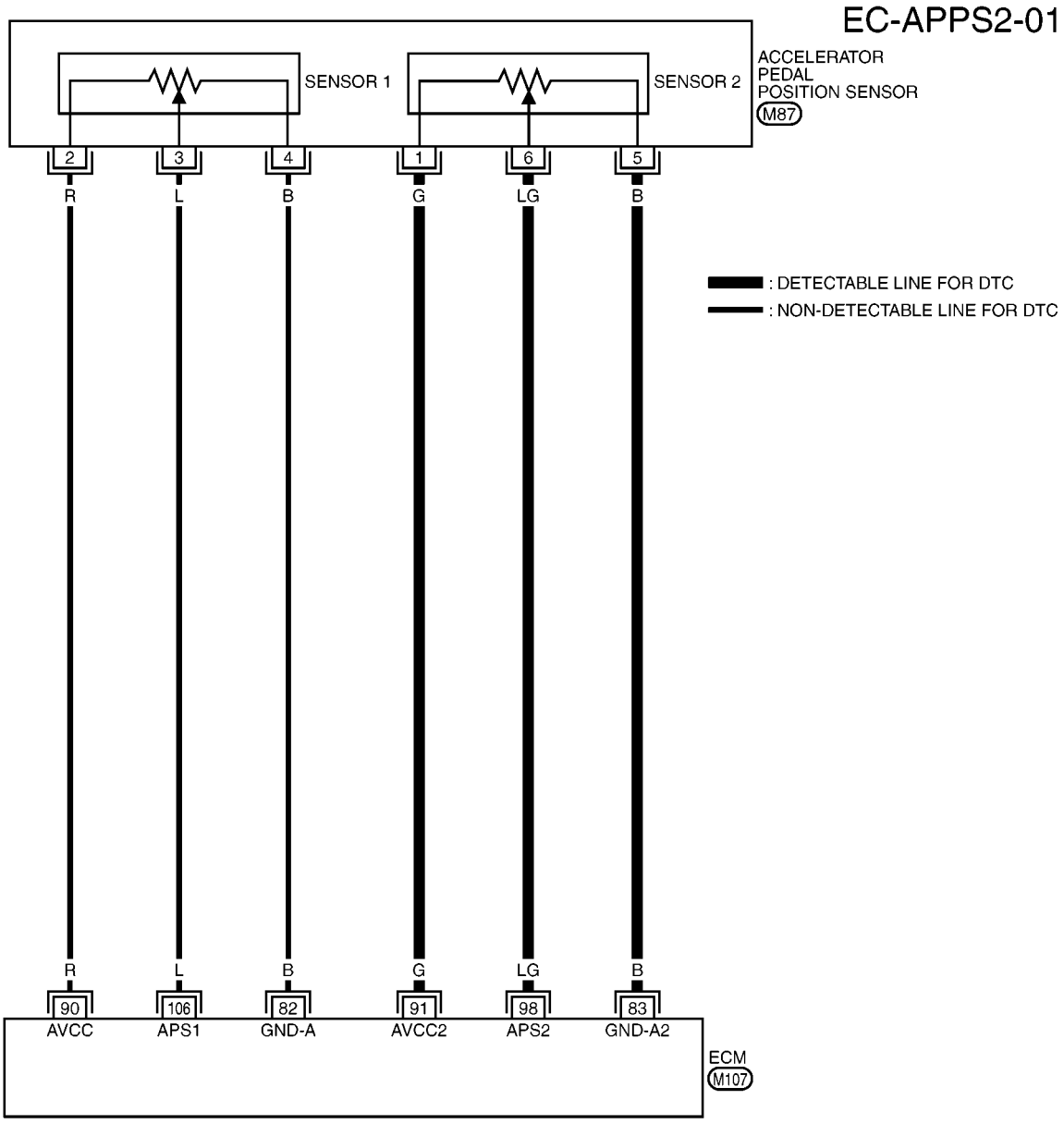


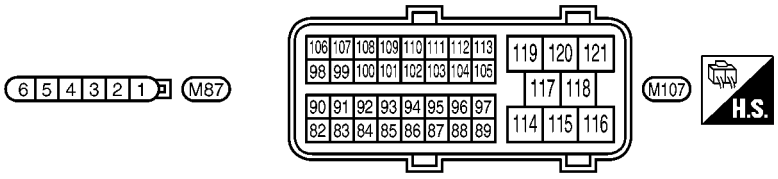
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QSL





YEC468A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

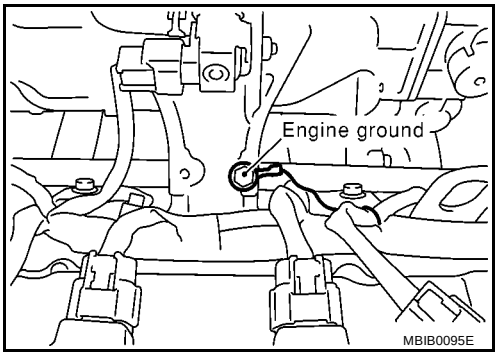
Diagnostic Procedure

EBS00QSM

1. RETIGHTEN GROUND SCREWS

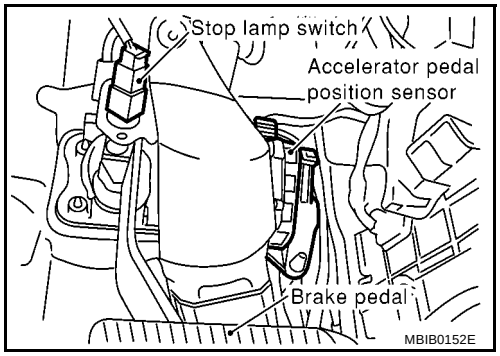
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



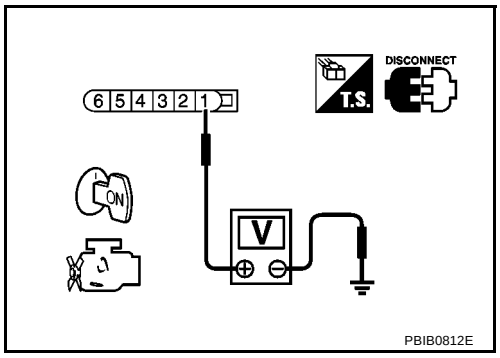
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 83 and APP sensor terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-499, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-49, "Throttle Valve Closed Position Learning" .
4. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

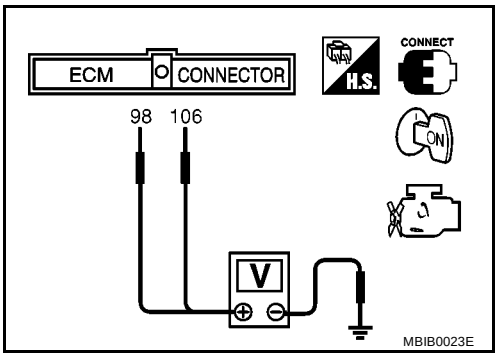
>> **INSPECTION END**

Component Inspection

EBS00QSN

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-49, "Throttle Valve Closed Position Learning" .
7. Perform EC-49, "Idle Air Volume Learning" .

Remove and Installation

EBS00QSO

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

EBS00QSP

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (The TP sensor 1 and 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

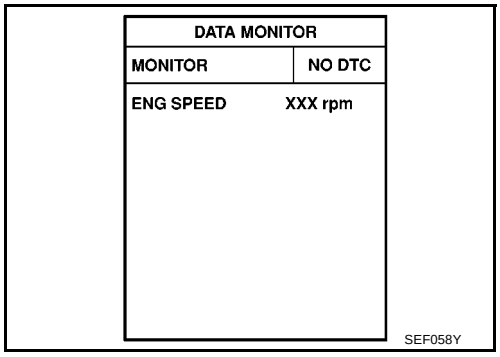
EBS00QSQ

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-502, "Diagnostic Procedure" .



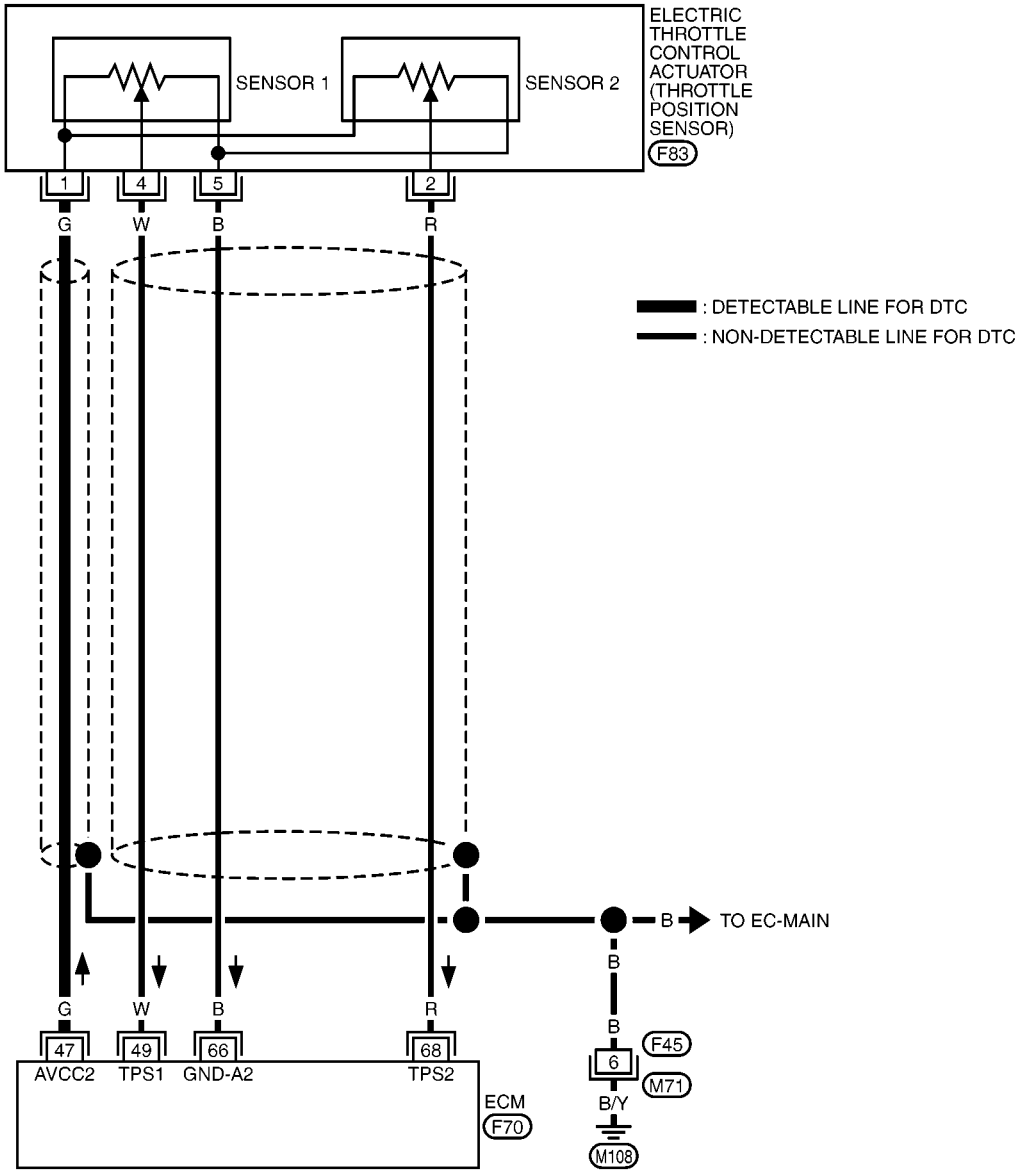
WITH GST

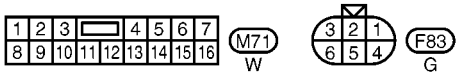
Follow the procedure “WITH CONSULT-II” above.

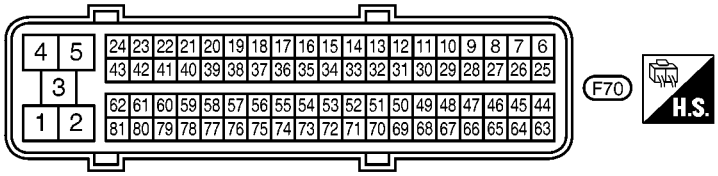
Wiring Diagram

EBS00QSR

EC-SEN/PW-01







YEC469A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V

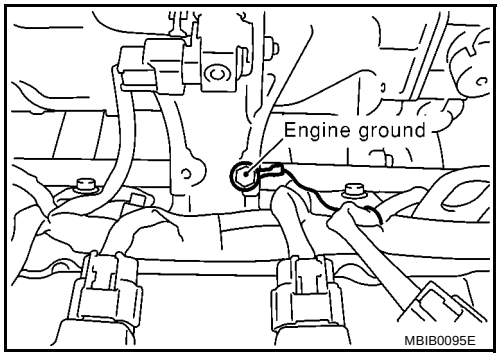
Diagnostic Procedure

EBS00QSS

1. RETIGHTEN GROUND SCREWS

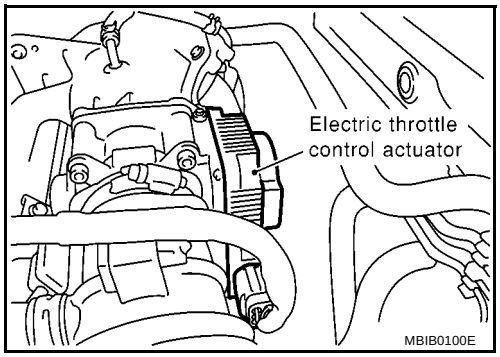
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

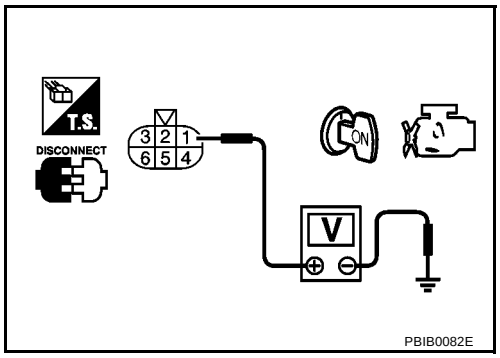


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

Check the following.

- Harness for short to power and short to ground between ECM terminal 47 and electric throttle control actuator terminal 1.
- ECM pin terminal.

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR

Refer to EC-315, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-49, "Throttle Valve Closed Position Learning" .
3. Perform EC-49, "Idle Air Volume Learning" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

EBS00QST

When the shift lever position is “P” or “N” (A/T models), “Neutral” (M/T models), park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

EBS00QSU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T models) Neutral (M/T models)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

EBS00QSV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	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 (PNP switch circuit is open or shorted.) ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

EBS00QSW

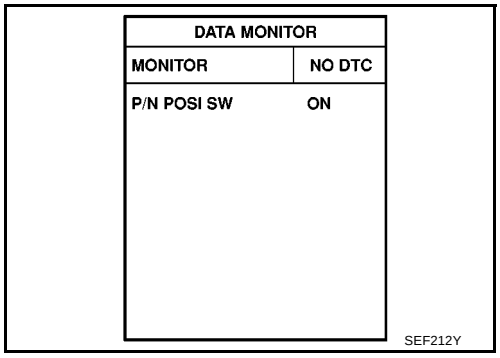
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

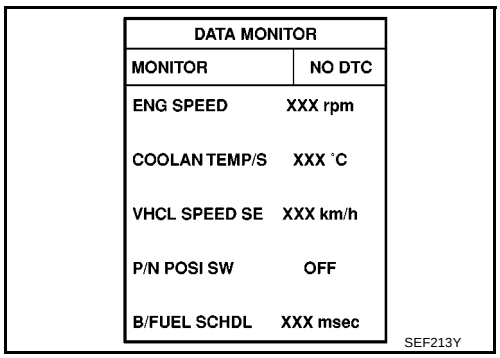
Position (Selector lever)	Known-good signal
“N” and “P” position (A/T models) “Neutral” position (M/T models)	ON
Except the above position	OFF



If NG, go to EC-507, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,200 - 6,000 rpm (A/T models) 1,300 - 6,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More than 3.0 msec
VHCL SPEED SE	More than 46 km/h (30 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-507, "Diagnostic Procedure" .

Overall Function Check

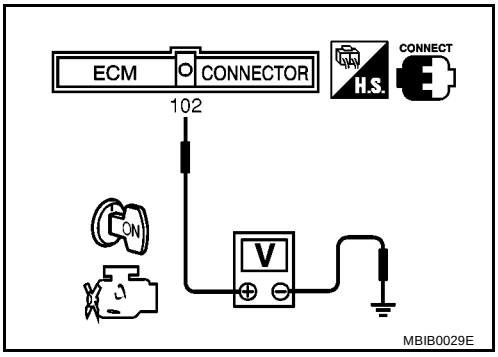
EBS00QSX

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 102 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
“P” and “N” position (A/T models) “Neutral” position (M/T models)	Approximately 0
Except the above position	A/T models: Battery voltage M/T models: Approximately 5

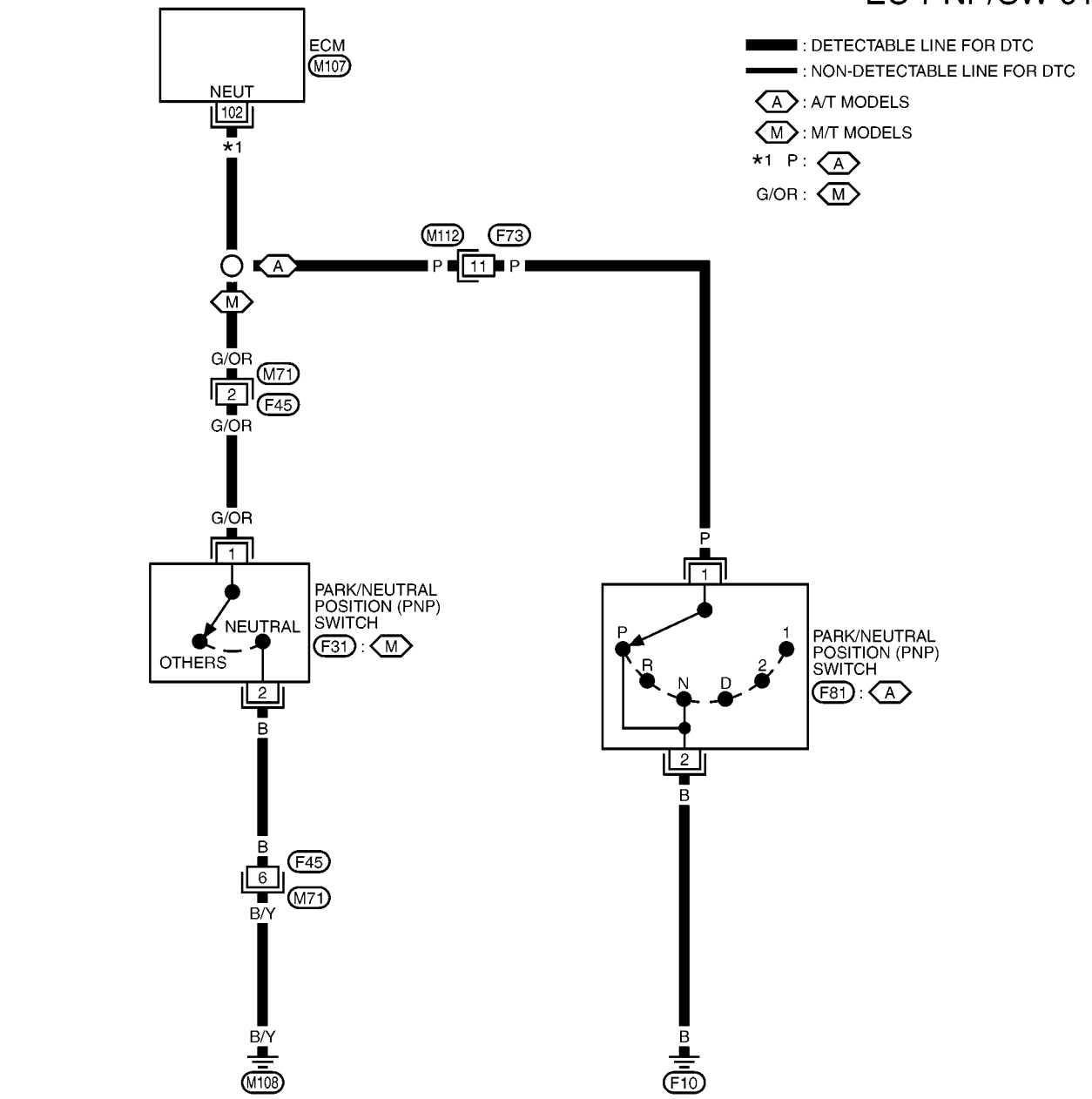


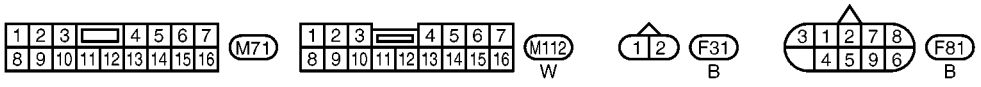
3. If NG, go to EC-507, "Diagnostic Procedure" .

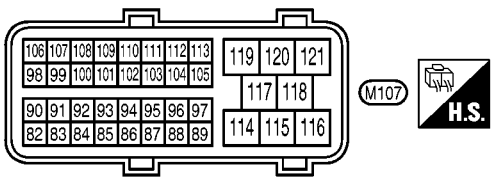
Wiring Diagram

EBS00QSY

EC-PNP/SW-01







YEC470A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	P (A/T) G/OR (M/T)	PNP switch	**[Ignition switch "ON"]** ● Shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

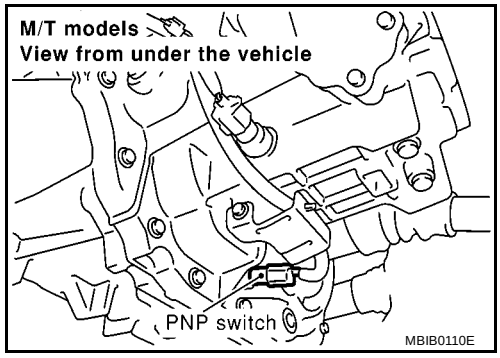
EBS00QSZ

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2. (M/T models)
NG >> Repair open circuit or short to power in harness or connectors. (A/T models)

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between Park/Neutral position (PNP) switch and ground

>> Repair open circuit or short to power in harems or connectors

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M112, F73 (A/T models)
- Harness connectors M71, F45 (M/T models)
- Harness for open or short between Park/Neutral position (PNP) switch and ECM

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

5. CHECK PNP SWITCH

Refer to AT-113, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" (A/T models) or “PNP SWITCH”, MT-17 (5MT) (M/T models).

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

EBS00QT0

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS00QT1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

EBS00QT2

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FALI-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

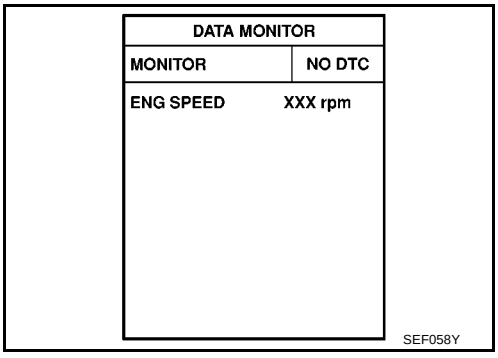
Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

EBS00QT3

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-511, "Diagnostic Procedure"
.



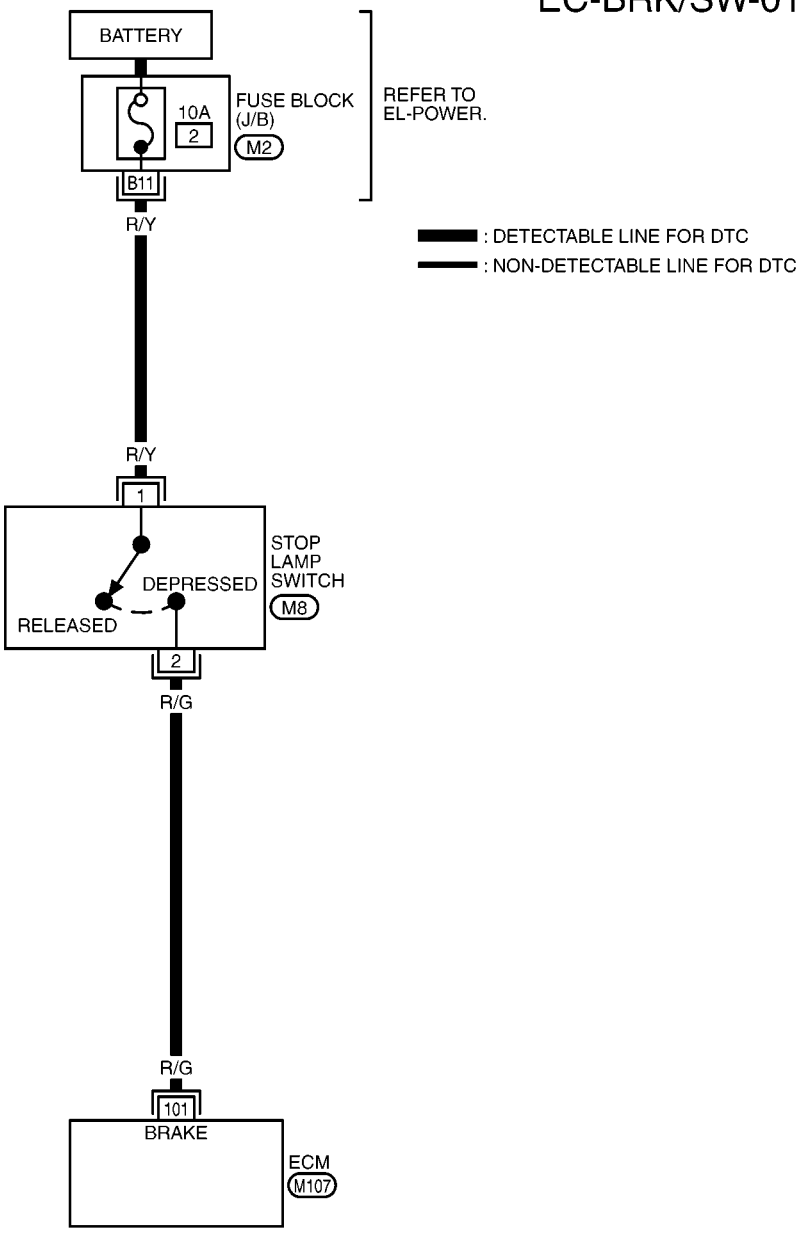
WITH GST

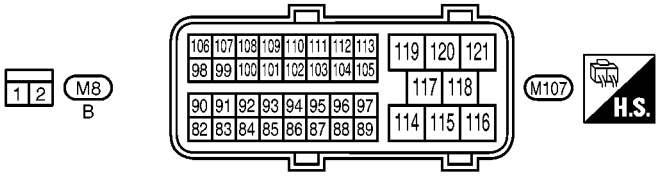
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS00QT4

EC-BRK/SW-01





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC471A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QT5

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch "OFF".
2. Check the stop lamp when depressing and releasing the brake pedal.

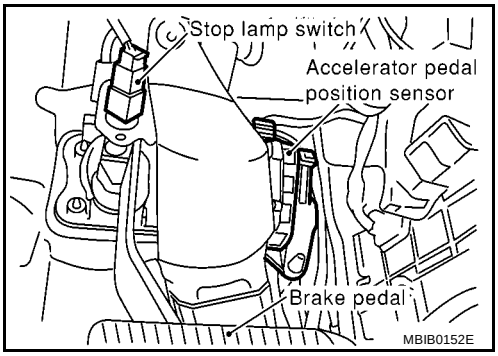
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.

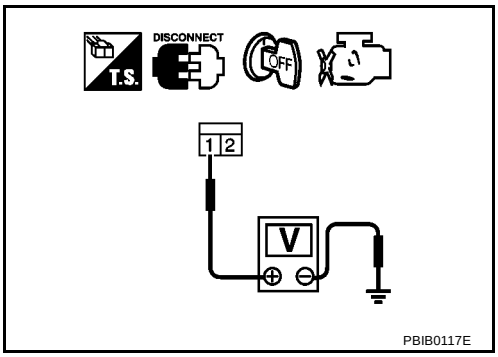


2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Fuse block (J/B) connector M2
- Harness for open and 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

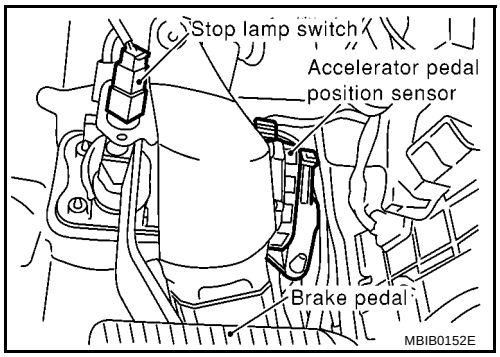
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect stop lamp switch harness connector.
4. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> 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-512, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

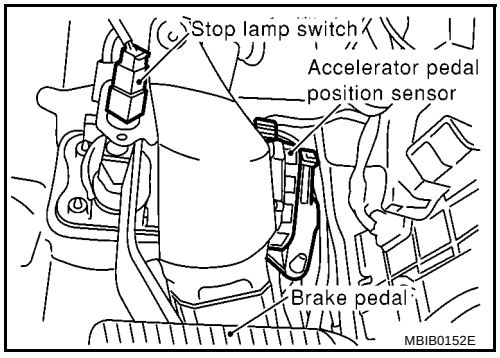
>> **INSPECTION END**

Component Inspection

EBS00QT6

STOP LAMP SWITCH

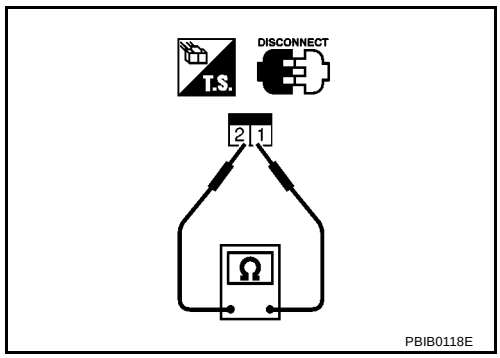
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to “BRAKE PEDAL AND BRACKET”, BR-14, and perform step 2 again.



IGNITION SIGNAL

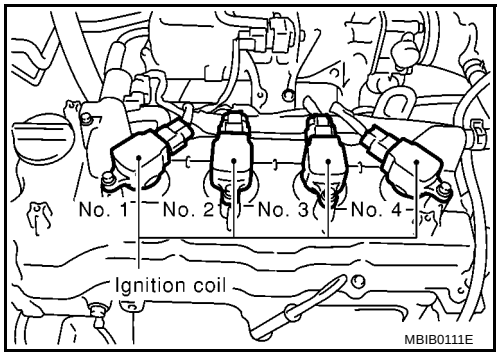
PFP:22448

Component Description

EBS00QT7

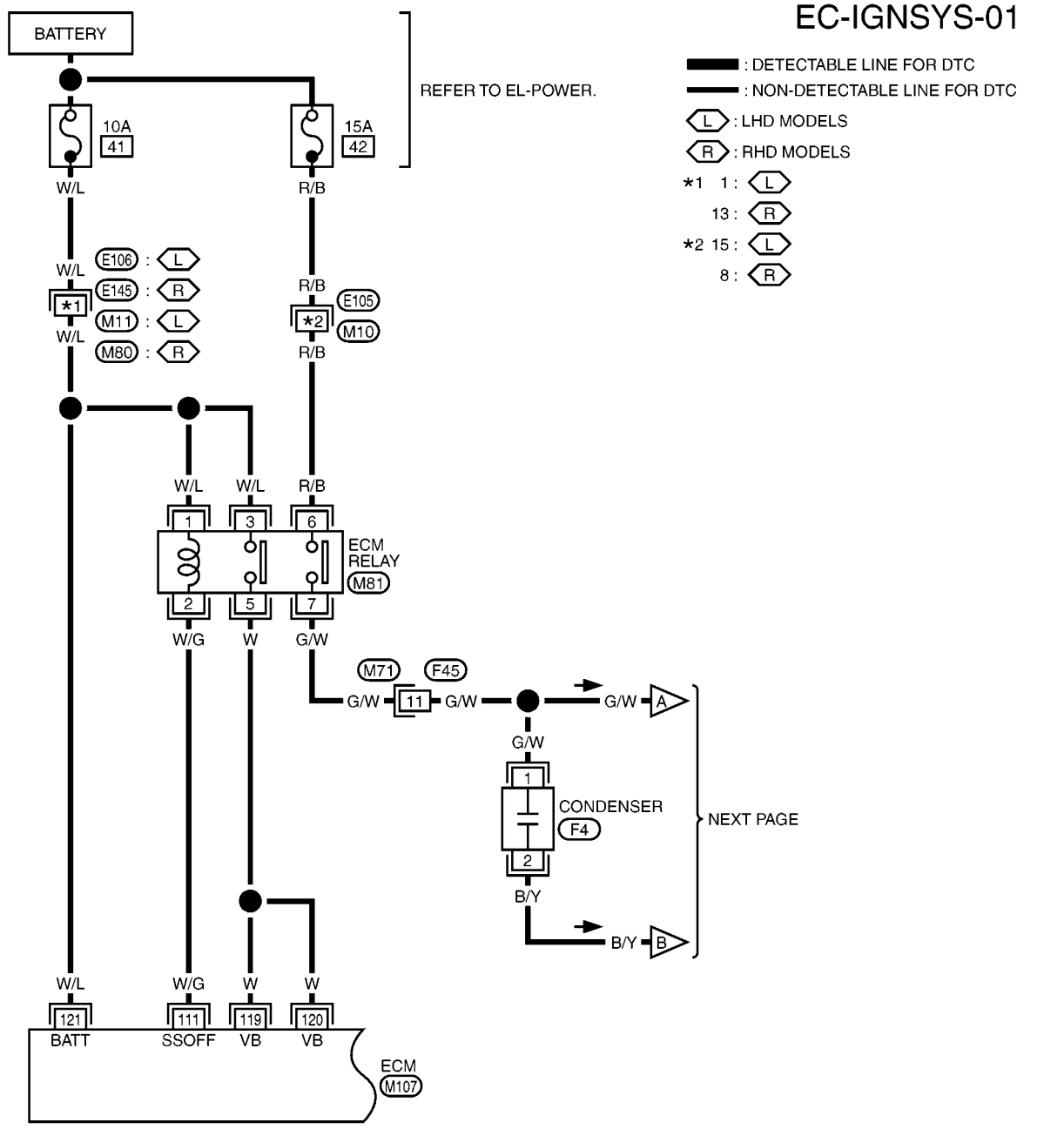
IGNITION COIL & POWER TRANSISTOR

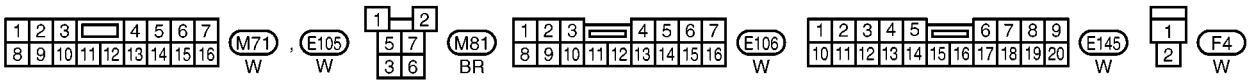
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

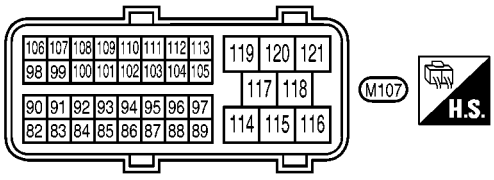


Wiring Diagram

EBS00QT8







YEC472A

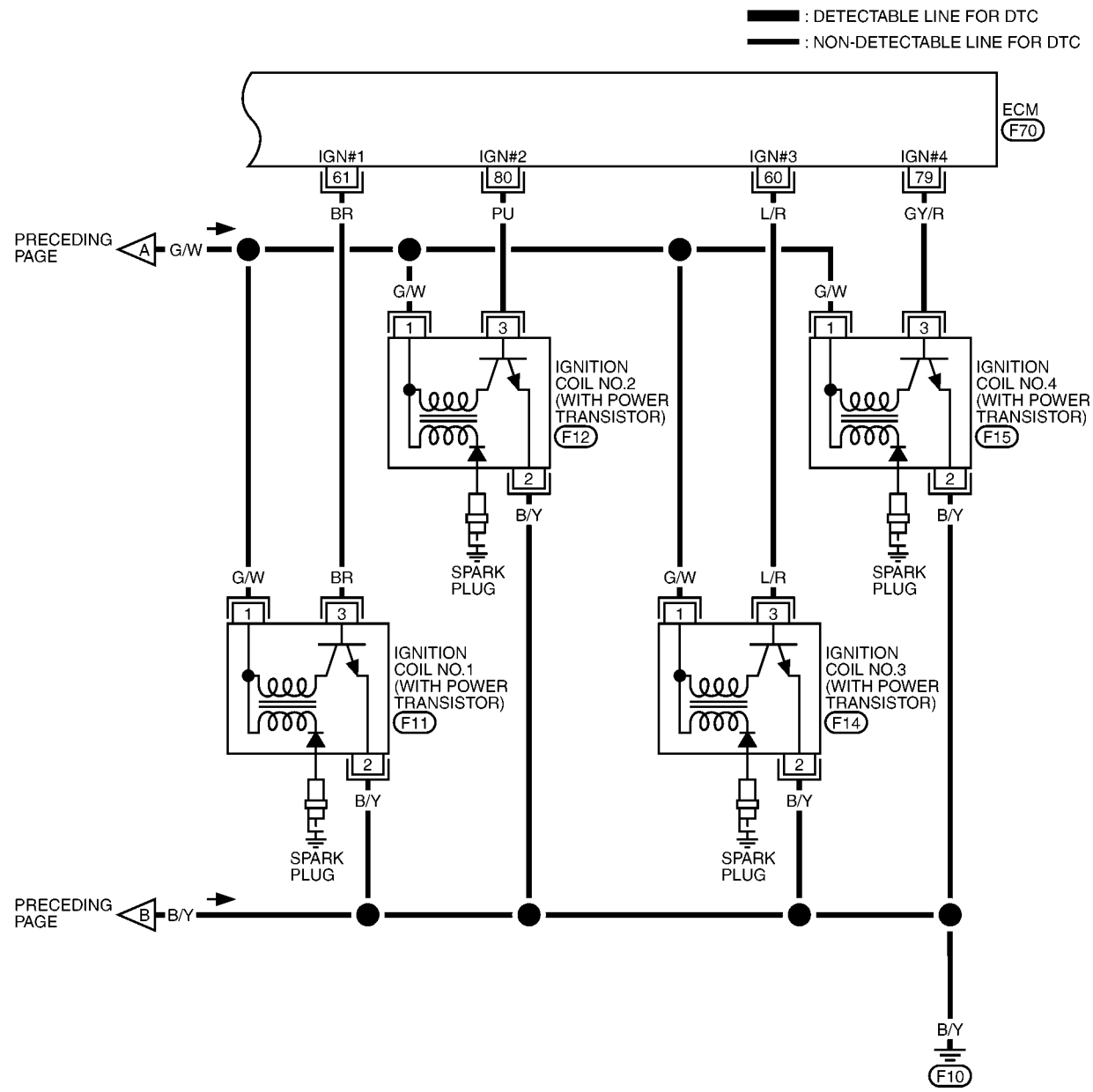
Specification data are reference values and are measured between each terminal and ground.

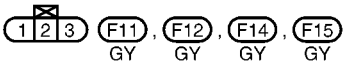
CAUTION:

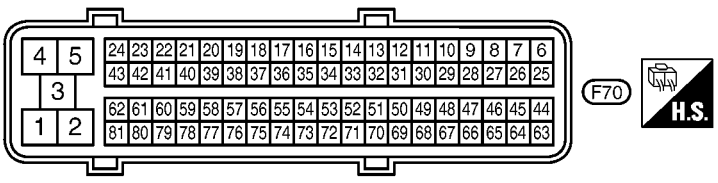
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02





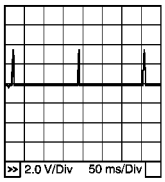
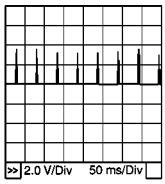


YEC473A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QT9

1. CHECK ENGINE START

Turn ignition switch “OFF”, and restart engine.

Is engine running?

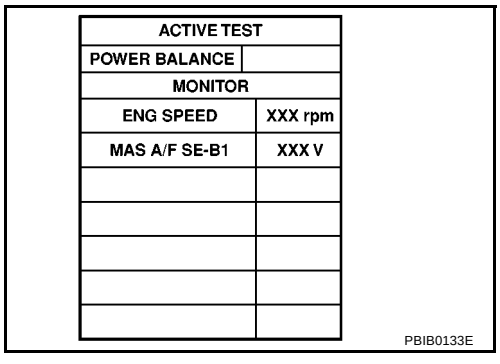
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.



PBIB0133E

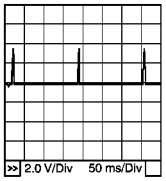
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

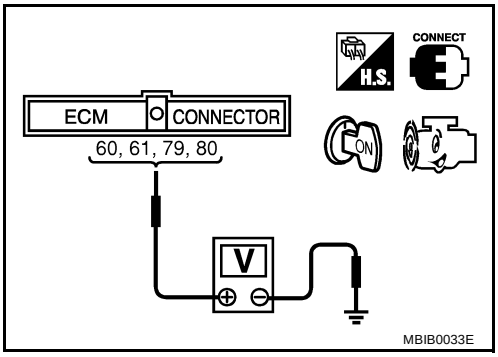
3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



PBIB0521E



MBIB0033E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

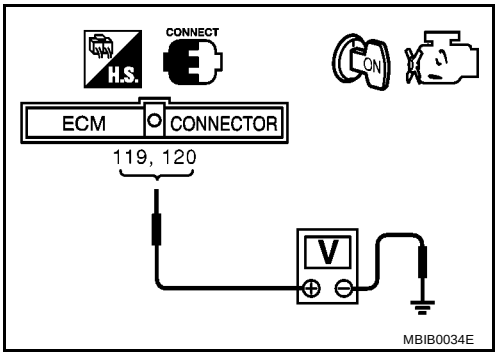
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> Go to EC-139, "POWER SUPPLY CIRCUIT FOR ECM"
.



MBIB0034E

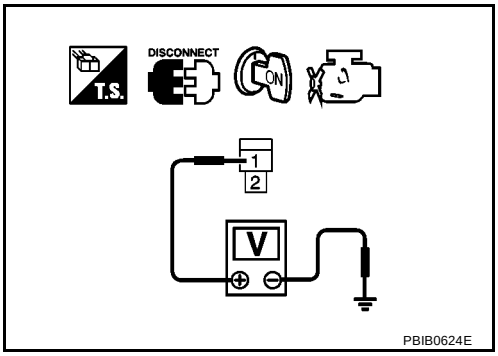
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.



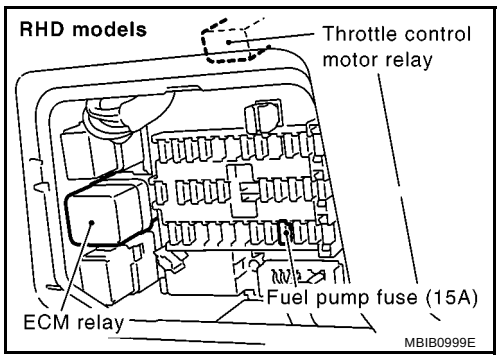
PBIB0624E

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch “OFF”.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

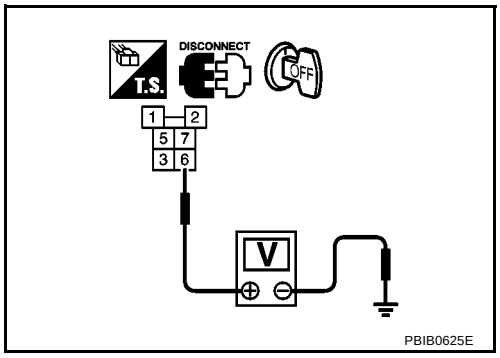
- Harness connectors M71, F45
- Harness for open or short between condenser and ECM relay

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

8. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

10. CHECK ECM RELAY

Refer to EC-522, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ECM relay.

11. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to power in harness or connector.

12. CHECK CONDENSER

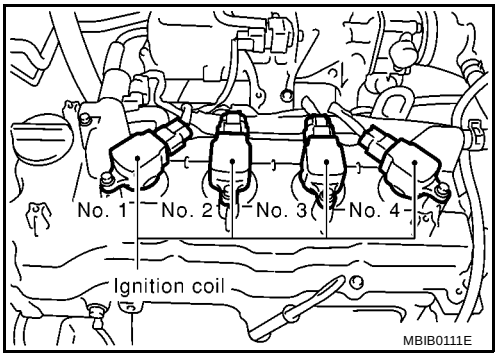
Refer to EC-522, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace condenser.

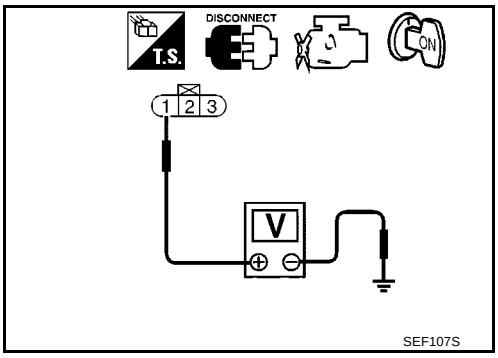
13. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch “OFF”.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between ignition coil and ECM relay

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

15. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ignition coil terminal 2 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to power in harness or connectors.

16. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-522, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ignition coil with power transistor.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

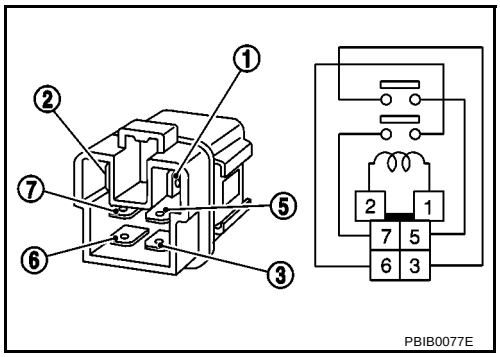
EBS00QTA

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.

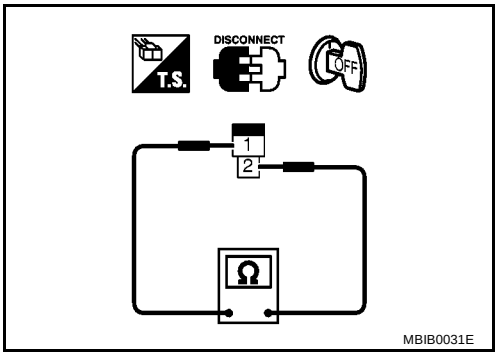


CONDENSER

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.

3. Check resistance between condenser terminals 1 and 2.

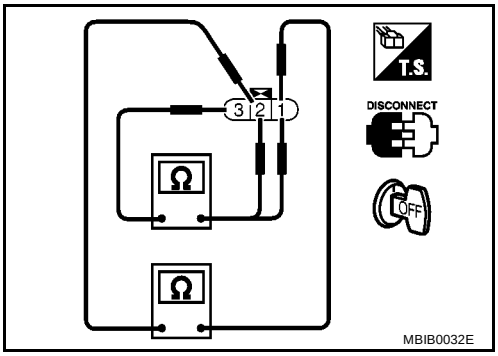
Resistance: Above 1 MΩ at 25°C (77°F)



IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
3 and 1	Except 0 or ∞
3 and 2	Except 0
1 and 2	



EBS00QTB

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-27, "IGNITION COIL" .

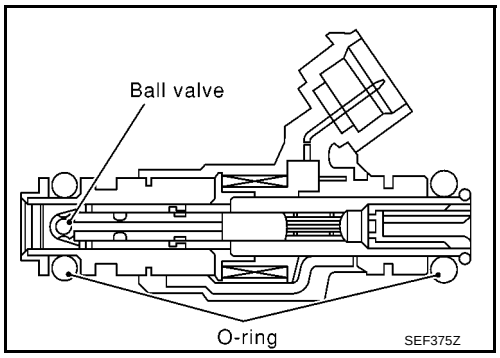
INJECTOR CIRCUIT

PFP:16600

Component Description

EBS00QTC

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QTD

Specification data are reference values.

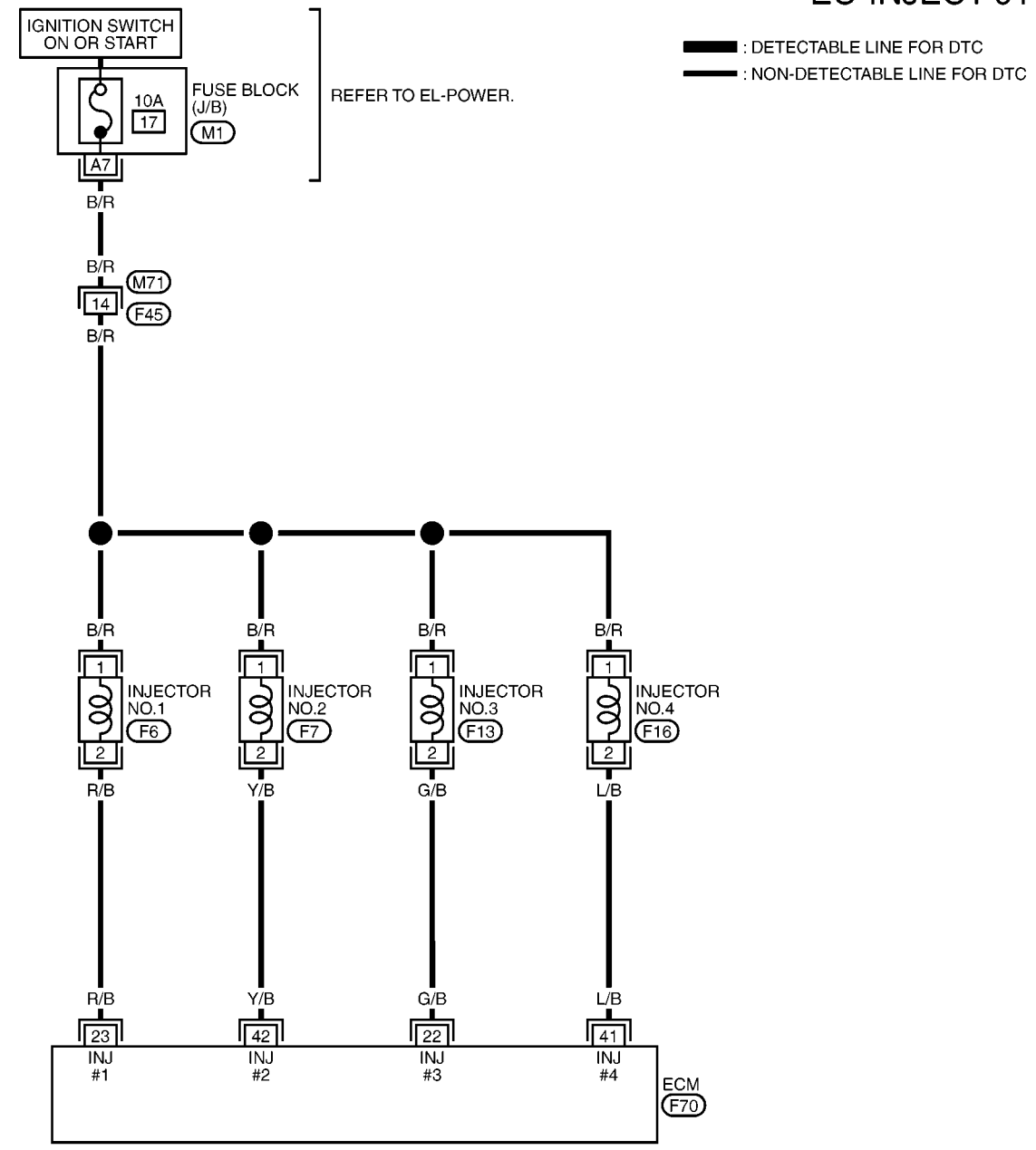
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.5 - 3.0 msec
		2,000 rpm	1.2 - 3.0 msec
INJ PULSE-B1 INJ PULSE-B2*	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.5 msec
		2,000 rpm	1.5 - 3.5 msec

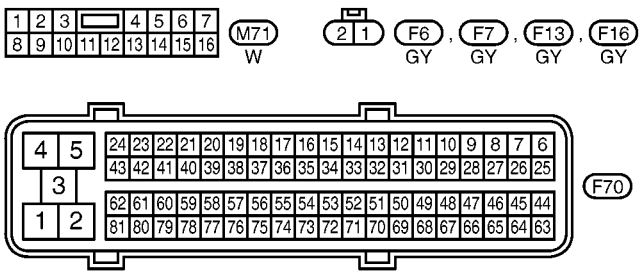
*: This item is displayed with A/T models.

Wiring Diagram

EBS00QTE

EC-INJECT-01





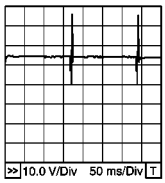
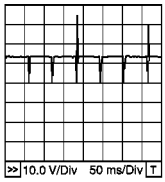
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC474A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QTF

1. INSPECTION START

Turn ignition switch to “START”.

Is any cylinder ignited?

Yes or No

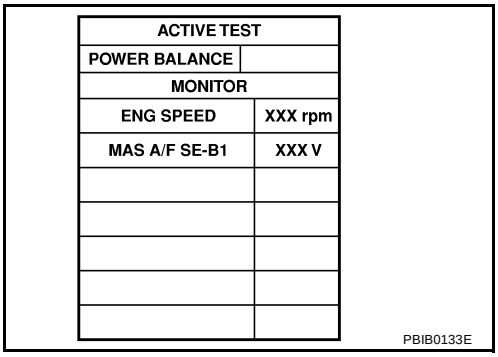
Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK OVERALL FUNCTION

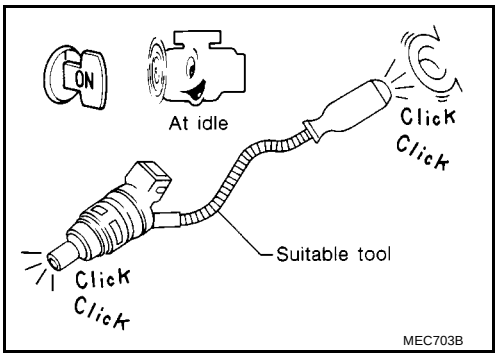
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

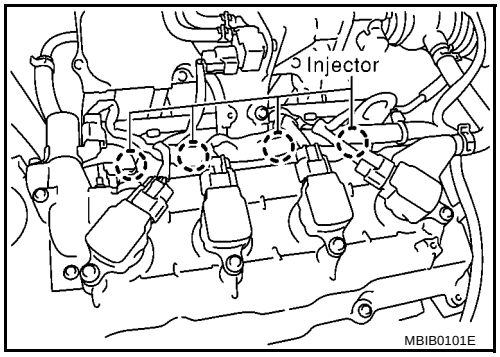


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

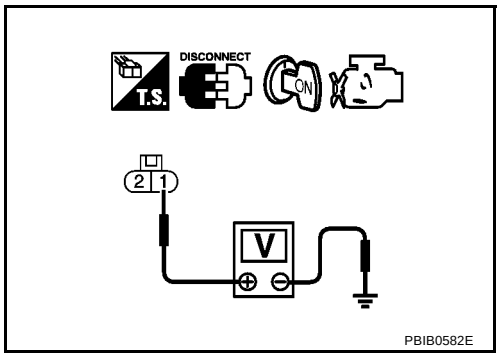
3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect injector harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

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

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INJECTOR

Refer to EC-529, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

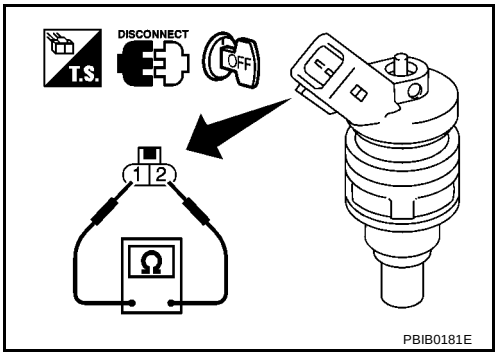
Component Inspection

EBS00QTG

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 20°C (68°F)]



PBIB0181E

Removal and Installation

EBS00QTH

INJECTOR

Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .

FUEL PUMP CIRCUIT

PFP:17042

Description

EBS00QTI

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

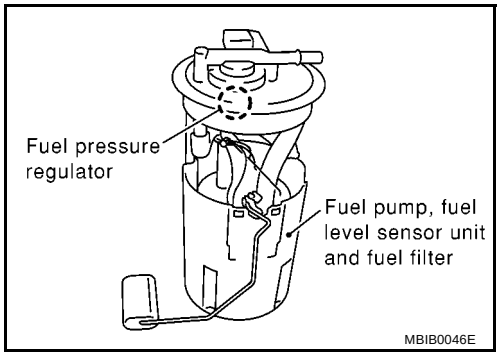
*: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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 (POS) 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 DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

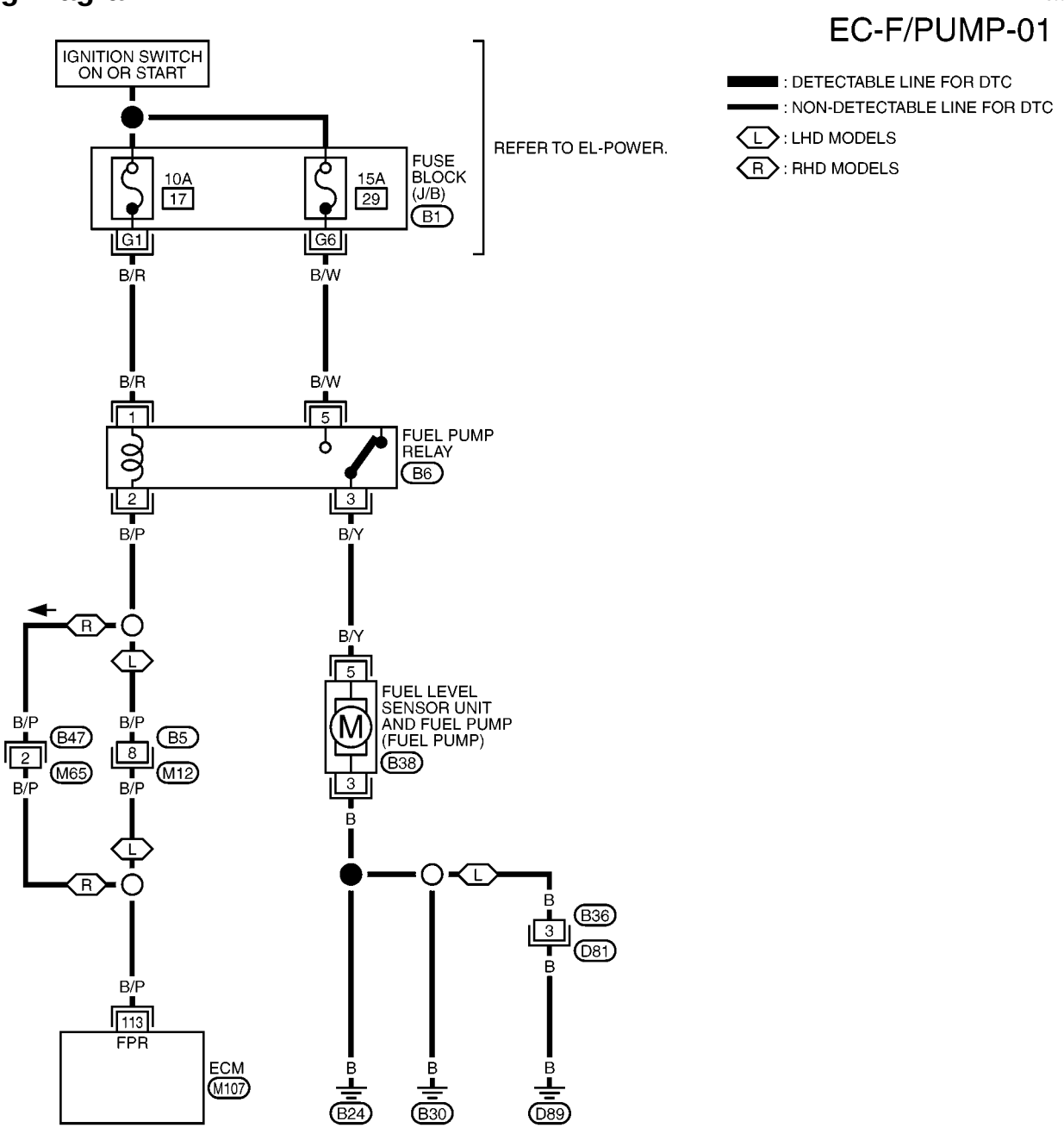
EBS00QTJ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

EBS00QTK



YEC475A

Specification data are reference values and are measured between each terminal 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.

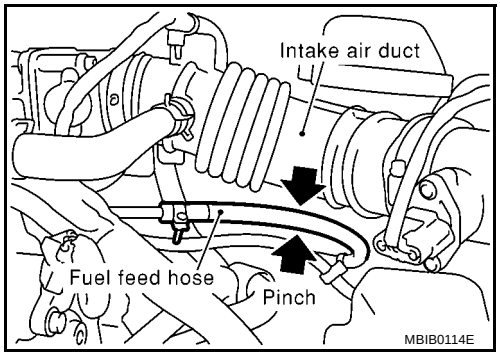
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QTL

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned "ON".

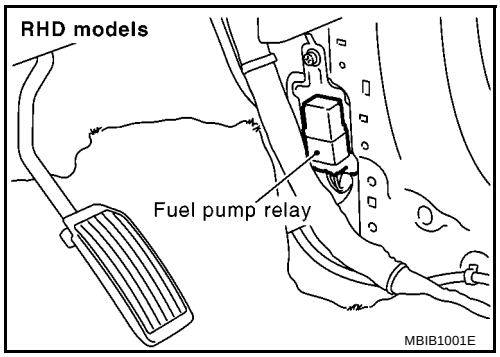


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

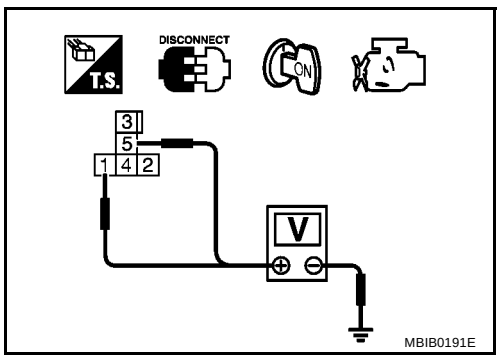
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector B1
- 10A fuse
- 15A fuse
- Harness for open or short between fuel pump relay and fuse

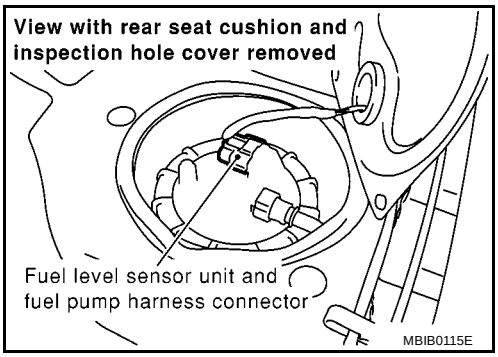
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between fuel pump relay terminal 3 and fuel level sensor unit and fuel pump terminal 5, fuel level sensor unit and fuel pump terminal 3 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B36, D81
- Harness for open or short between fuel level sensor unit and fuel pump and fuel pump relay
- Harness for open or short between fuel level sensor unit and fuel pump and body ground

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

6. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and fuel pump relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M12, B5 (LHD models)
- Harness connectors M65, B42 (RHD models)
- Harness for open or short between ECM and fuel pump relay

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

8. CHECK FUEL PUMP RELAY

Refer to EC-534, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

Refer to EC-534, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

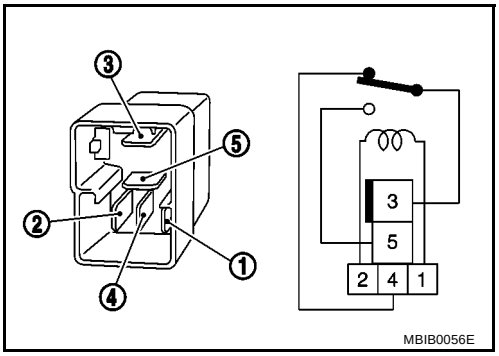
Component Inspection

EBS00QTM

FUEL PUMP RELAY

Check continuity between terminals 3 and 4, 3 and 5 under the following conditions.

Conditions	Terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	No
	3 and 5	Yes
No current supply	3 and 4	Yes
	3 and 5	No

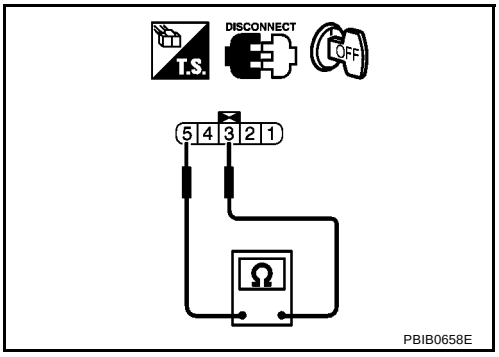


MBIB0056E

FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 3 and 5.

Resistance: Approximately 1.0Ω [at 25°C (77°F)]



PBIB0658E

Removal and Installation

EBS00QTN

FUEL PUMP

Refer to “Fuel Pump, Fuel Level Sensor Unit and Fuel Filter”, FE-9.

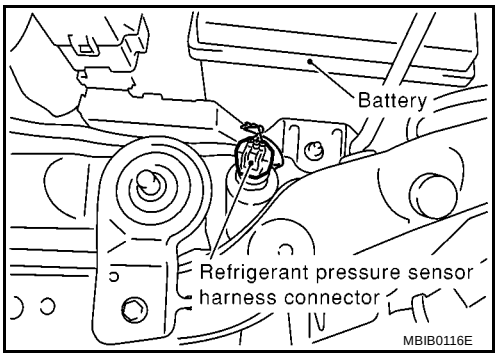
REFRIGERANT PRESSURE SENSOR

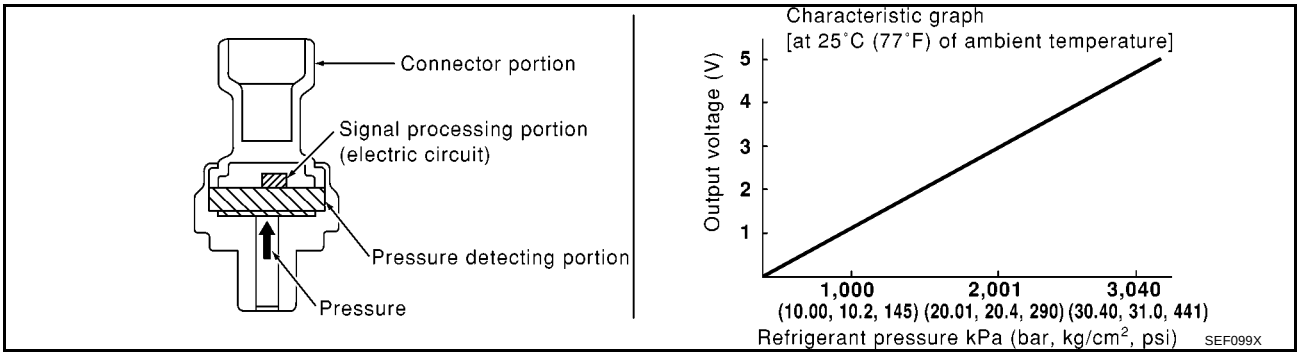
PFP:92136

Component Description

EBS00QTO

The refrigerant pressure sensor is installed at the liquid tank 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.

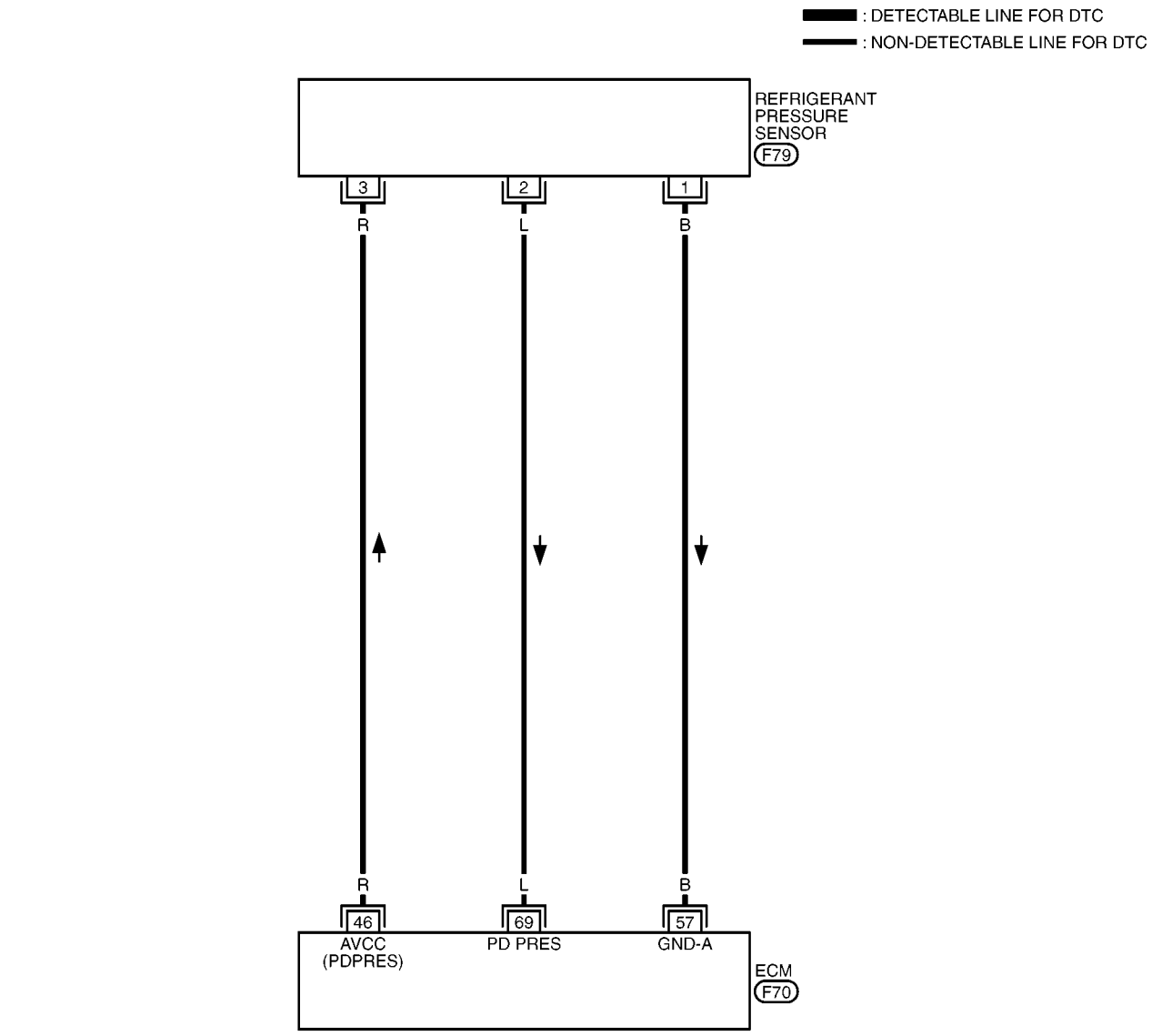


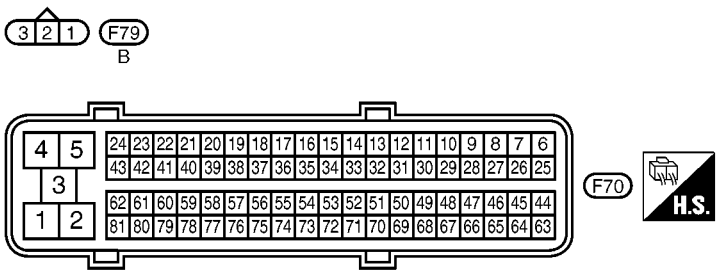


Wiring Diagram

EBS00QTP

EC-RP/SEN-01





YEC476A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V

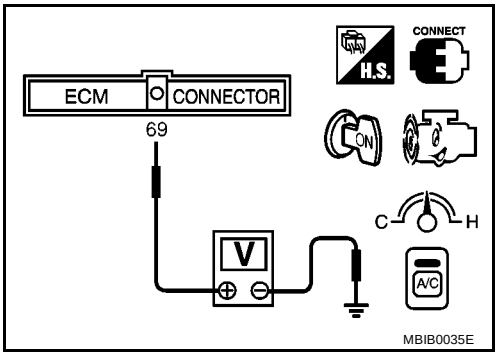
Diagnostic Procedure

EBS00QTQ

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 switch "ON".
3. Check voltage between ECM terminal 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

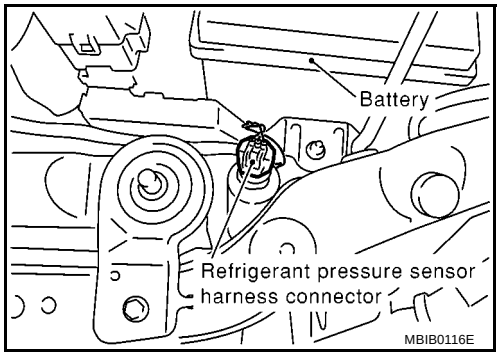


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

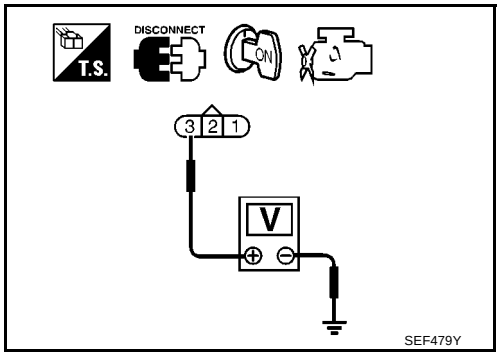
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 57 and refrigerant pressure sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

EBS00QTR

REFRIGERANT PRESSURE SENSOR

Refer to “REFRIGERANT SYSTEM”, ATC-15.

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

EBS00QTS

The electrical load signals except headlamp switch signal are transferred through the CAN communication line.

CONSULT-II Reference Value in Data Monitor Mode

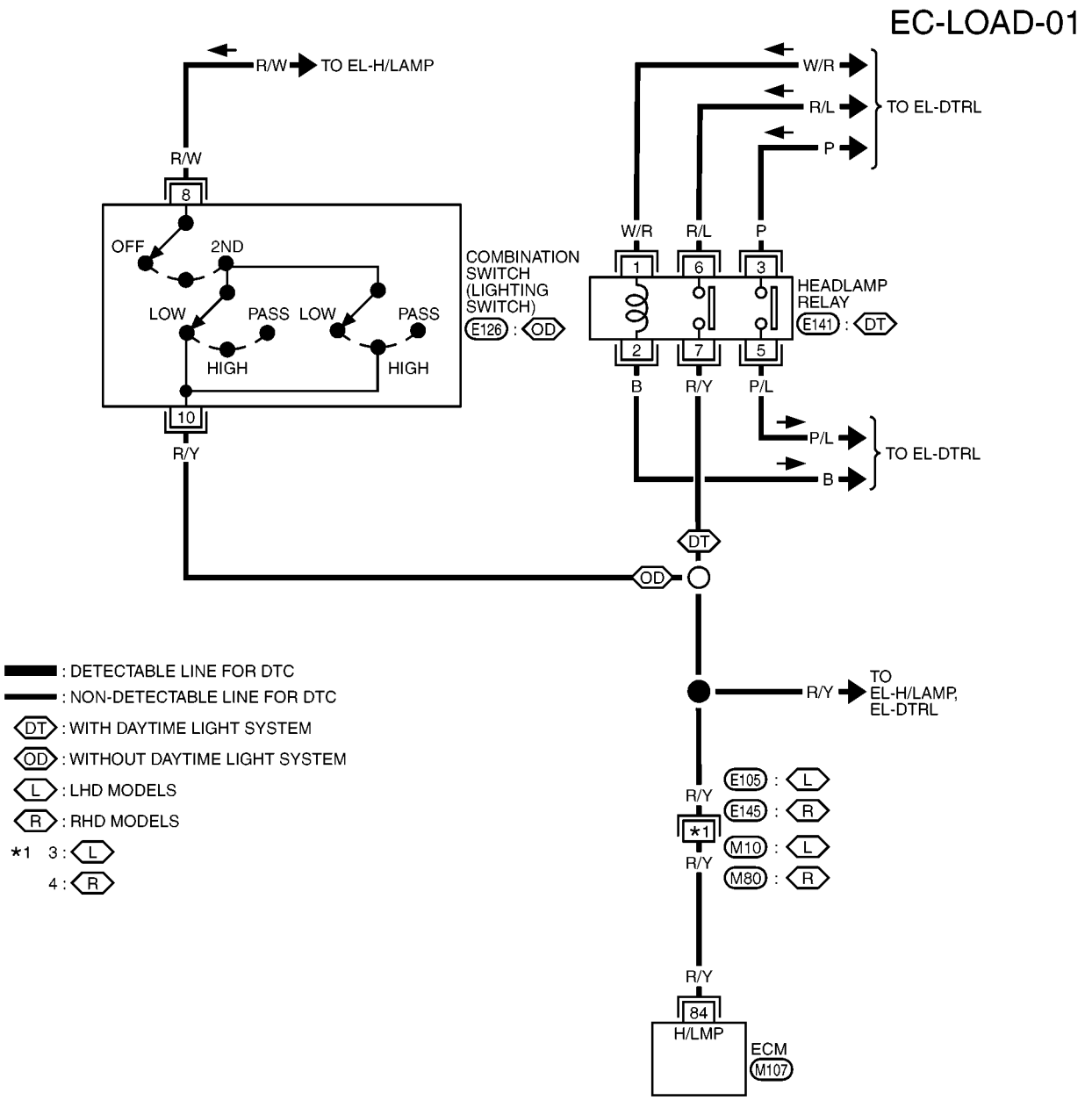
EBS00QTT

Specification data are reference values.

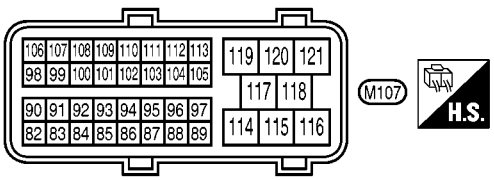
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF

Wiring Diagram

EBS00QTU







YEC477A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V

Diagnostic Procedure

EBS00QTV

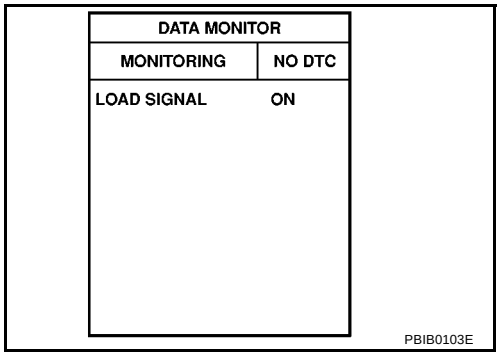
1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

With CONSULT-II

With GST

1. Turn ignition switch "ON".
2. Connect CONSULT-II or GST and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF



OK or NG

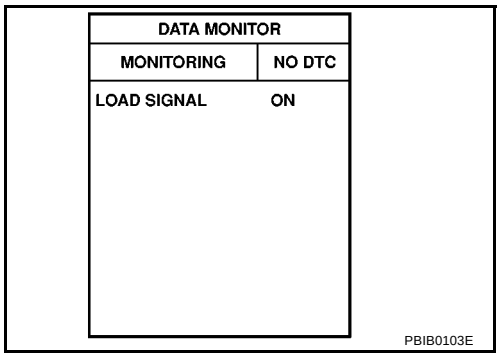
OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> GO TO 4.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch "ON" at 2nd position	ON
Lighting switch "OFF"	OFF



OK or NG

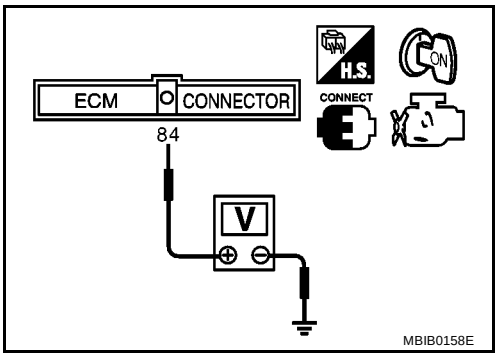
OK >> **INSPECTION END**
NG >> GO TO 5.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch “ON” at 2nd position	Battery voltage
Lighting switch “OFF”	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to “REAR WINDOW DEFOGGER”, EL-177.

>> **INSPECTION END**

5. CHECK HEADLAMP FUNCTION

1. Turn lighting switch “ON” at 2nd position.
2. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 6.
NG >> Refer to “HEADLAMP-DAYTIME LIGHT SYSTEM-”, EL-45 or “HEADLAMP-HEADLAMP AIMING CONTROL-”, EL-52.

6. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

WITHOUT DAYTIME LIGHT SYSTEM

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect combination switch (lighting switch) harness connector.
4. Check harness continuity between ECM terminal 84 and combination switch (lighting switch) terminal 10. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

WITH DAYTIME LIGHT SYSTEM

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect headlamp relay.
4. Check harness continuity between ECM terminal 84 and headlamp relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10 (LHD models)
- Harness connectors E145, M80 (RHD models)
- harness for open and short between ECM and combination switch (lighting switch)
- harness for open and short between ECM and headlamp relay

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

8. CHECK INTERMITTENT INCIDENT

Refer to EC-138, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

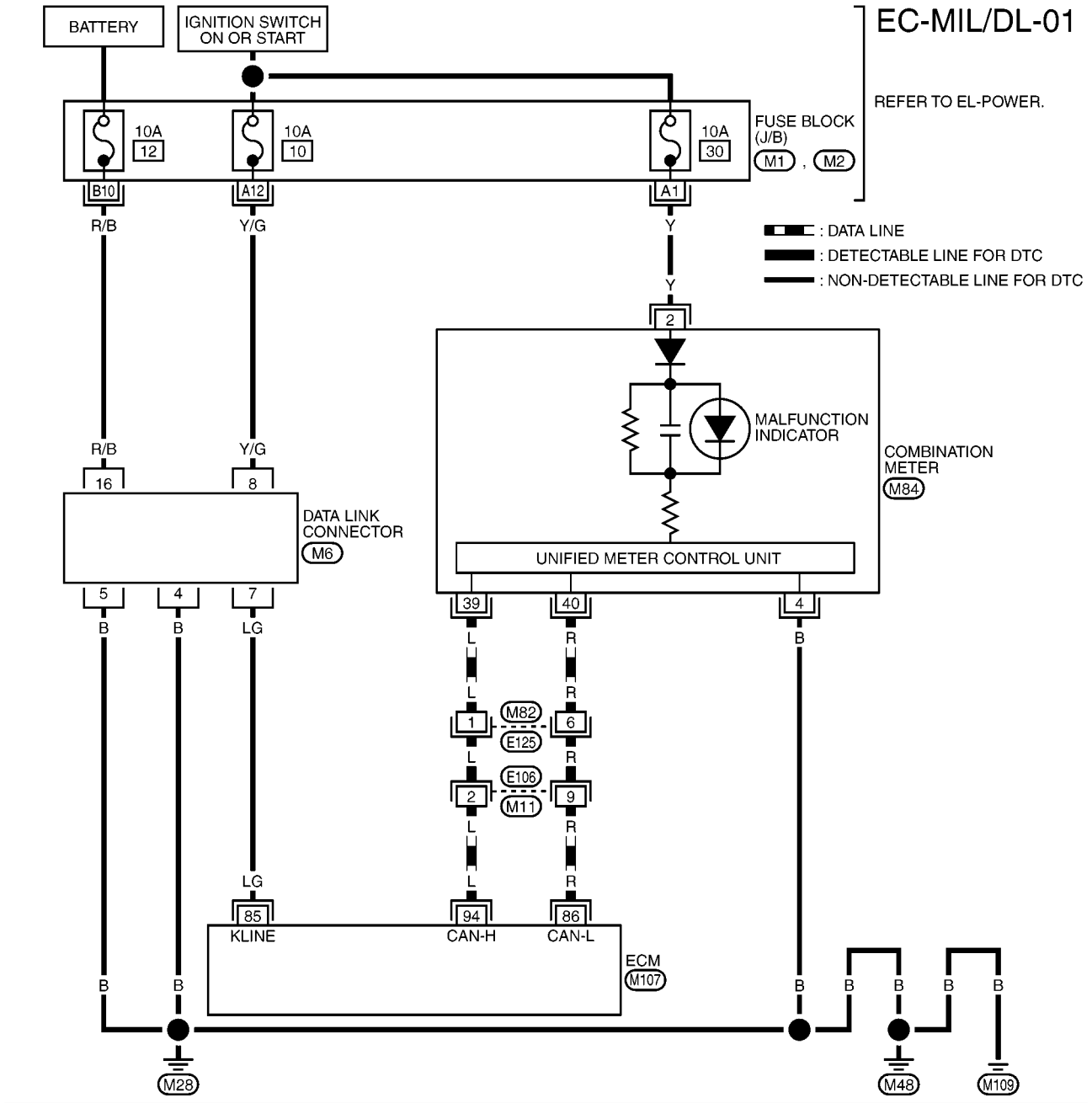
>> **INSPECTION END**

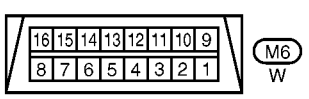
MI & DATA LINK CONNECTORS

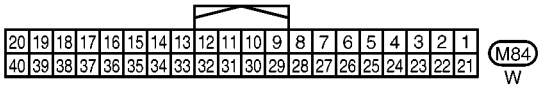
PFP:24814

Wiring Diagram—LHD Models

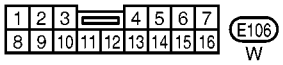
EBS00QTW

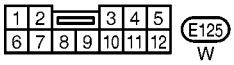


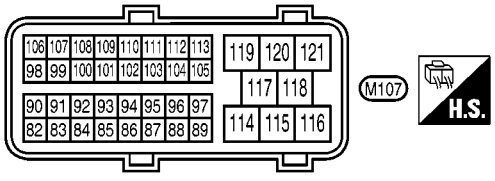




REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)



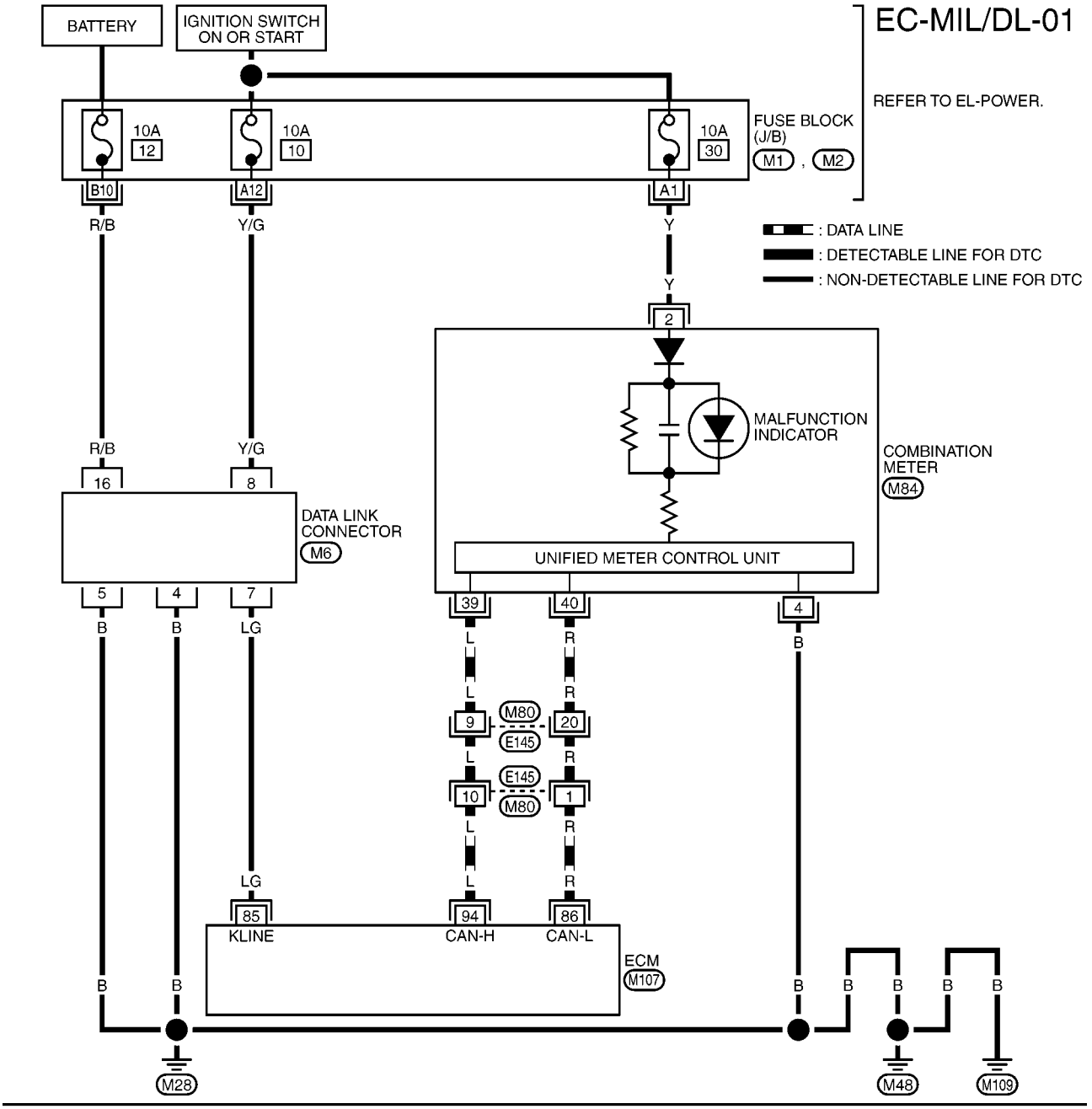


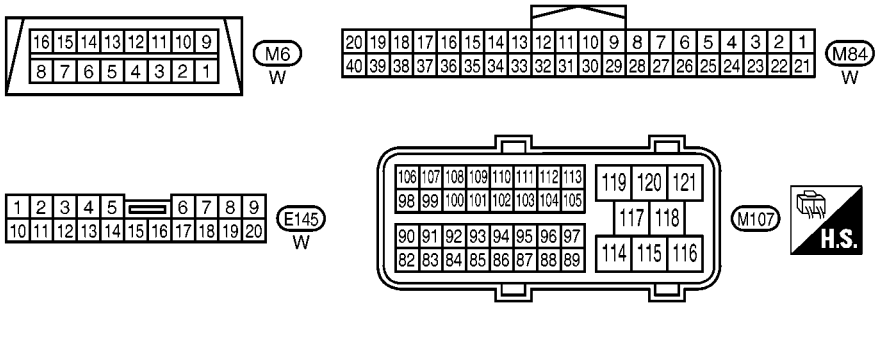


YEC478A

Wiring Diagram—RHD Models

EBS00QTX





REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

YEC479A

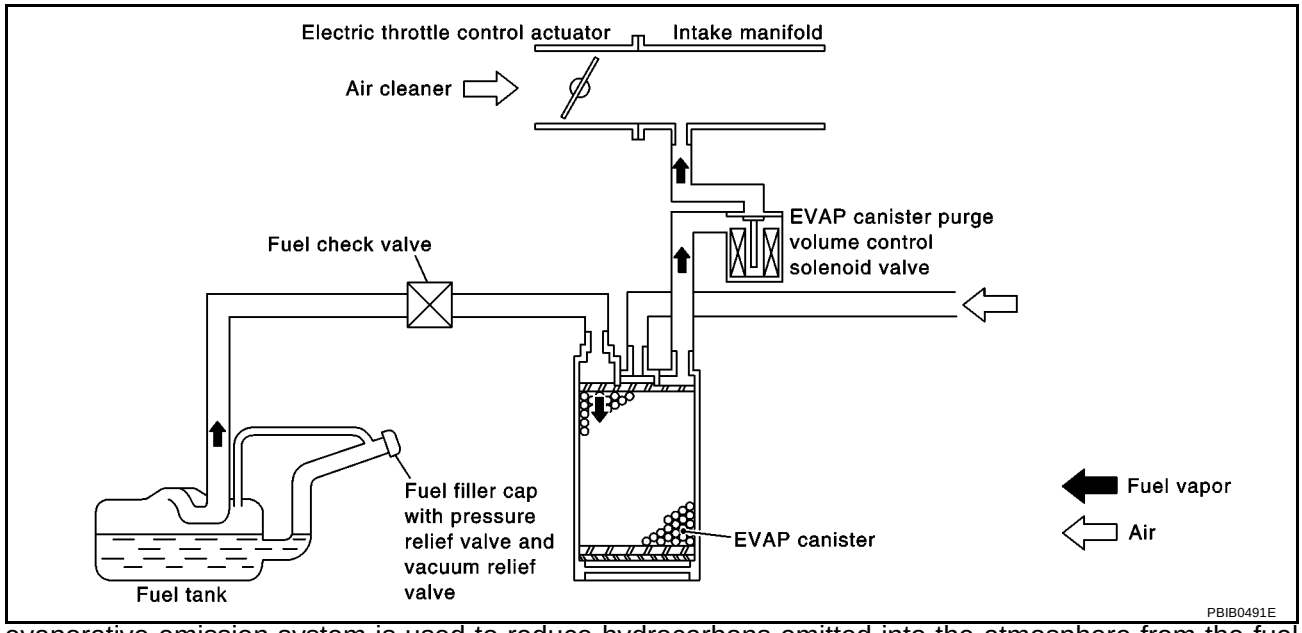
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

EBS00QTY

SYSTEM DESCRIPTION



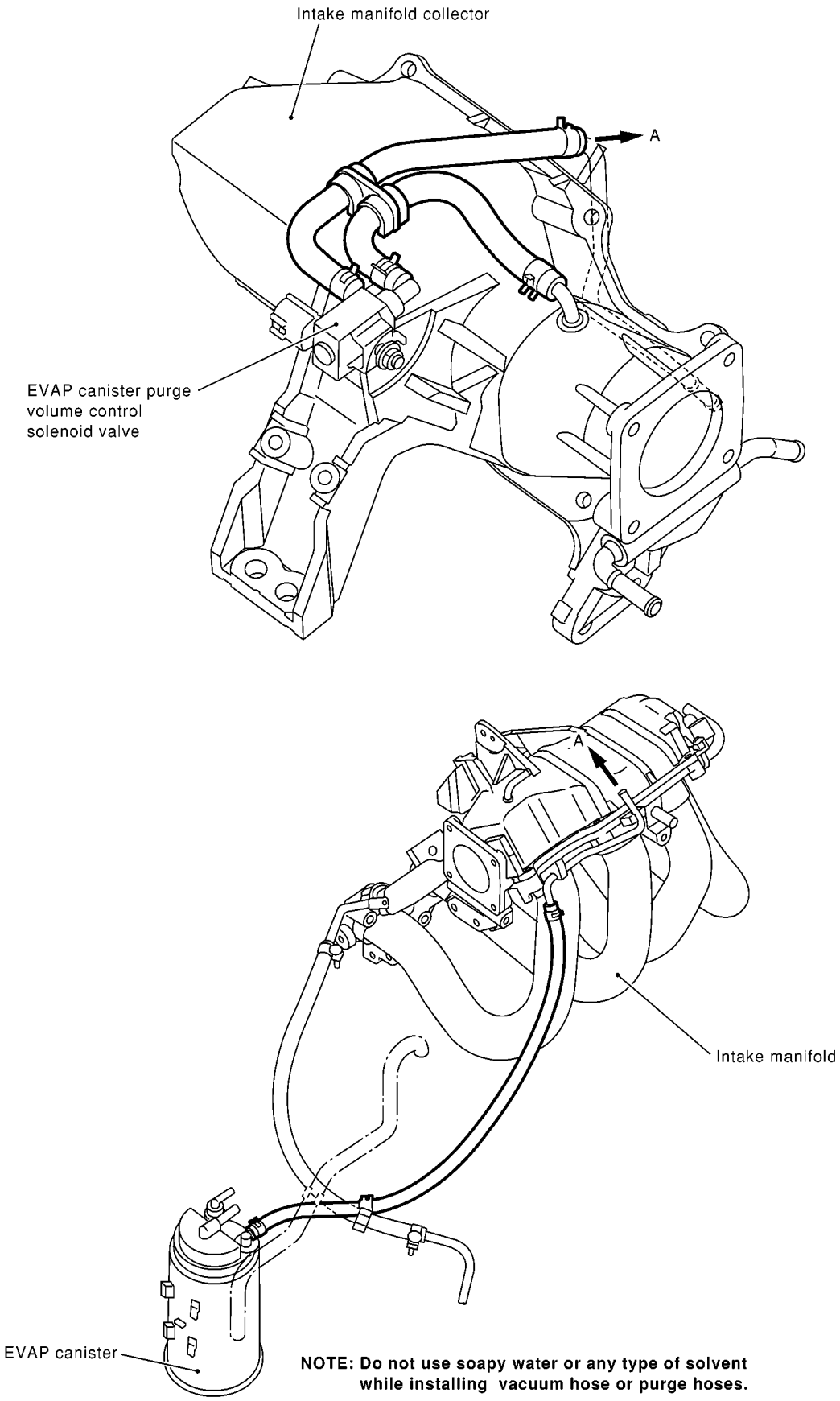
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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 and idling.

EVAPORATIVE EMISSION LINE DRAWING



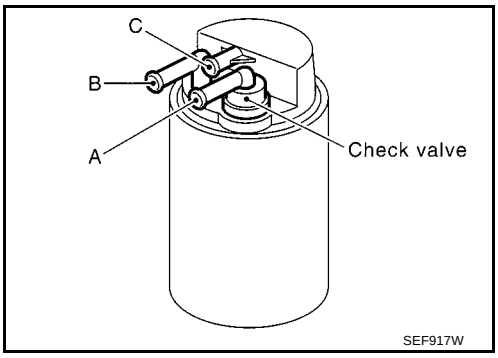
Component Inspection

EBS00QTZ

EVAP CANISTER

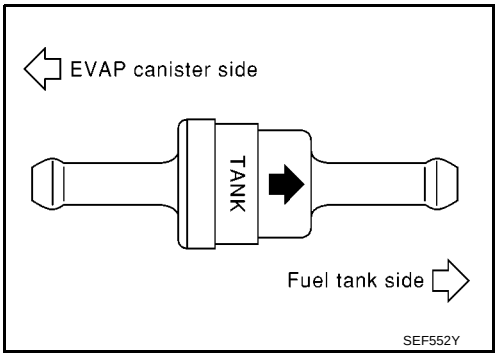
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** . Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** . Check that air flows freely through port **C** .



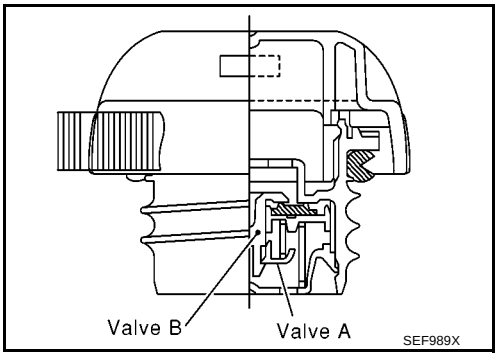
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

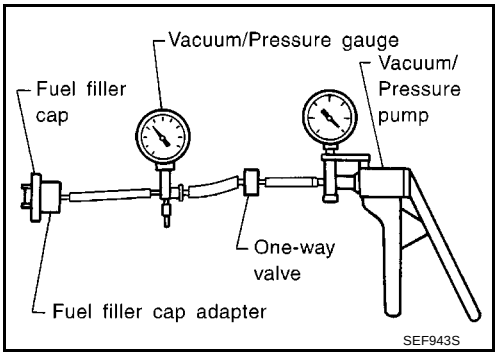
1. Wipe clean valve housing.



2. 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 –3.3 kPa (–0.060 to –0.033 bar, –0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)**

3. If out of specification, replace fuel filler cap as an assembly.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-370, "Component Inspection" .

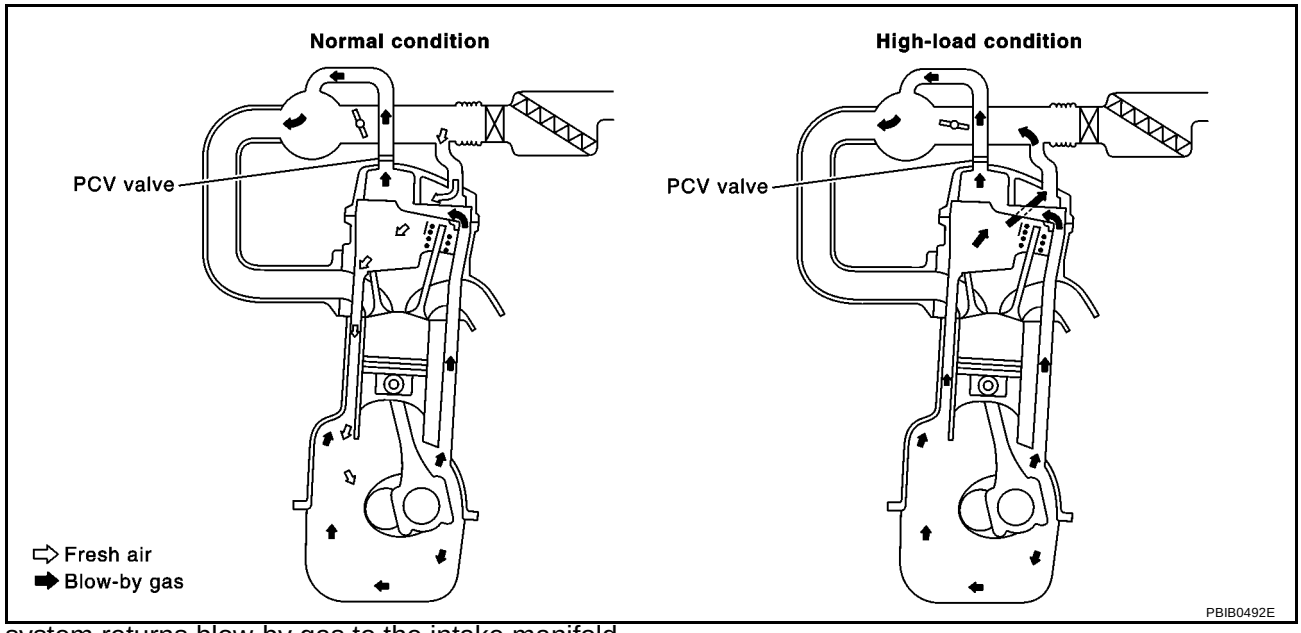
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

EBS00QU0

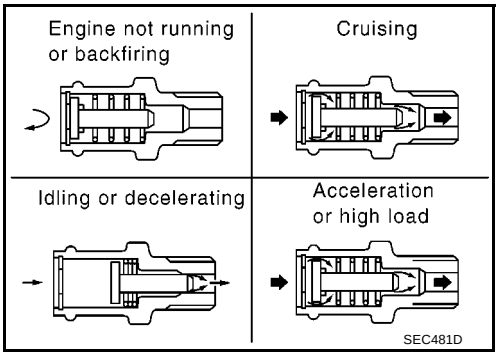
SYSTEM DESCRIPTION



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.

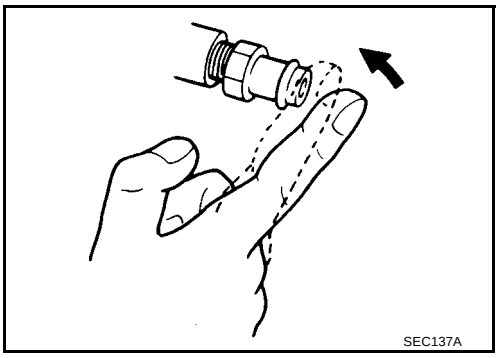


Component Inspection

EBS00QU1

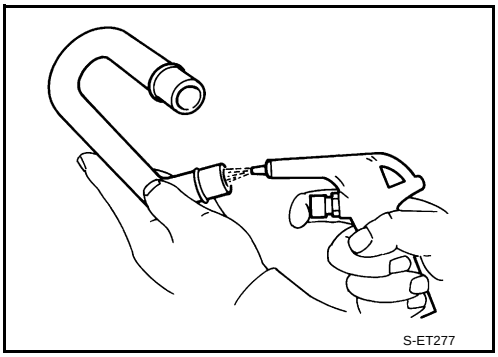
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

EBS00QU2

Fuel pressure at idle	Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

Idle Speed and Ignition Timing

EBS00QU3

Target idle speed	A/T	No-load*1 (in “P” or N” position)	800±50 rpm
	M/T	No-load*1 (in “Neutral” position)	700±50 rpm
Air conditioner: ON	A/T	In “P” or N” position	900 rpm or more
	M/T	In “Neutral” position	
Ignition timing	A/T	In “P” or N” position	10°±5° BTDC
	M/T	In “Neutral” position	8°±5° BTDC

*1: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

EBS00QU4

	Calculated load value % (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

EBS00QU5

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.7*V
Mass air flow (Using CONSULT-II or GST)	1.0 - 4.0 g·m/sec at idle* 5.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

EBS00QU6

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

EBS00QU7

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

EBS00QU8

Resistance [at 25°C (77°F)]	8 - 10Ω

Heated Oxygen sensor 2 Heater

EBS00QU9

Resistance [at 25°C (77°F)]	5.0 - 7.0Ω

Crankshaft Position Sensor (POS)

EBS00QUA

Refer to EC-347, "Component Inspection" .

Camshaft Position Sensor (PHASE)

EBS00QUB

Refer to EC-353, "Component Inspection" .

Throttle Control Motor

EBS00QUC

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

EBS00QUD

Resistance [at 20°C (68°F)]	13.5 - 17.5Ω

Fuel Pump

EBS00QUE

Resistance [at 25°C (77°F)]	Approximately 1.0Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

EBS00QUF

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to “INDENTIFICATION PLATE”, GI-40.

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-651, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II	ECM*2			
APP SEN 1/CIRC	P0227	0227	1	×	EC-728
APP SEN 1/CIRC	P0228	0228	1	×	EC-728
APP SEN 2/CIRC	P1227	1227	1	×	EC-801
APP SEN 2/CIRC	P1228	1228	1	×	EC-801
APP SENSOR	P0226	0226	1	×	EC-722
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-811
CAN COMM CIRCUIT	U1001	1001*4	2	—	EC-651
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-738
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-745
CTP LEARNING	P1225	1225	2	—	EC-797
CTP LEARNING	P1226	1226	2	—	EC-799
ECM	P0605	0605	1 or 2	× or —	EC-752
ECM BACK UP/CIRC	P1065	1065	2	×	EC-755
ECT SEN/CIRCUIT	P0117	0117	2	×	EC-660
ECT SEN/CIRCUIT	P0118	0118	2	×	EC-660
ENG OVER TEMP	P1217	1217	1	×	EC-780
ETC ACTR	P1121	1121	1 or 2	×	EC-759
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-762
ETC MOT	P1128	1128	1	×	EC-775
ETC MOT PWR	P1124	1124	1	×	EC-769
ETC MOT PWR	P1126	1126	1	×	EC-769
HO2S1 (B1)	P0132	0132	2	×	EC-665
HO2S1 (B1)	P0134	0134	2	×	EC-680
HO2S2 (B1)	P0138	0138	2	×	EC-695
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-734
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-734
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-654
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-654
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-583
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*3	—	Flashing*3	EC-585
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II	ECM*2			
SENSOR POWER/CIRC	P1229	1229	1	×	EC-807
TP SEN 1/CIRC	P0222	0222	1	×	EC-716
TP SEN 1/CIRC	P0223	0223	1	×	EC-716
TP SEN 2/CIRC	P1223	1223	1	×	EC-791
TP SEN 2/CIRC	P1224	1224	1	×	EC-791
TP SENSOR	P0221	0221	1	×	EC-710

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*3: When engine is running.
*4: The trouble shooting for this DTC needs CONSULT-II.

A/T MODELS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II	ECM*2			
APP SEN 1/CIRC	P0227	0227	1	×	EC-728
APP SEN 1/CIRC	P0228	0228	1	×	EC-728
APP SEN 2/CIRC	P1227	1227	1	×	EC-801
APP SEN 2/CIRC	P1228	1228	1	×	EC-801
APP SENSOR	P0226	0226	1	×	EC-722
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-811
CAN COMM CIRCUIT	U1000	1000*4	2	—	EC-651
CAN COMM CIRCUIT	U1001	1001*4	2	—	EC-651
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-738
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-745
CTP LEARNING	P1225	1225	2	—	EC-797
CTP LEARNING	P1226	1226	2	—	EC-799
ECM	P0605	0605	1 or 2	× or —	EC-752
ECM BACK UP/CIRC	P1065	1065	2	×	EC-755
ECT SEN/CIRCUIT	P0117	0117	2	×	EC-660
ECT SEN/CIRCUIT	P0118	0118	2	×	EC-660
ENG OVER TEMP	P1217	1217	1	×	EC-780
ETC ACTR	P1121	1121	1 or 2	×	EC-759
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-762
ETC MOT	P1128	1128	1	×	EC-775
ETC MOT PWR	P1124	1124	1	×	EC-769
ETC MOT PWR	P1126	1126	1	×	EC-769
HO2S1 (B1)	P0132	0132	2	×	EC-671
HO2S1 (B1)	P0134	0134	2	×	EC-686
HO2S1 (B2)	P0152	0152	2	×	EC-671
HO2S1 (B2)	P0154	0154	2	×	EC-686
HO2S2 (B1)	P0138	0138	2	×	EC-701
HO2S2 (B2)	P0158	0158	2	×	EC-701
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-734

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II	ECM*2			
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-734
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-654
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-654
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-583
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*3	—	Flashing*3	EC-585
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—
SENSOR POWER/CIRC	P1229	1229	1	×	EC-807
TP SEN 1/CIRC	P0222	0222	1	×	EC-716
TP SEN 1/CIRC	P0223	0223	1	×	EC-716
TP SEN 2/CIRC	P1223	1223	1	×	EC-791
TP SEN 2/CIRC	P1224	1224	1	×	EC-791
TP SENSOR	P0221	0221	1	×	EC-710

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*3: When engine is running.
*4: The trouble shooting for this DTC needs CONSULT-II.

NOTE:
Regarding V10 models with A/T, “B1” indicates bank 1 (cylinders number 1 and 4), “B2” indicates bank 2 (cylinders number 2 and 3).

DTC No. Index

EBS00QUG

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to “IDENTIFICATION PLATE”, GI-40.

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-651, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

×: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II	ECM*2				
No DTC	Flashing*3	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*3	EC-585
U1001	1001*4	CAN COMM CIRCUIT	2	—	EC-651
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-654
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-654
P0117	0117	ECT SEN/CIRCUIT	2	×	EC-660
P0118	0118	ECT SEN/CIRCUIT	2	×	EC-660
P0132	0132	HO2S1 (B1)	2	×	EC-665
P0134	0134	HO2S1 (B1)	2	×	EC-680
P0138	0138	HO2S2 (B1)	2	×	EC-695

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II	ECM*2				
P0221	0221	TP SENSOR	1	×	EC-710
P0222	0222	TP SEN 1/CIRC	1	×	EC-716
P0223	0223	TP SEN 1/CIRC	1	×	EC-716
P0226	0226	APP SENSOR	1	×	EC-722
P0227	0227	APP SEN 1/CIRC	1	×	EC-728
P0228	0228	APP SEN 1/CIRC	1	×	EC-728
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-734
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-734
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-738
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-745
P0605	0605	ECM	1 or 2	× or —	EC-752
P1065	1065	ECM BACK UP/CIRC	2	×	EC-755
P1121	1121	ETC ACTR	1 or 2	×	EC-759
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-762
P1124	1124	ETC MOT PWR	1	×	EC-769
P1126	1126	ETC MOT PWR	1	×	EC-769
P1128	1128	ETC MOT	1	×	EC-775
P1217	1217	ENG OVER TEMP	1	×	EC-780
P1223	1223	TP SEN 2/CIRC	1	×	EC-791
P1224	1224	TP SEN 2/CIRC	1	×	EC-791
P1225	1225	CTP LEARNING	2	—	EC-797
P1226	1226	CTP LEARNING	2	—	EC-799
P1227	1227	APP SEN 2/CIRC	1	×	EC-801
P1228	1228	APP SEN 2/CIRC	1	×	EC-801
P1229	1229	SENSOR POWER/CIRC	1	×	EC-807
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EC-583
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-811

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*3: When engine is running.
*4: The troubleshooting for this DTC needs CONSULT-II.

A/T MODELS

×: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II	ECM*2				
No DTC	Flashing*3	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*3	EC-585
U1000	1000*4	CAN COMM CIRCUIT	2	—	EC-651
U1001	1001*4	CAN COMM CIRCUIT	2	—	EC-651
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-654
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-654

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II	ECM*2				
P0117	0117	ECT SEN/CIRCUIT	2	×	EC-660
P0118	0118	ECT SEN/CIRCUIT	2	×	EC-660
P0132	0132	HO2S1 (B1)	2	×	EC-671
P0134	0134	HO2S1 (B1)	2	×	EC-686
P0138	0138	HO2S2 (B1)	2	×	EC-701
P0152	0152	HO2S1 (B2)	2	×	EC-671
P0154	0154	HO2S1 (B2)	2	×	EC-686
P0158	0158	HO2S2 (B2)	2	×	EC-701
P0221	0221	TP SENSOR	1	×	EC-710
P0222	0222	TP SEN 1/CIRC	1	×	EC-716
P0223	0223	TP SEN 1/CIRC	1	×	EC-716
P0226	0226	APP SENSOR	1	×	EC-722
P0227	0227	APP SEN 1/CIRC	1	×	EC-728
P0228	0228	APP SEN 1/CIRC	1	×	EC-728
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-734
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-734
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-738
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-745
P0605	0605	ECM	1 or 2	× or —	EC-752
P1065	1065	ECM BACK UP/CIRC	2	×	EC-755
P1121	1121	ETC ACTR	1 or 2	×	EC-759
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-762
P1124	1124	ETC MOT PWR	1	×	EC-769
P1126	1126	ETC MOT PWR	1	×	EC-769
P1128	1128	ETC MOT	1	×	EC-775
P1217	1217	ENG OVER TEMP	1	×	EC-780
P1223	1223	TP SEN 2/CIRC	1	×	EC-791
P1224	1224	TP SEN 2/CIRC	1	×	EC-791
P1225	1225	CTP LEARNING	2	—	EC-797
P1226	1226	CTP LEARNING	2	—	EC-799
P1227	1227	APP SEN 2/CIRC	1	×	EC-801
P1228	1228	APP SEN 2/CIRC	1	×	EC-801
P1229	1229	SENSOR POWER/CIRC	1	×	EC-807
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EC-583
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-811

*1: 1st trip DTC No. is the same as DTC No.
*2: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*3: When engine is running.
*4: The troubleshooting for this DTC needs CONSULT-II.

NOTE:
Regarding V10 models with A/T, “B1” indicates bank 1 (cylinders number 1 and 4), “B2” indicates bank 2 (cylinders number 2 and 3).

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS00QUH

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. Information necessary to service the system safely is included in the SRS 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 SRS 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.**

On Board Diagnostic (OBD) System of Engine

EBS00QUI

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.

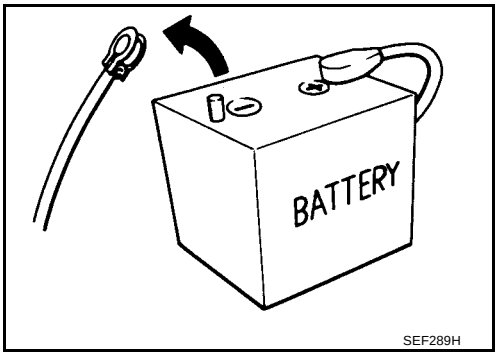
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground 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 “HARNESS CONNECTOR”, EL-7.**
- **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 erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precaution

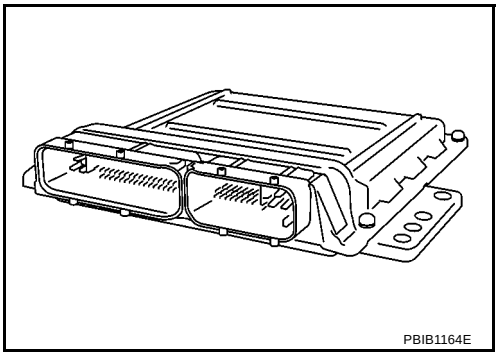
EBS00QUJ

- **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 battery ground 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.**

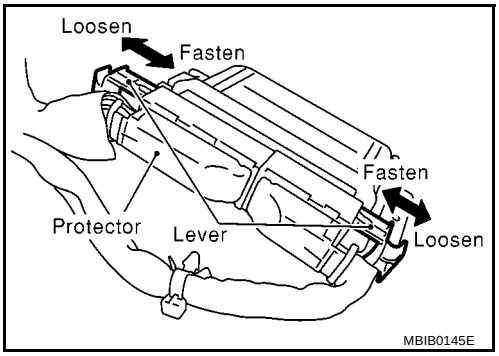


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

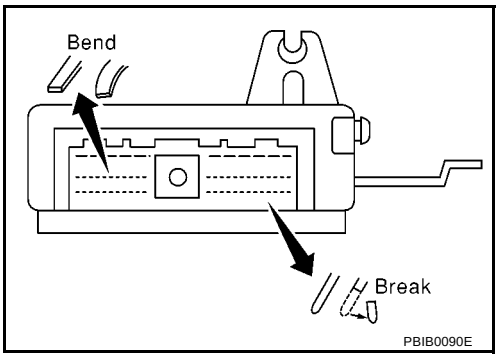

PBIB1164E

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at right.**



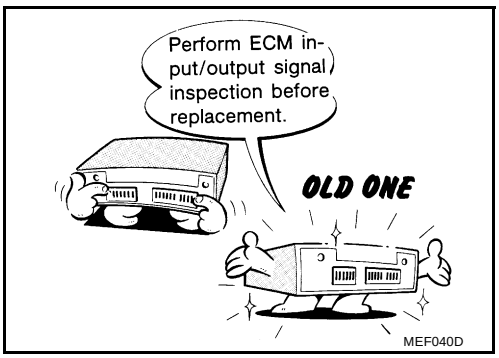
MBIB0145E

- **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.**



PBIB0090E

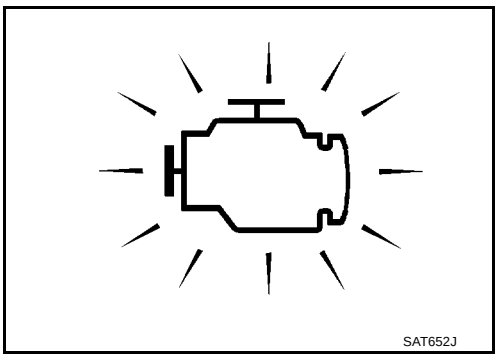
- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-610, "ECM Terminals and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**



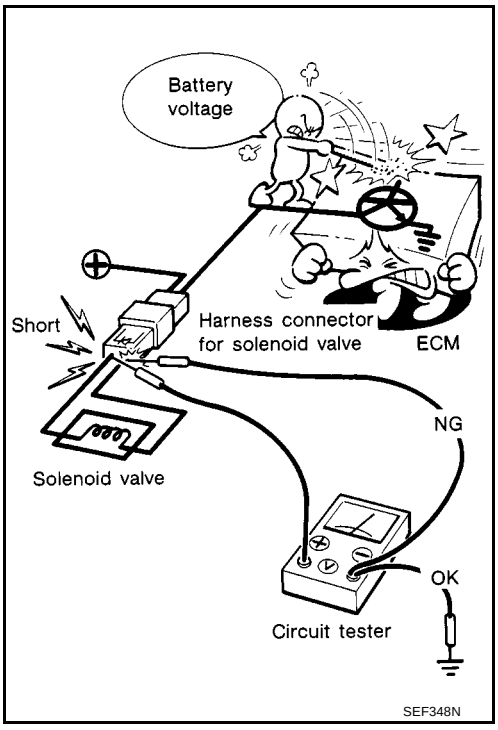
MEF040D

- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

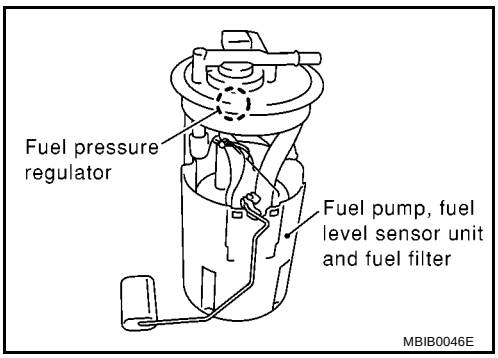
- **After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".**
  The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.



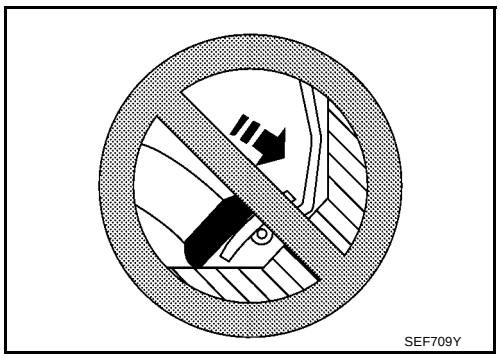
- **When measuring ECM signals with a circuit tester, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.**
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a 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.**



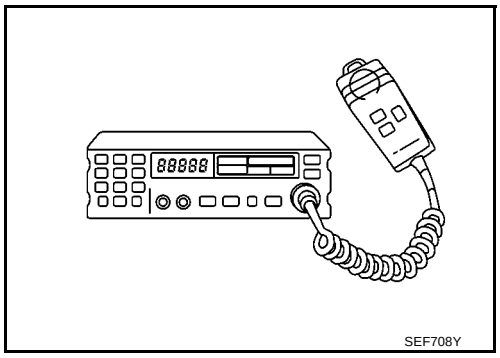
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



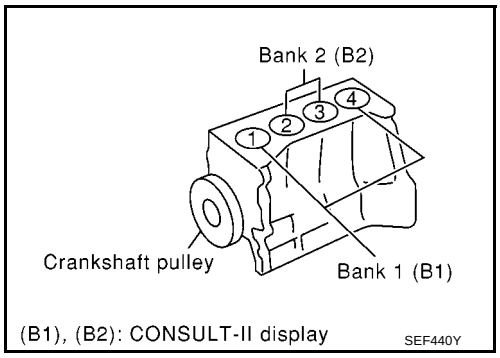
- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **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 radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**
- **Regarding V10 models with A/T, "B1" indicates bank 1 (cylinders number 1 and 4), "B2" indicates bank 2 (cylinders number 2 and 3).**



SEF708Y



SEF440Y

Wiring Diagrams and Trouble Diagnosis

EBS00QUK

When you read wiring diagrams, refer to the following:

- "HOW TO READ WIRING DIAGRAMS", GI-11
- "POWER SUPPLY ROUTING", EL-11 for power distribution circuit

When you perform trouble diagnosis, refer to the following:

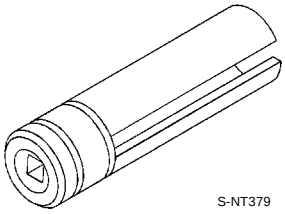
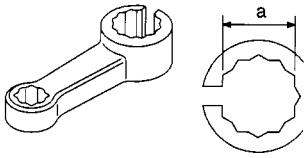
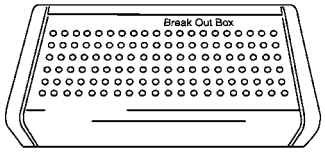
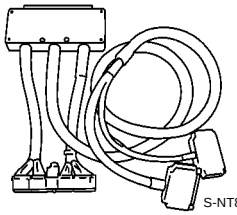
- "How to Follow Test Groups in Trouble Diagnoses", GI-32
- "HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT", GI-21

PREPARATION

PFP:00002

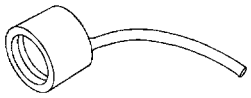
Special Service Tools

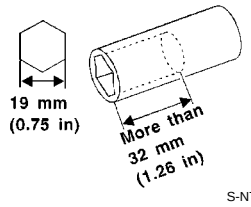
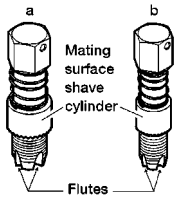
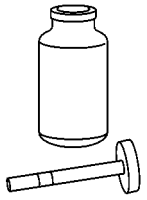
EBS00QUL

Tool number Tool name	Description	
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors **a: 22 mm (0.87 in)**
KV109E0010 Break-out box	 S-NT825	Measuring ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 S-NT826	Measuring ECM signals with a circuit tester

Commercial Service Tools

EBS00QUM

Tool name	Description	
Quick connector release	 PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter	 S-NT653	Checking fuel tank vacuum relief valve opening pressure

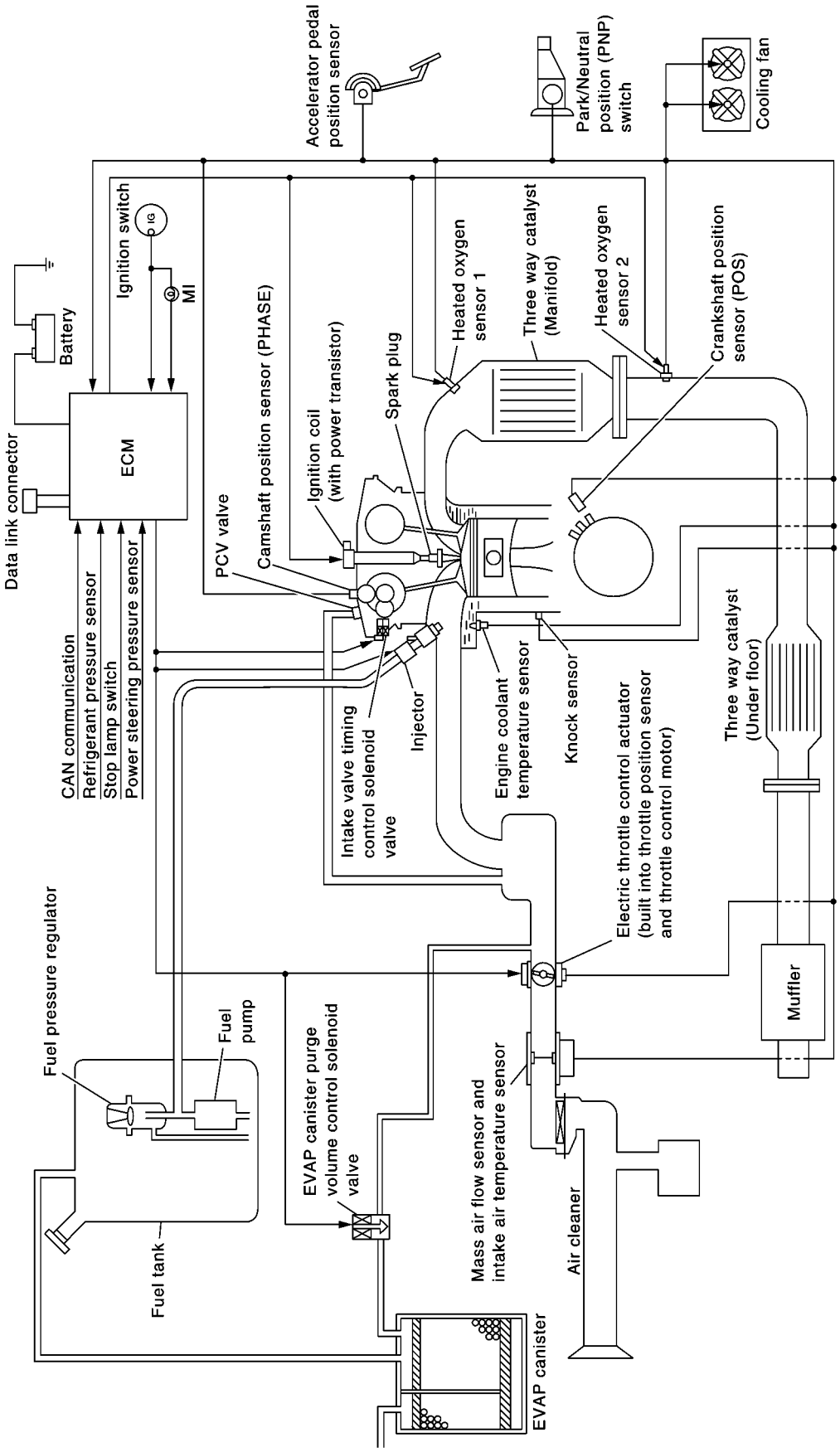
Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 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 ie: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram - M/T Models

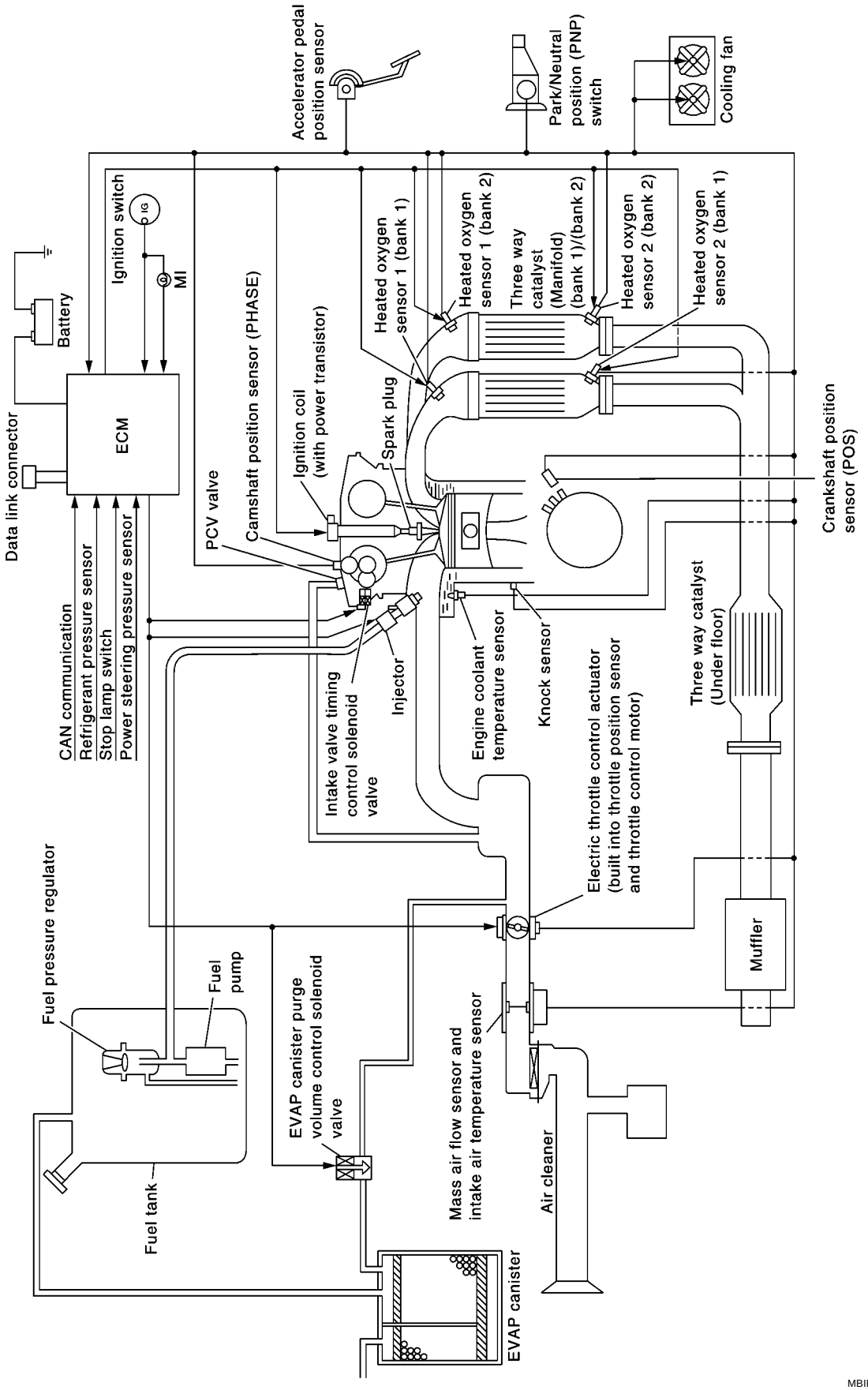
EBS00QUN



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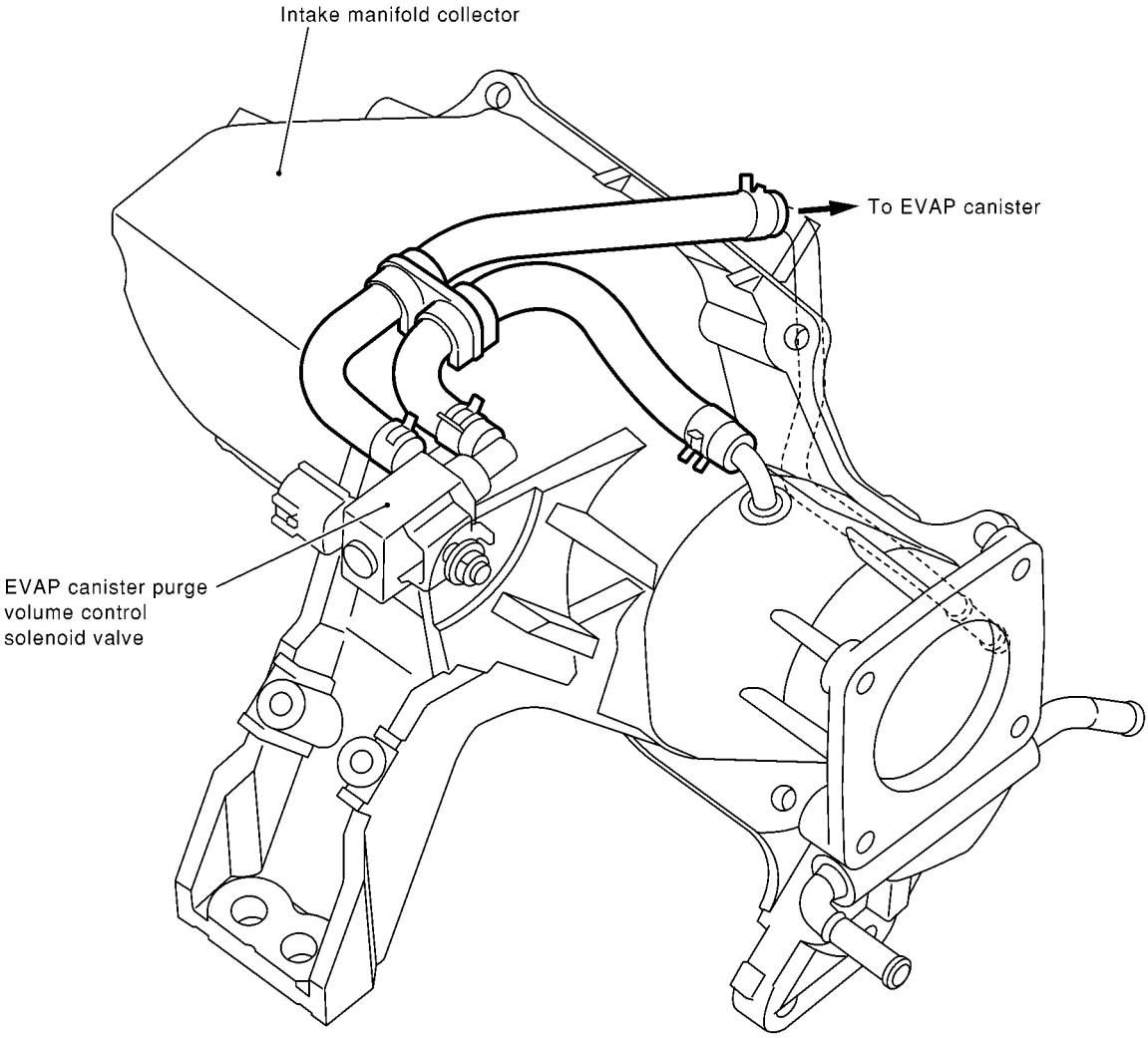
System Diagram - A/T Models

EBS00QUO



Vacuum Hose Drawing

EBS00QUP



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

MBIB0013E

Refer to EC-565, "System Diagram - M/T Models" or EC-566, "System Diagram - A/T Models" for Vacuum Control System.

System Chart

EBS00QUQ

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Power steering pressure sensor ● Ignition switch ● Stop lamp switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Heated oxygen sensor 2*1 ● TCM (Transmission control module)*2 ● Air conditioner switch*2 ● Vehicle speed signal*2 ● Electrical load signal*2	Fuel injection & mixture ratio control	Fuel injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MI (On the instrument panel)*3
	Intake valve timing control	Intake valve timing control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay*3
	Cooling fan control	Cooling fan relays*3

*1: This sensor is not used to control the engine system under normal conditions.
*2: The signals are sent to the ECM through CAN communication line.
*3: The output signals are sent from the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

EBS00QUR

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*3 and piston position	Fuel injection & mixture ratio control	Fuel injectors
Mass air flow sensor	Amount of intake air		
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		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Vehicle speed signal*2	Vehicle speed		
Air conditioner switch*2	Air conditioner operation		

*1: Under normal conditions, this sensor is not for engine control operation.
*2: This signal is sent to the ECM through CAN communication line.
*3: The 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.

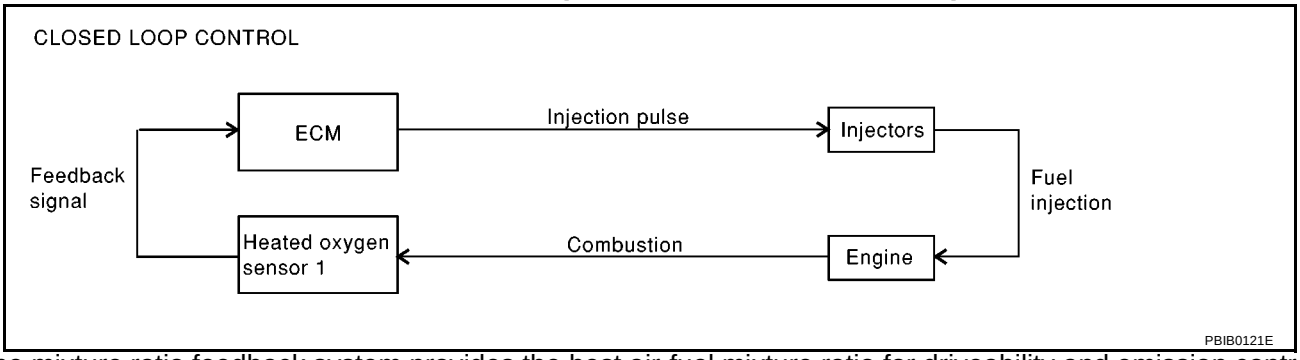
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D” (A/T 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 if 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-680 (M/T models) or EC-686 (A/T models). 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.

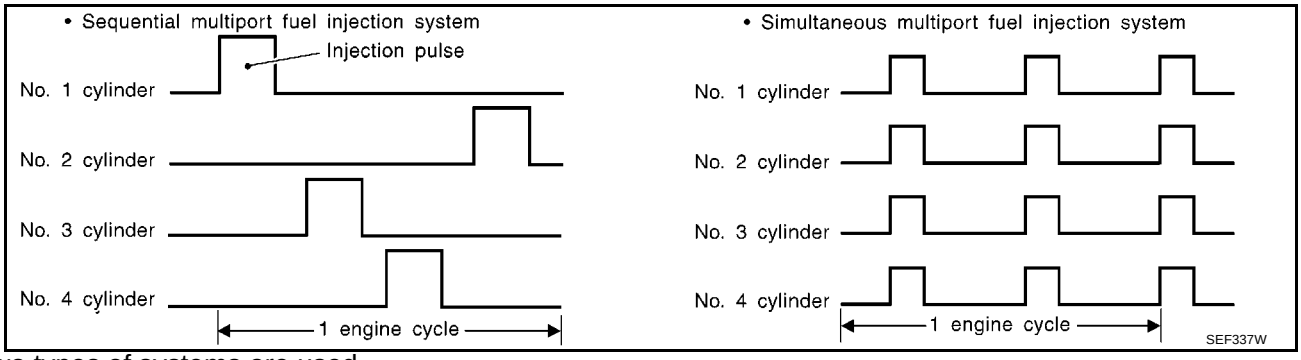
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from “N” to “D” (A/T models)
- 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 orig-

inally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., 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.
“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 or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

EBS00QUS

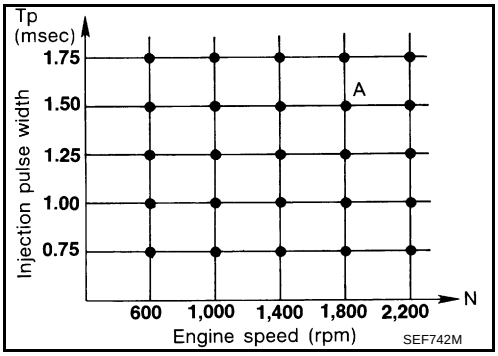
INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2 and piston position	Ignition timing control	Power transistor
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		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Vehicle speed signal*1	Vehicle speed		

*1: This signal is sent to the ECM through CAN communication line.
*2: The ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

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. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC



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 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.

Air Conditioning Cut Control

EBS00QUT

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
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		
Power steering pressure sensor	Power steering operation		
Vehicle speed signal*1	Vehicle speed		

*1: These signals are sent to the ECM through CAN communication line.
*2: The 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.

Fuel Cut Control (at No Load and High Engine Speed)

EBS00QUU

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injectors
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed signal*1	Vehicle speed		

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

SYSTEM DESCRIPTION

If the engine speed is above 3,950 rpm with no load (for example, in neutral and engine speed over 3,950 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 operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-568
.

CAN Communication

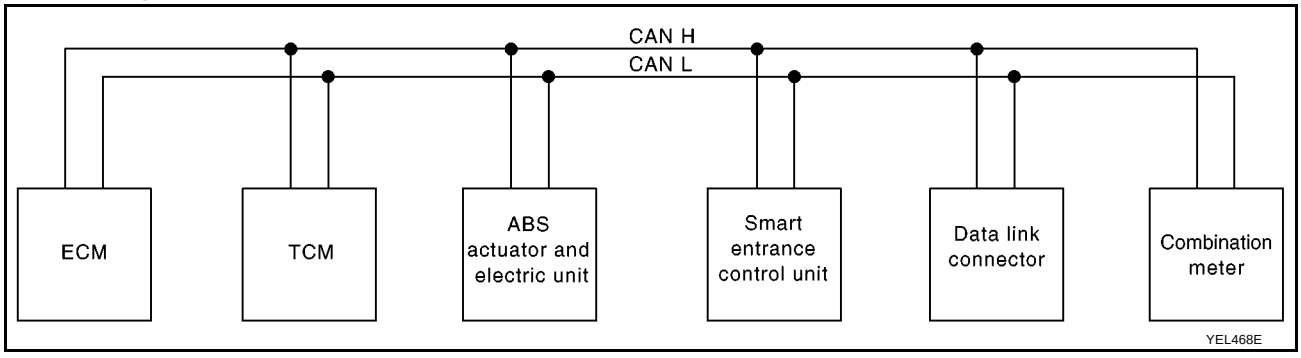
EBS00QUV

SYSTEM DESCRIPTION

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.

A/T MODELS

System diagram



Input/output signal chart

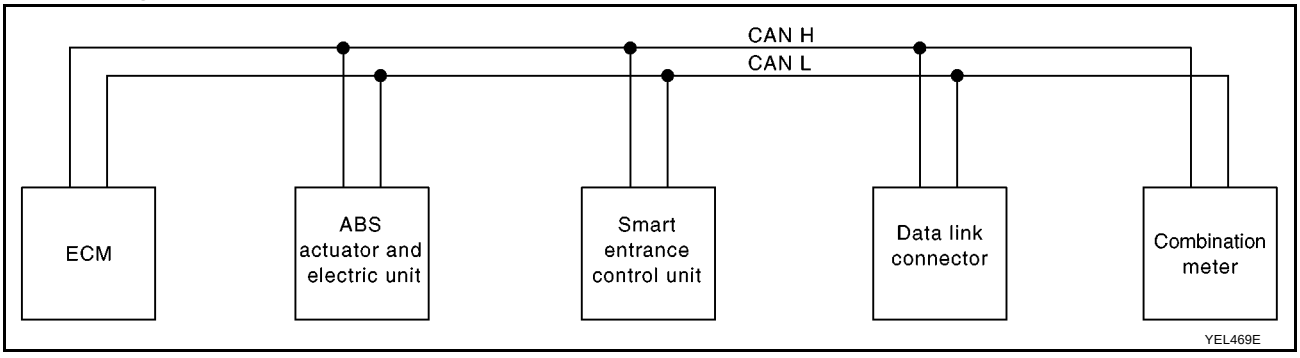
T: Transmit R: Receive

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T				R
Brake switch signal		R			T
Rear window defogger signal	R			T	
Heater fan switch signal	R				T
Air conditioner switch signal	R				T
MI signal	T				R

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine coolant temperature signal	T				R
Fuel consumption signal	T				R
Vehicle speed signal			T		R
	R				T
Seat belt reminder signal				R	T
Headlamp switch signal				T	R
Flashing indicator signal				T	R
Engine cooling fan speed signal	T			R	
Door switches state signal				T	R
A/C compressor signal	T			R	
A/C compressor feedback signal	T				R
Accelerator pedal position signal	T	R			
Output shaft revolution signal	R	T			
ABS operation signal			T		R
OD OFF switch signal		R			T
OD OFF indicator signal		T			R
A/T self-diagnosis signal	R	T			
ABS warning lamp signal			T		R
N range switch signal		R			T
P range switch signal		R			T

M/T MODELS

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T			R
Rear window defogger signal	R		T	
Heater fan switch signal	R			T
Air conditioner switch signal	R			T
MI signal	T			R
Engine coolant temperature signal	T			R
Fuel consumption signal	T			R

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Vehicle speed signal		T		R
	R			T
Seat belt reminder signal			R	T
Headlamp switch signal			T	R
Flashing indicator signal			T	R
Engine cooling fan speed signal	T		R	
Door switches state signal			T	R
A/C compressor signal	T		R	
A/C compressor feedback signal	T			R
ABS operation signal		T		R
ABS warning lamp signal		T		R

BASIC SERVICE PROCEDURE

PFP:00018

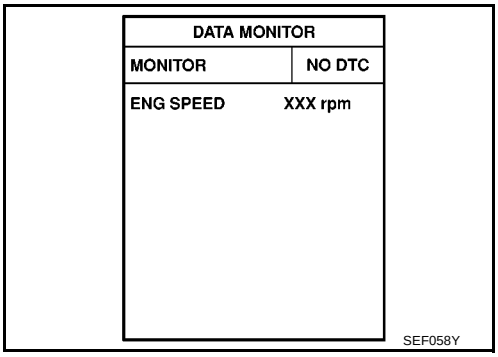
Idle Speed and Ignition Timing Check

EBS00QUW

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check the idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire which is installed between No. 1 ignition coil and No. 1 spark plug.

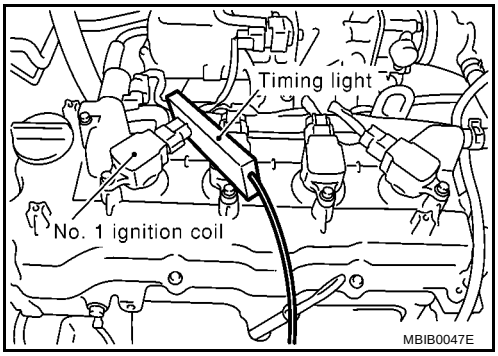
NOTE:
For the method of installing the tachometer, refer to EC-575, "IGNITION TIMING" .

IGNITION TIMING

Any of following two methods may be used.

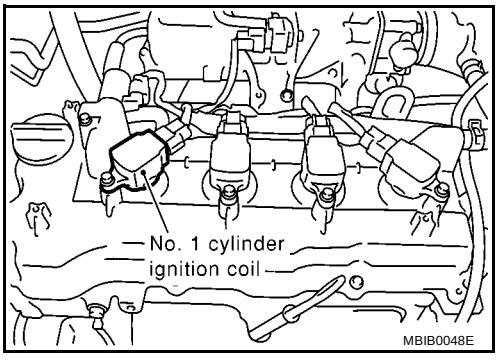
Method A

1. Slide the harness protector of ignition coil No. to clear the wires.
2. Attach timing light to the wires as shown.
3. Check ignition timing.

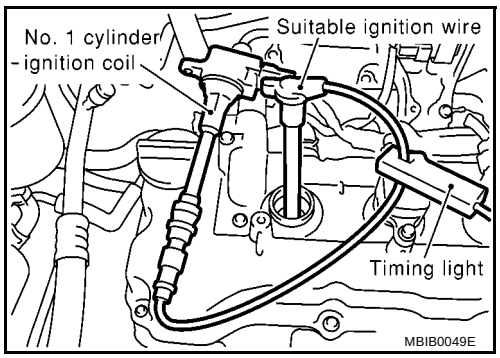


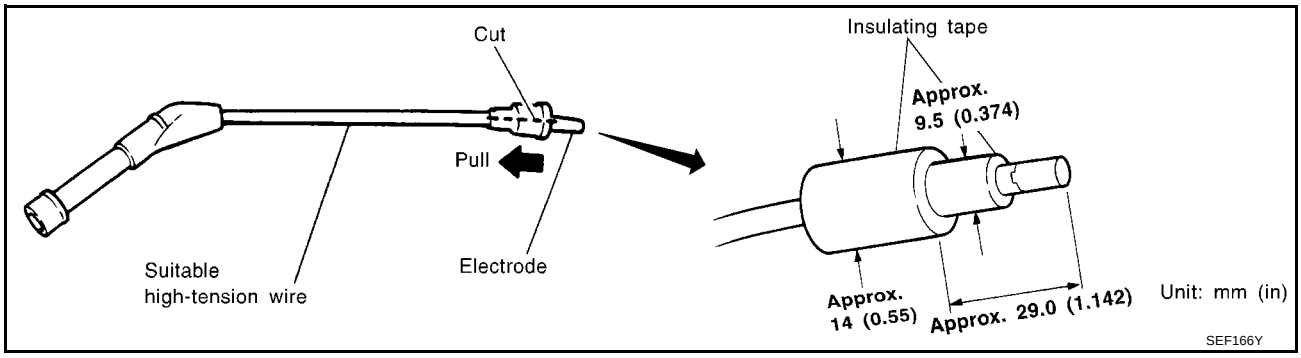
Method B

1. Remove No. 1 ignition coil.



2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.

Accelerator Pedal Released Position Learning

EBS00QUX

DESCRIPTION

"Accelerator Pedal Released Position Learning" is an operation 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.

OPERATION PROCEDURE

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

Throttle Valve Closed Position Learning

EBS00QUY

DESCRIPTION

"Throttle Valve Closed Position Learning" is an operation 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.

OPERATION PROCEDURE

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

Idle Air Volume Learning

EBS00QUZ

DESCRIPTION

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine 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.

PREPARATION

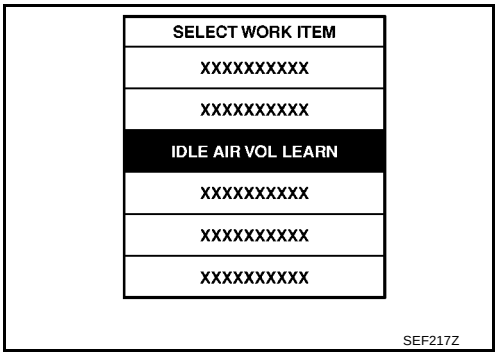
Before performing “Idle Air Volume Learning”, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP 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
  For models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

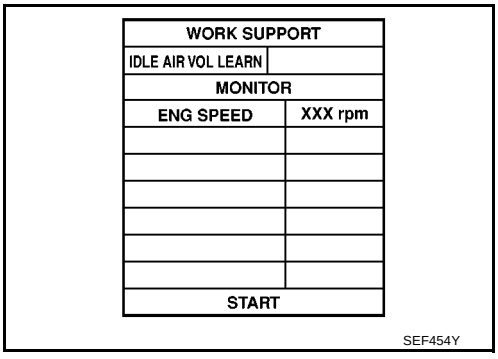
OPERATION PROCEDURE

With CONSULT-II

1. Perform EC-576, "Accelerator Pedal Released Position Learning" .
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

WORK SUPPORT	
IDLE AIR VOL LEARN	CMPLT
MONITOR	
ENG SPEED	XXX rpm
START	

MBIB0238E

ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm (in “Neutral” position) A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 8±5° BTDC (in “Neutral” position) A/T: 10±5° BTDC (in “P” or “N” position)

Without CONSULT-II

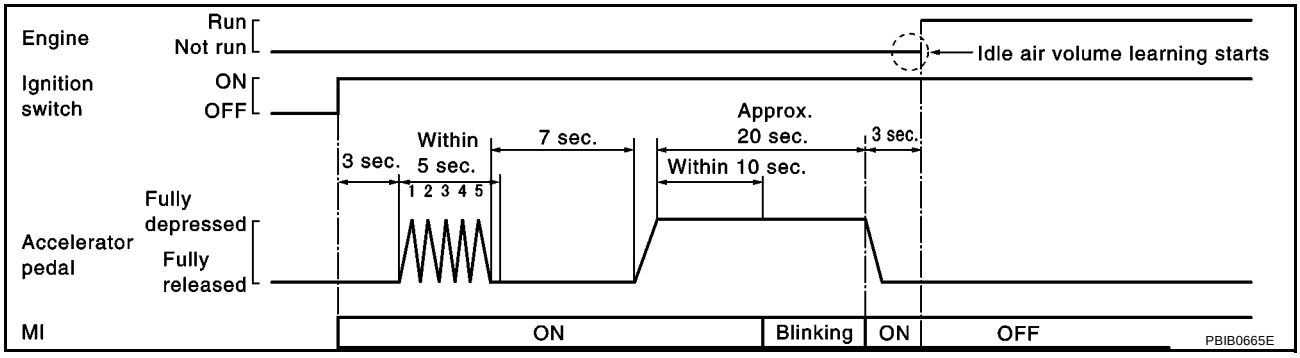
NOTE:

- **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 EC-576, "Accelerator Pedal Released Position Learning" .
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

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



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

ITEM	SPECIFICATION
Idle speed	M/T: 700±50 rpm (in “Neutral” position) A/T: 800±50 rpm (in “P” or “N” position)
Ignition timing	M/T: 8±5° BTDC (in “Neutral” position) A/T: 10±5° BTDC (in “P” or “N” position)

13. If idle speed and ignition timing are not within the specification, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-640, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" **.**
5. **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.**

Fuel Pressure Check

EBS00QV0

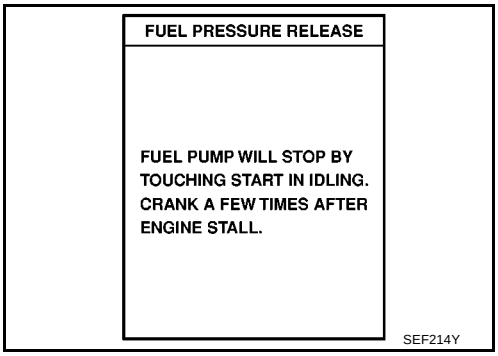
FUEL PRESSURE RELEASE

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because V10 models do not have fuel return system.

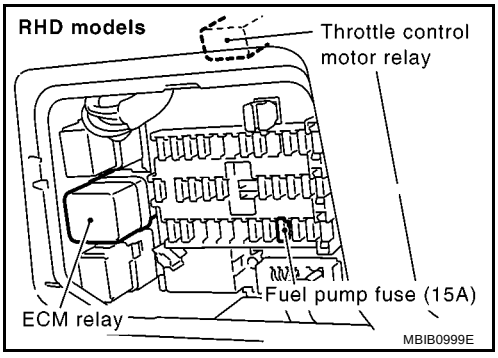
With CONSULT-II

1. Turn ignition switch "ON".
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch "OFF".



Without CONSULT-II

1. Remove fuel pump fuse located in fuse box.
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

NOTE:

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**

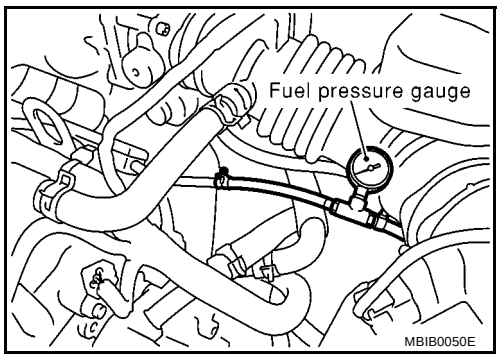
1. Release fuel pressure to zero. Refer to EC-579, "FUEL PRESSURE RELEASE" .

2. Install the fuel pressure gauge with the fuel pressure check adapter as shown in the figure.
3. Turn ignition switch “ON”, and check for fuel leakage.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

   At idling: Approximately 350 kPa
   (3.5 bar, 3.57 kg/cm^2 , 51 psi)

6. If result is unsatisfactory, go to next step.
7. 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.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS00QV1

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-II	×	×	×	×
ECM	×	×*1	—	—

*1: 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-593 .)

Two Trip Detection Logic

EBS00QV2

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. When the ECM enters fail-safe mode (Refer to EC-593 .), the DTC is stored in the ECM memory even in the 1st trip.
When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operate when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

EBS00QV3

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 fail-safe items, the DTC is stored in the ECM memory even in the 1st trip.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-582, "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 II, refer to EC-589 . Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Examples: P0117, P0340, P1065, etc. (CONSULT-II also displays the malfunctioning component or system.)

Without CONSULT-II

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0340 1065 etc.

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. 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]”.

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

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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, 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-II. For details, see EC-627 .
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 EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

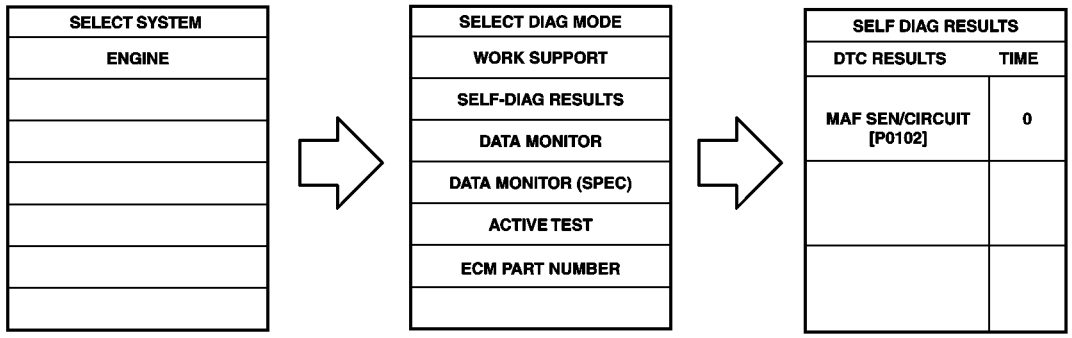
How to Erase DTC (With CONSULT-II)

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

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. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.

4. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)
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” again.



2. Turn **CONSULT-II** “ON” and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

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How to Erase DTC (Without CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once.
2. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-585, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

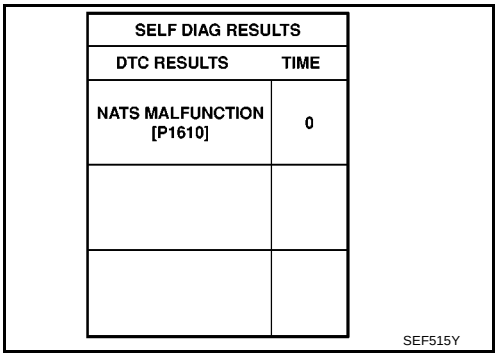
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - Freeze frame data
  - 1st trip freeze frame data
  - Others

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.

NATS (Nissan Anti-theft System)

EBS00QV4

- **If the security indicator lights up with the ignition switch in the “ON” position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to “NATS (NISSAN ANTI-THEFT SYSTEM)”, EL-352.**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.



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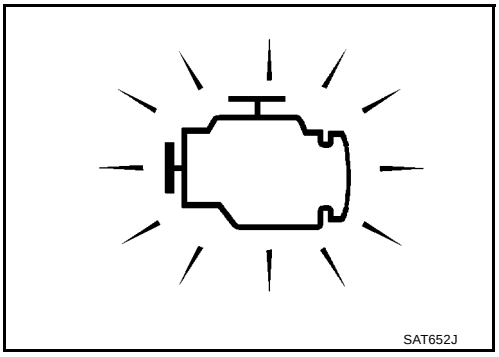
Malfunction Indicator (MI)

EBS00QV5

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 “WARNING LAMPS”, EL-115 or see EC-929 .
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 the MI in the 1st trip. ● “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.

When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operate when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

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. Refer to EC-585, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
How to switch the diagnostic test (function) modes, and details of the above functions are described later EC-585, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
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
- Others

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

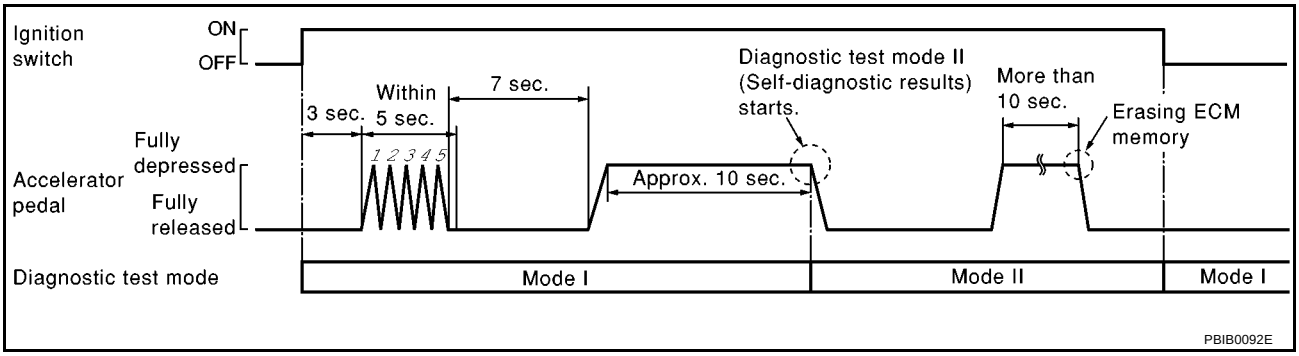
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned “OFF”.**

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).



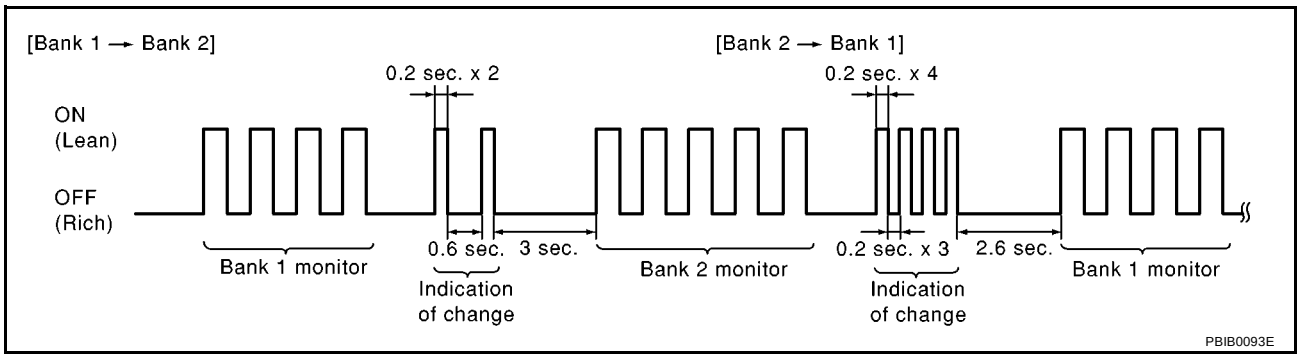
How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-585, "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).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor for A/T models.

How to Switch Monitored Sensor From Bank 1 to Bank 2 or Vice Versa

1. Fully depress the accelerator pedal quickly and then release it immediately.

2. Make sure that monitoring sensor has changed by MI blinking as follows.



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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-585, "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 the bulb. Refer to “WARNING LAMPS”, EL-115 or see EC-929 .

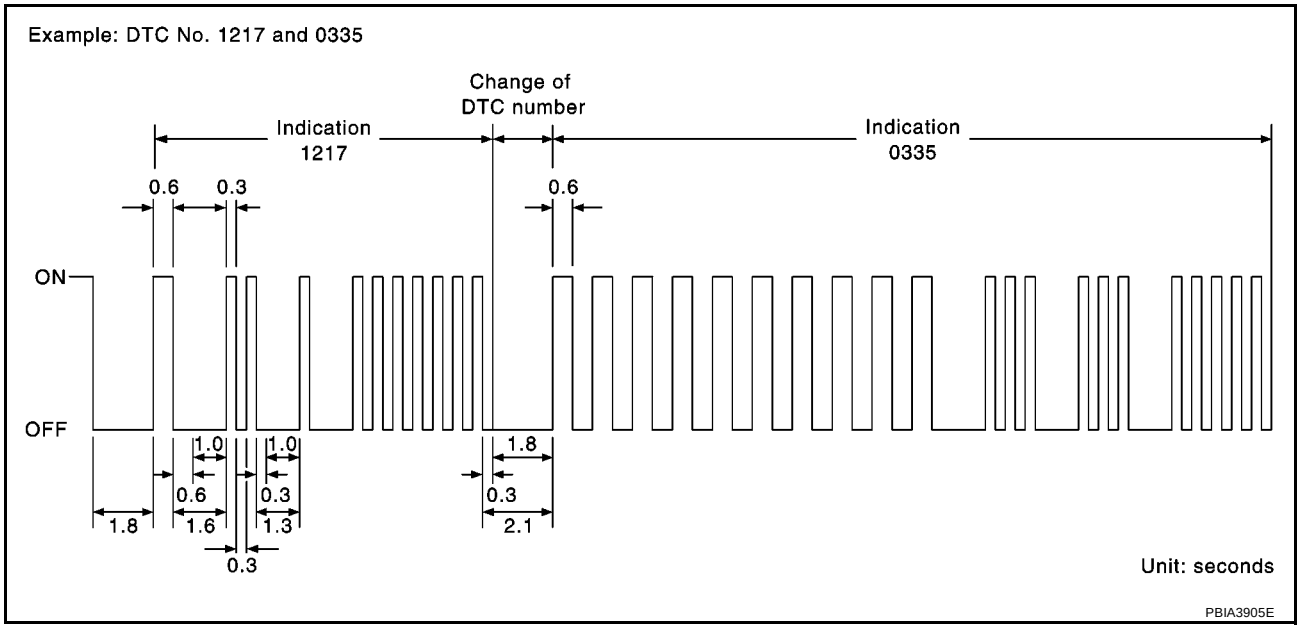
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

- These DTC numbers are 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 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-II. 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-554, "INDEX FOR DTC")

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 EC-585, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the DTC will be lost from the backup memory after approx 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.

TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnosis Introduction

EBS00QV6

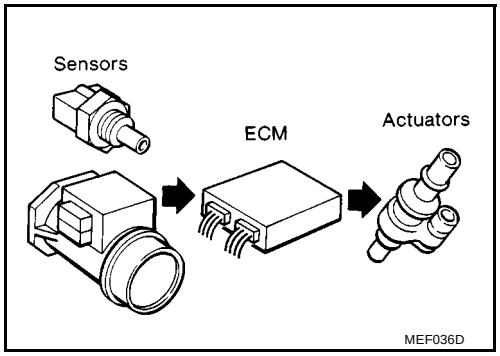
INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine. It is much more difficult to diagnose a incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

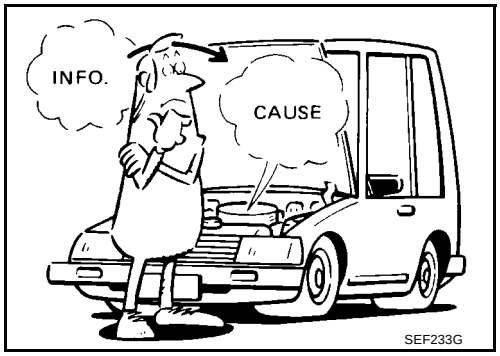
A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the “Work Flow” on EC-589 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on EC-592 should be used.

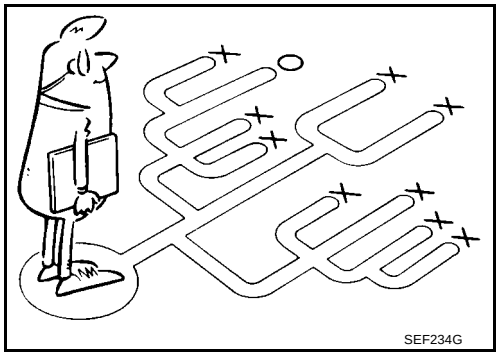
Start your diagnosis by looking for “conventional” malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



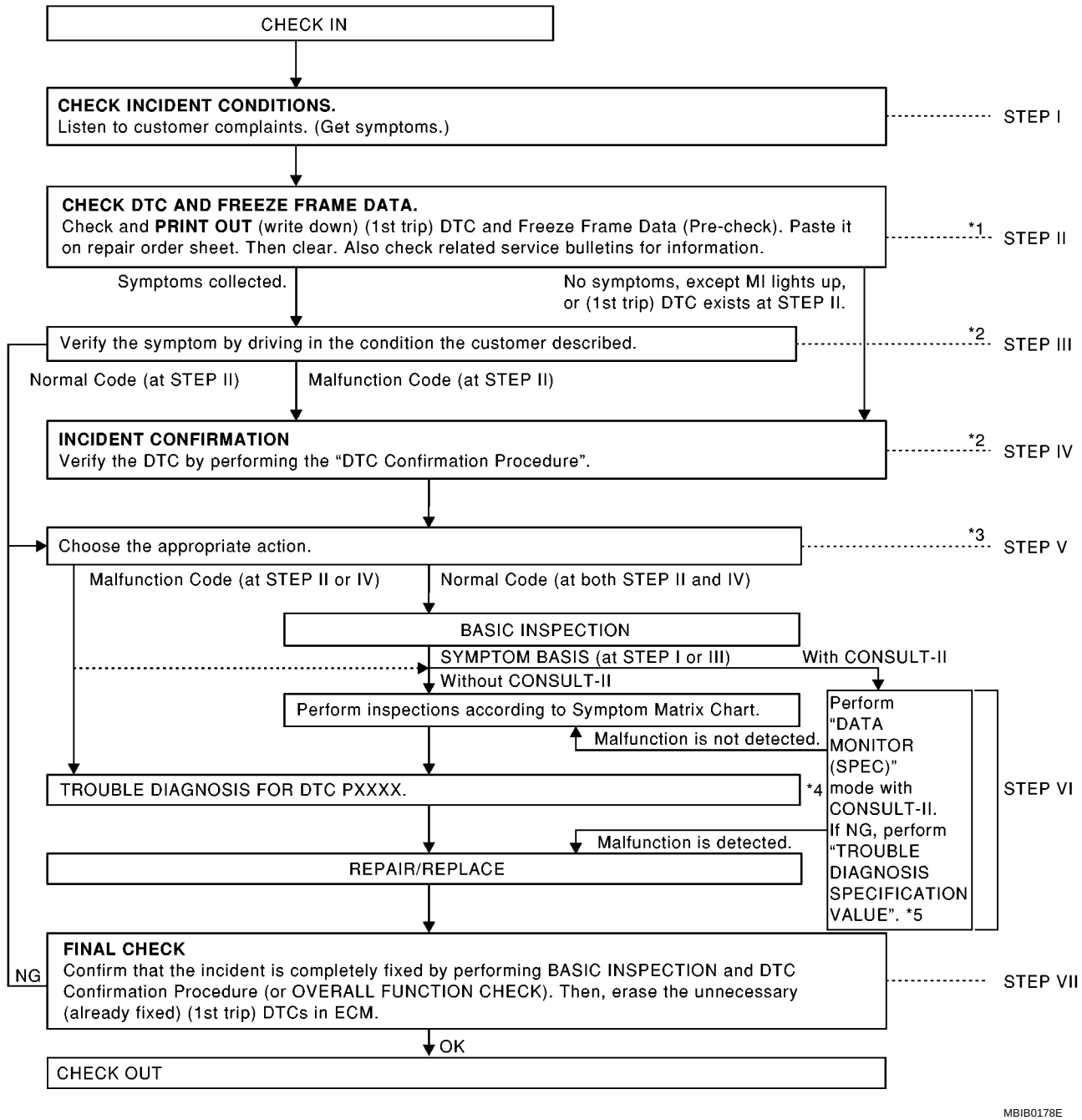
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SEF234G

WORK FLOW
Flow Chart



MBIB0178E

*1 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-645, "POWER SUPPLY CIRCUIT FOR ECM" .

*4 If the incident cannot be verified, perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5 EC-640, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-592 .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. See EC-600 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall Function Check” is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-595 .) If COSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TOROUBLE DIAGNOSIS – SPECIFICATION VALUE”. (Refer to EC-640 .) (If malfunction is detected, proceed to “PERAIR/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-600 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-610 , EC-634 . The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to “Circuit Inspection” in “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)

DIAGNOSTIC WORKSHEET

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

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

DTC Inspection Priority Chart

EBS00QV7

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-651, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

M/T MODELS

Priority	Detected items (DTC)
1	● U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 P1229 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0605 ECM ● P1610-P1615 NATS
2	● P0132 P0134 Heated oxygen sensor 1 ● P0138 Heated oxygen sensor 2 ● P1065 ECM power supply ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1805 Brake switch
3	● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

A/T MODELS

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0117 P0118 Engine coolant temperature sensor ● P0221 P0222 P0223 P1223 P1224 P1225 P1226 P1229 Throttle position sensor ● P0226 P0227 P0228 P1227 P1228 Accelerator pedal position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0605 ECM ● P1610-P1615 NATS
2	● P0132 P0134 P0152 P0154 Heated oxygen sensor 1 ● P0138 P0158 Heated oxygen sensor 2 ● P1065 ECM power supply ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1805 Brake switch
3	● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT)

Fail-safe Chart

EBS00QV8

- When the DTC listed below is detected, the ECM enters the fail-safe mode and the MI lights up.

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.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="6">P0117
P0118</td><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0221
P0222
P0223
P1223
P1224</td><td>Throttle 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>
<tr><td>P0226
P0227
P0228
P1227
P1228</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>
<tr><td>P1121</td><td>Electric throttle control actuator
(ECM detect the throttle valve is stuck open.)</td><td colspan="2">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” position, and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P1122</td><td>Electric throttle control function</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>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>
</table>

- When there is an open circuit on MI circuit, the ECM can not 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 has trouble and MI circuit is open by means of operating fail-safe function.
  The fail-safe function also operate when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

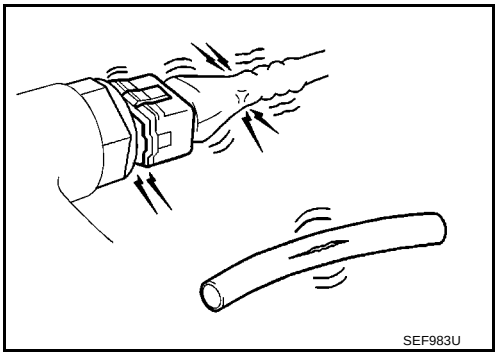
Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Basic Inspection

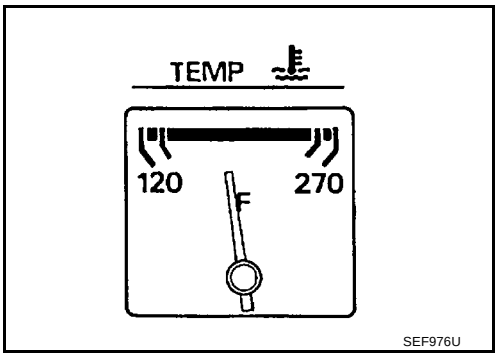
EBS00QV9

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


SEF983U

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.

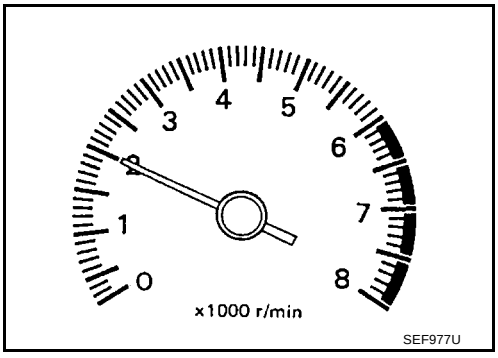


SEF976U

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-II or ECM.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

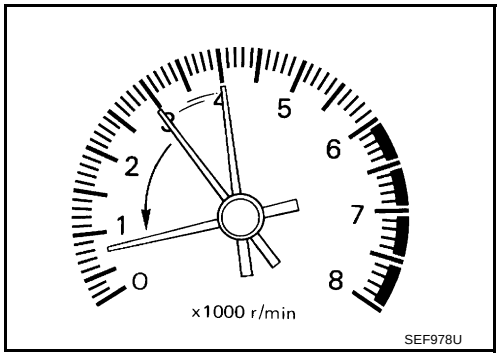
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

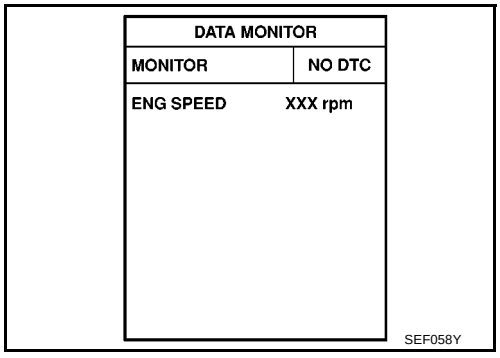
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
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. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)



Without CONSULT-II

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

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-576, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-576, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-576, "Idle Air Volume Learning" .

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-745 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-738 .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a incident, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-583, "NATS (Nissan Anti-theft System)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 8 ± 5° BTDC (in “Neutral” position)
A/T: 10 ± 5° BTDC (in “P” or “N” position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-576, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-576, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-576, "Idle Air Volume Learning" .

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the construction of “Idle Air Volume Learning”.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 700 ± 50 rpm (in “Neutral” position)
A/T: 800 ± 50 rpm (in “P” or “N” position)

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

M/T: 8 ± 5° BTDC (in "Neutral" position)
A/T: 10 ± 5° BTDC (in "P" or "N" position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-50, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-745 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-738 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a incident, but this is the rarely the case.)
2. Perform initialization of NATS system and registration of NATS ignition key IDs. Refer to EC-583, "NATS (Nissan Anti-theft System)" .

>> GO TO 4.

Symptom Matrix Chart

EBS00QVA

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-913
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-579
	Injector circuit	1	1	2	3	2		2	2			2			EC-907
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-931
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-934
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-575
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-759, EC-762, EC-769, EC-775
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-575
	Ignition circuit	1	1	2	2	2		2	2			2			EC-874
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-645
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-654
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-660
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-710, EC-716, EC-791, EC-797, EC-799, EC-807
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-722, EC-728, EC-801
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-665, EC-671, EC-680, EC-686, EC-844, EC-851
Knock sensor circuit				2	2							3			EC-734
Crankshaft position sensor (POS) circuit		2	2												EC-738
Camshaft position sensor (PHASE) circuit		2	2												EC-745
Vehicle speed signal circuit			2	3		3						3			EC-891

	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	
Power steering pressure sensor circuit		2				3	3	3	3					EC-892
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-752, EC-755
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-897
PNP switch circuit			3		3	3	3	3	3		3			EC-903
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-919
Electrical load signal circuit						3	3	3	3					EC-924
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-29
ABS actuator and electric unit (control unit)			4											BR-70

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		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													FE-6
	Fuel piping			5	5	5		5	5			5			FE-5
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

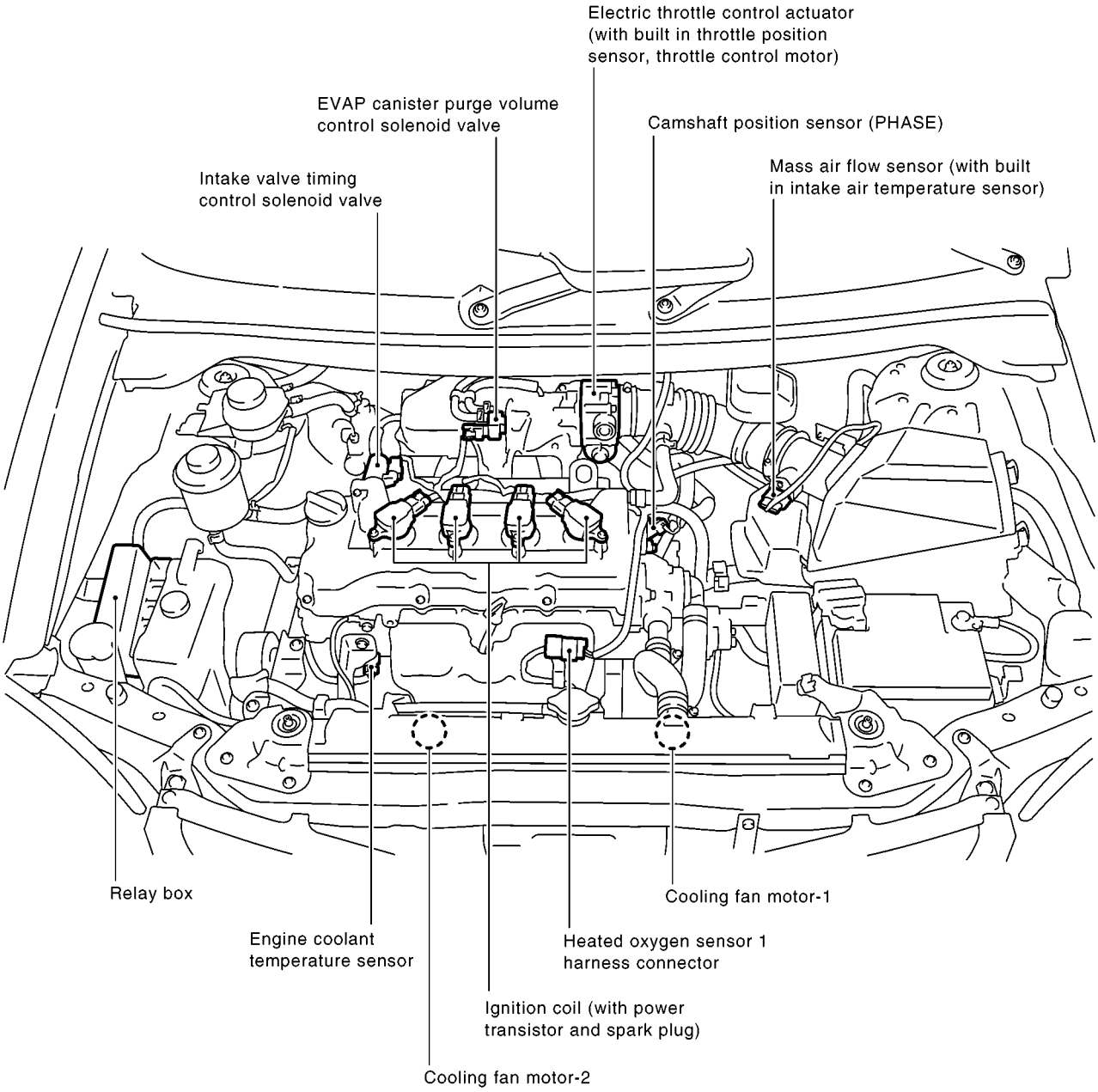
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct		5	5		5		5	5			5			EM-16
	Air cleaner														EM-16
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)	5			5		5			5					EM-16
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														EM-18
Cranking	Battery	1	1	1		1		1	1			1		1	SC-3
	Alternator circuit														SC-24
	Starter circuit	3													SC-13
	Signal plate/Flywheel/Drive plate	6													EM-74
	PNP switch	4													AT-118 or MT-17 (5MT)
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-60
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-74
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-50
	Camshaft														EM-35
	Intake valve timing control														EM-50
	Intake valve												3		EM-60
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-21, FE-11
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		LC-3
	Oil level (Low)/Filthy oil														LC-3

		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	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			LC-16
	Thermostat									5					LC-15
	Water pump														LC-14
	Water gallery														LC-11
	Cooling fan									5					LC-17
	Coolant level (low)/Contaminated coolant														LC-11
NATS (Nissan Anti-Theft System)		1	1												EC-583 or EL-352

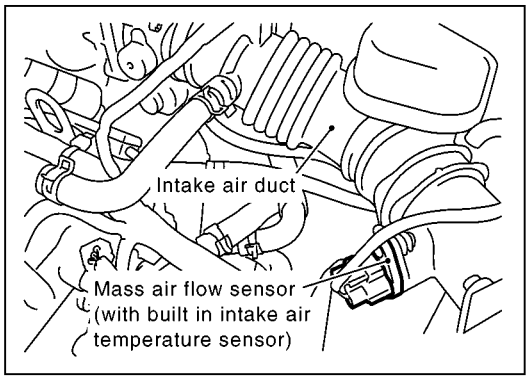
1 - 6: The numbers refer to the order of inspection.

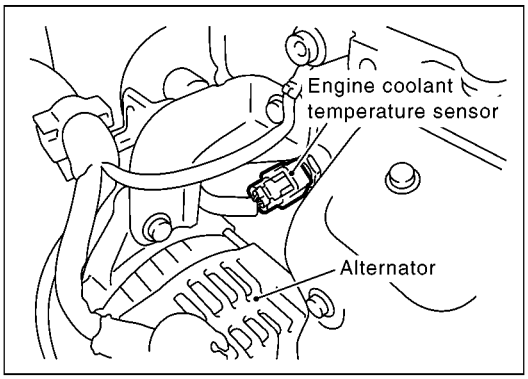
Engine Control Component Parts Location

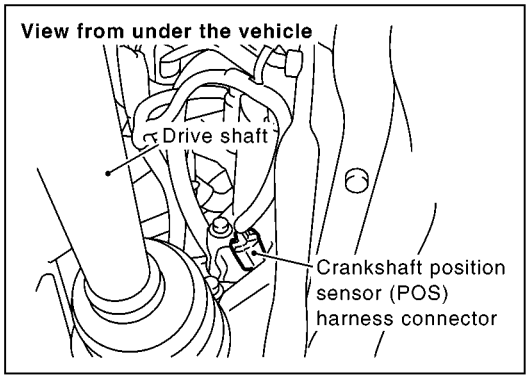
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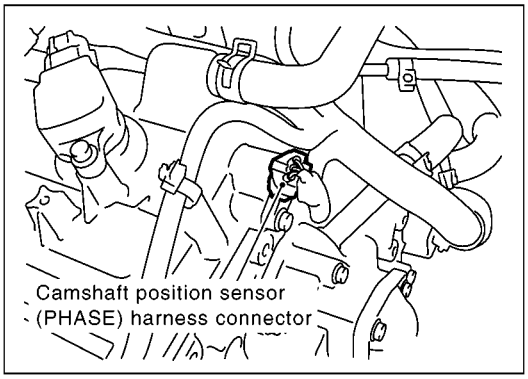


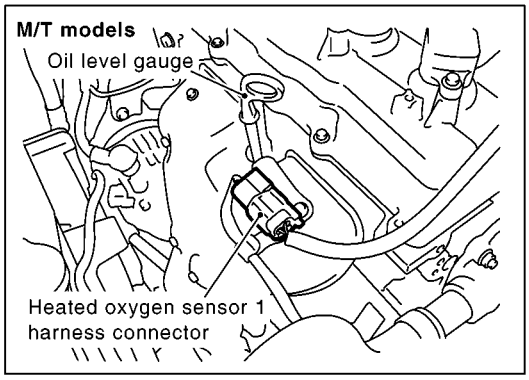
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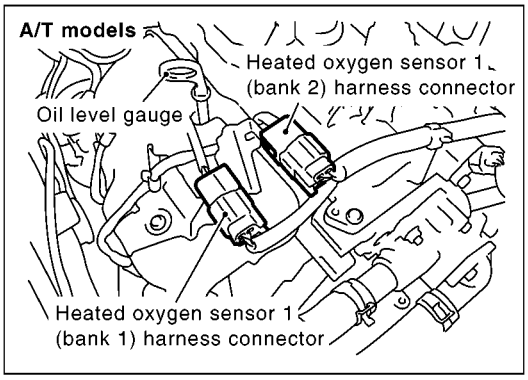

Intake air duct
Mass air flow sensor
(with built in intake air
temperature sensor)

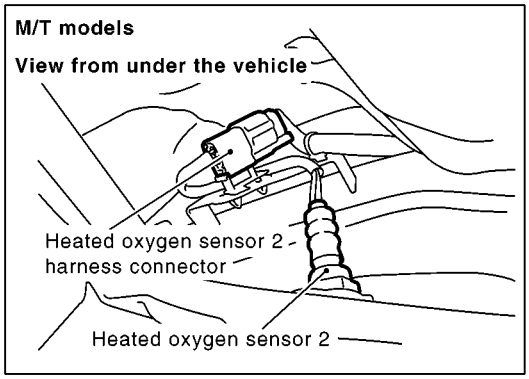

Engine coolant
temperature sensor
Alternator

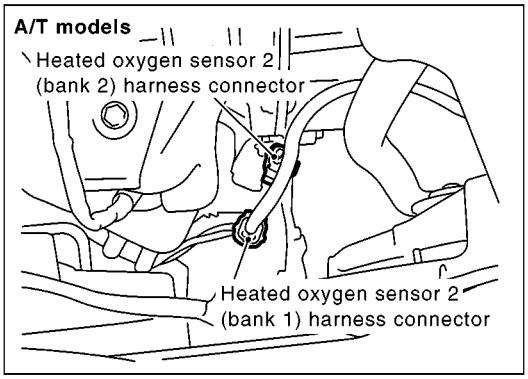

View from under the vehicle
Drive shaft
Crankshaft position
sensor (POS)
harness connector


Camshaft position sensor
(PHASE) harness connector

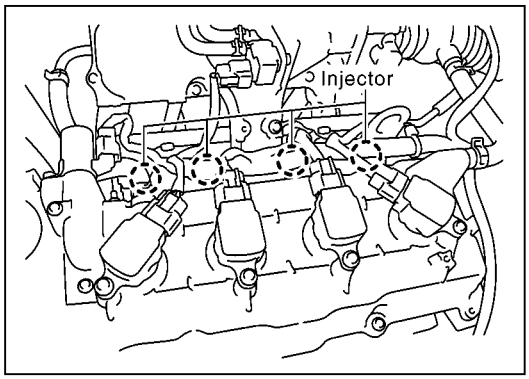

M/T models
Oil level gauge
Heated oxygen sensor 1
harness connector

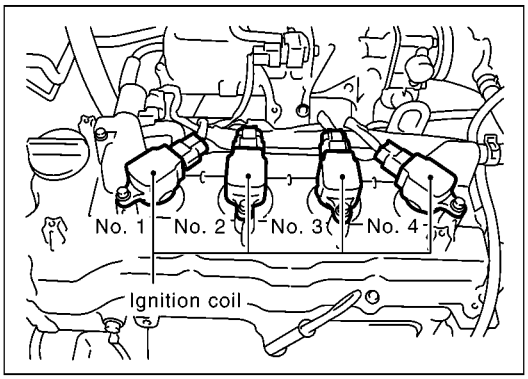

A/T models
Heated oxygen sensor 1
(bank 2) harness connector
Oil level gauge
Heated oxygen sensor 1
(bank 1) harness connector

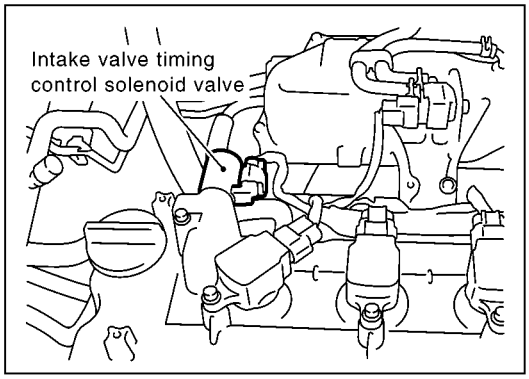

M/T models
View from under the vehicle
Heated oxygen sensor 2
harness connector
Heated oxygen sensor 2

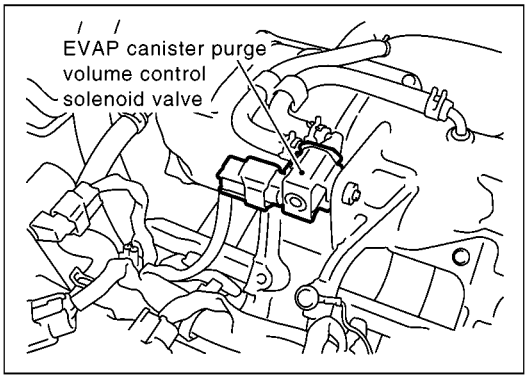

A/T models
Heated oxygen sensor 2
(bank 2) harness connector
Heated oxygen sensor 2
(bank 1) harness connector

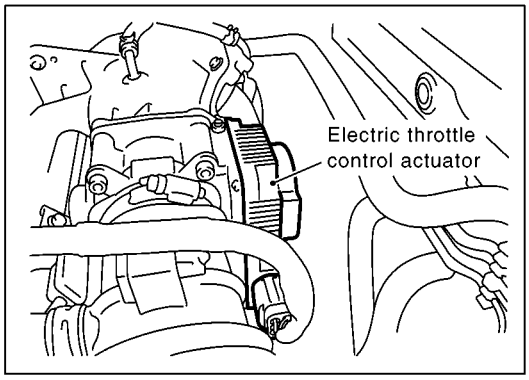
MBIB1003E

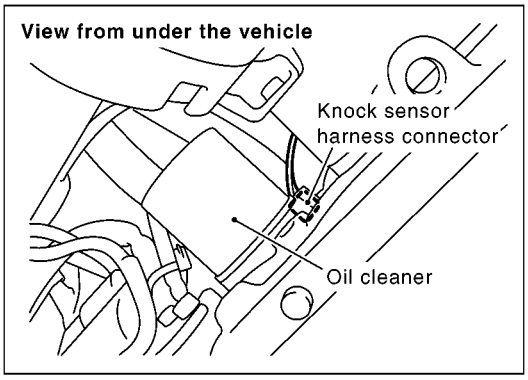

Injector

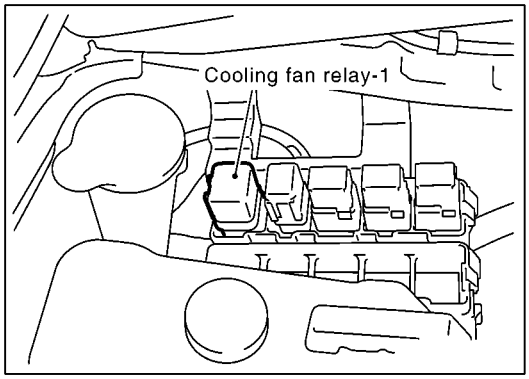

No. 1
No. 2
No. 3
No. 4
Ignition coil

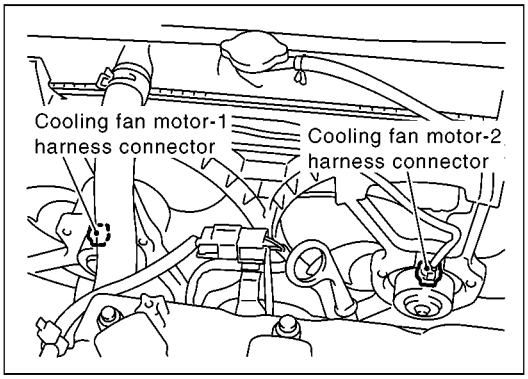

Intake valve timing
control solenoid valve


EVAP canister purge
volume control
solenoid valve

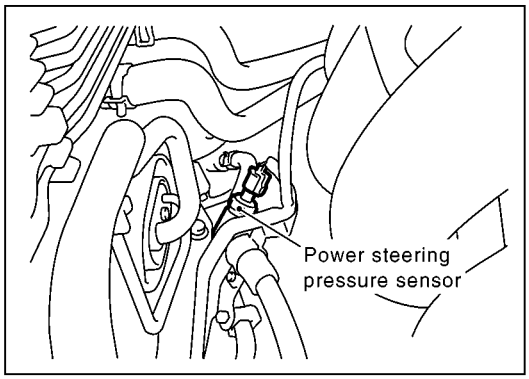

Electric throttle
control actuator

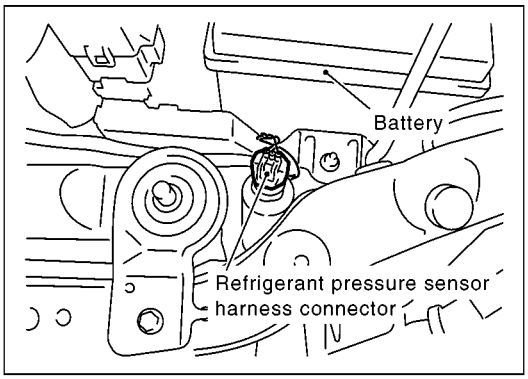

View from under the vehicle
Knock sensor
harness connector
Oil cleaner

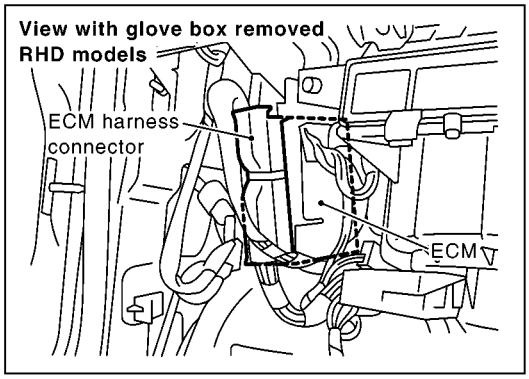

Cooling fan relay-1

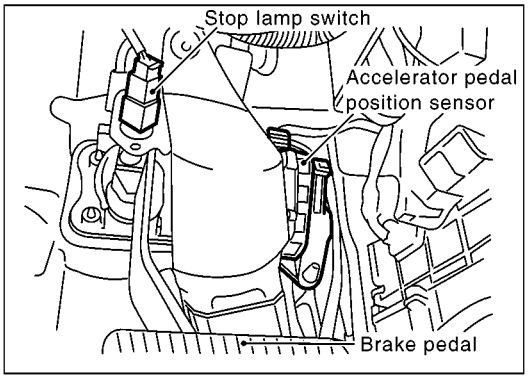

Cooling fan motor-1
harness connector
Cooling fan motor-2
harness connector

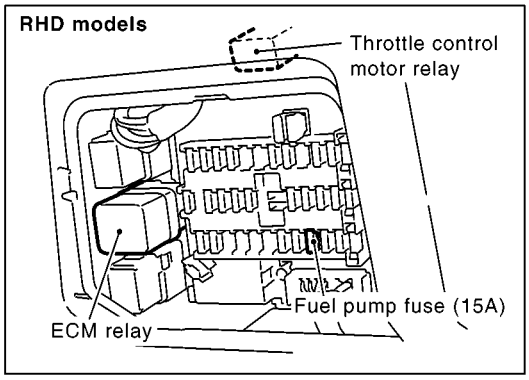
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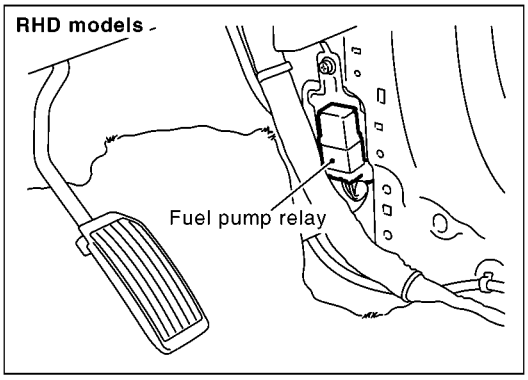

Power steering
pressure sensor

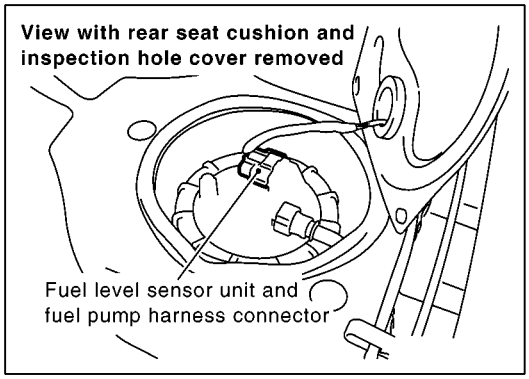

Battery
Refrigerant pressure sensor
harness connector

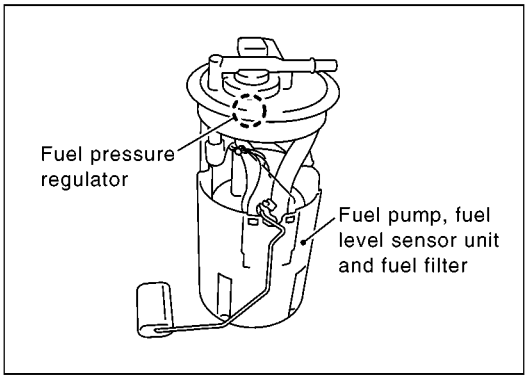

View with glove box removed
RHD models
ECM harness
connector
ECM


Stop lamp switch
Accelerator pedal
position sensor
Brake pedal


RHD models
Throttle control
motor relay
Fuel pump fuse (15A)
ECM relay


RHD models
Fuel pump relay

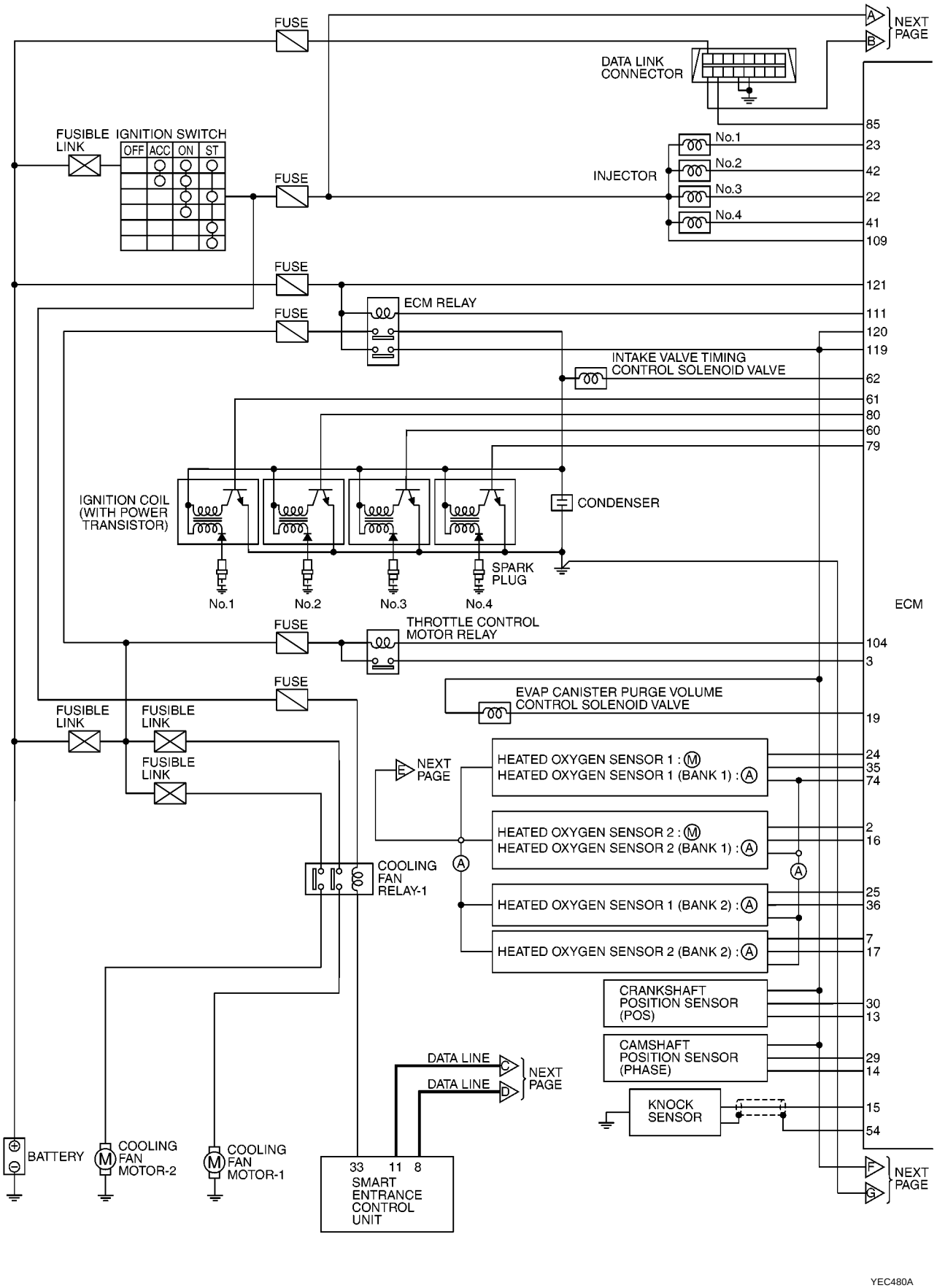

View with rear seat cushion and
inspection hole cover removed
Fuel level sensor unit and
fuel pump harness connector

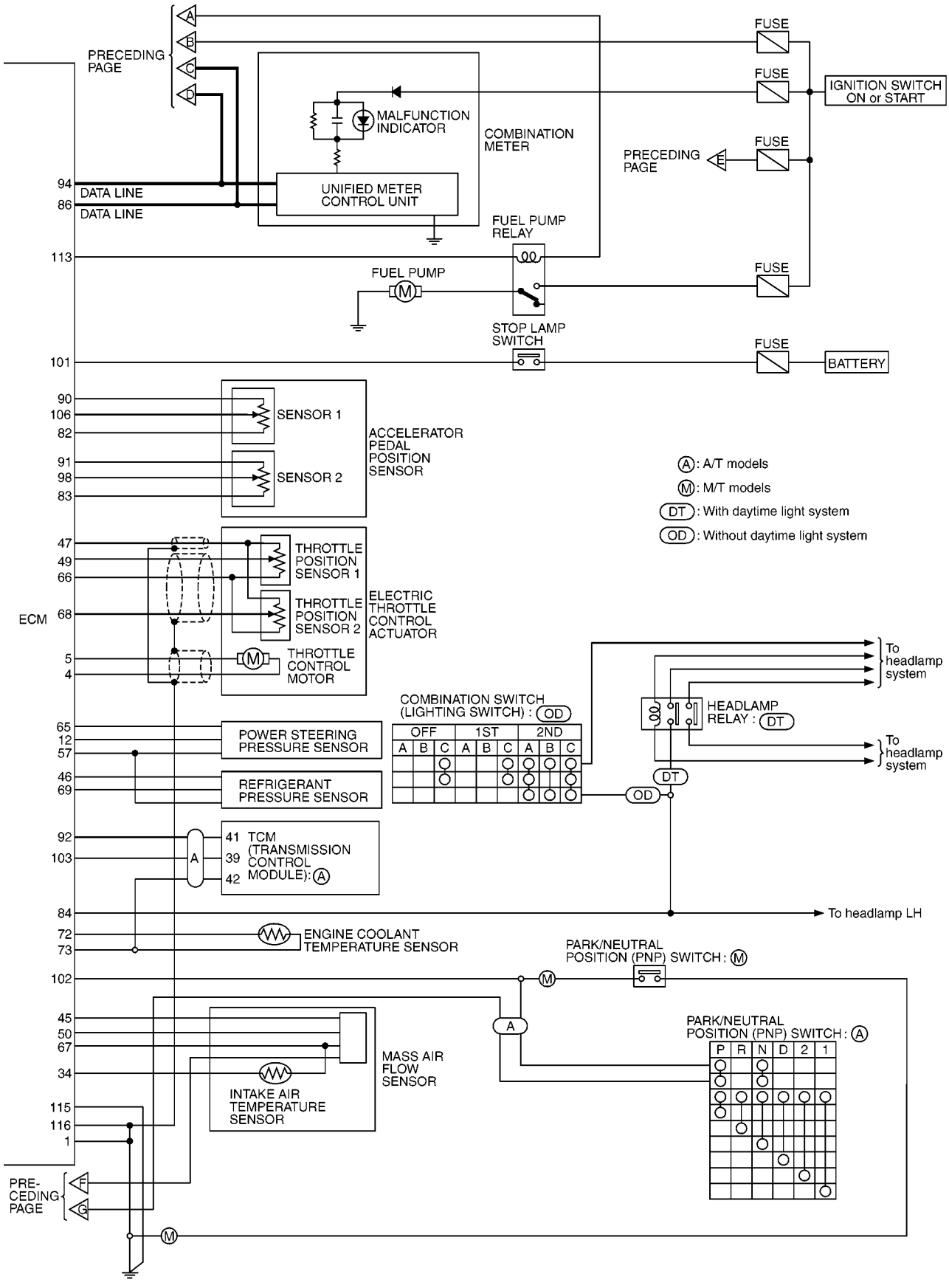

Fuel pressure
regulator
Fuel pump, fuel
level sensor unit
and fuel filter

MBIB1005E

Circuit Diagram

EBS00QVC

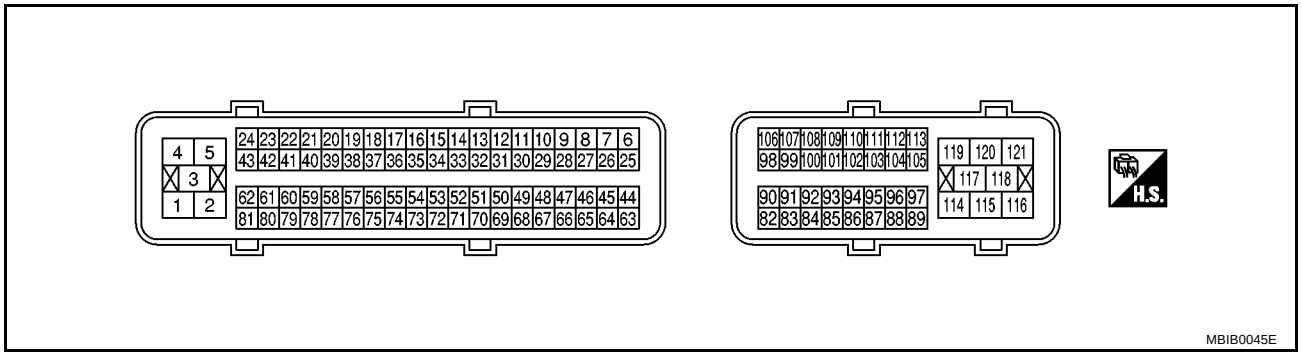



PRECEDING PAGE
A
B
C
D
MALFUNCTION INDICATOR
COMBINATION METER
UNIFIED METER CONTROL UNIT
94 DATA LINE
86 DATA LINE
FUEL PUMP RELAY
113
FUEL PUMP
M
STOP LAMP SWITCH
101
FUSE
IGNITION SWITCH ON or START
PRECEDING PAGE
E
BATTERY
90
106
82
SENSOR 1
91
98
83
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
A: A/T models
M: M/T models
DT: With daytime light system
OD: Without daytime light system
47
49
66
THROTTLE POSITION SENSOR 1
68
THROTTLE POSITION SENSOR 2
ELECTRIC THROTTLE CONTROL ACTUATOR
ECM
5
4
THROTTLE CONTROL MOTOR
COMBINATION SWITCH (LIGHTING SWITCH) : OD
OFF 1ST 2ND
A B C A B C A B C
To headlamp system
HEADLAMP RELAY : DT
65
12
57
POWER STEERING PRESSURE SENSOR
46
69
REFRIGERANT PRESSURE SENSOR
92
103
41 TCM (TRANSMISSION CONTROL MODULE): A
39
42
84
To headlamp LH
72
73
ENGINE COOLANT TEMPERATURE SENSOR
PARK/NEUTRAL POSITION (PNP) SWITCH : M
102
45
50
67
34
MASS AIR FLOW SENSOR
INTAKE AIR TEMPERATURE SENSOR
PARK/NEUTRAL POSITION (PNP) SWITCH : A
P R N D 2 1
115
116
1
PRE-CEDING PAGE
F
G

YEC481A

ECM Harness Connector Terminal Layout

EBS00QVD

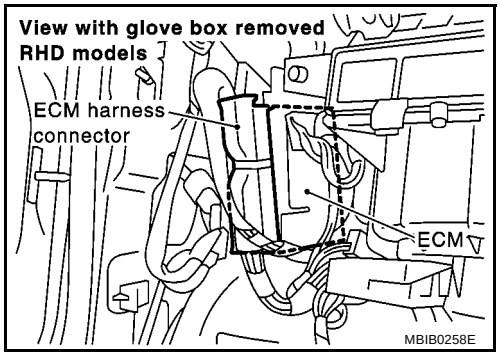


ECM Terminals and Reference Value

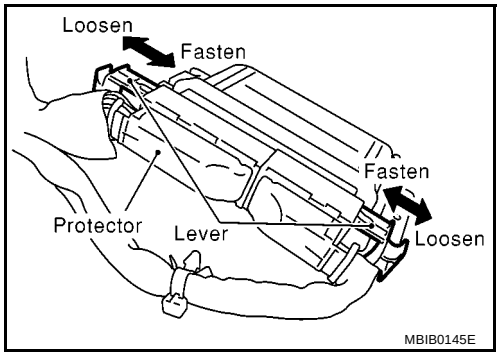
EBS00QVE

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



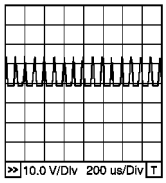
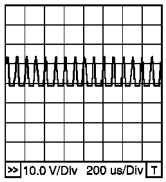
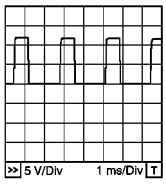
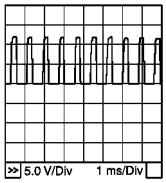
ECM INSPECTION TABLE

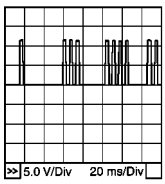
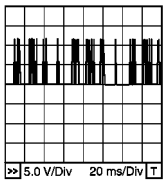
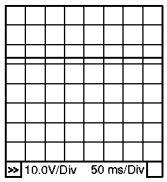
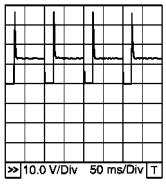
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II

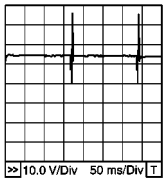
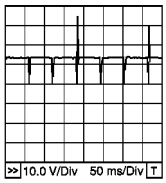
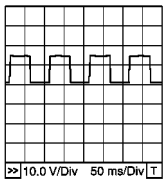
CAUTION:

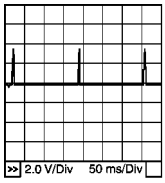
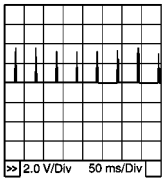
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

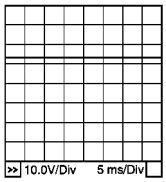
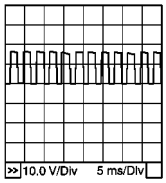
M/T Models

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
2	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,800 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch “ON”] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
3	R	Throttle control motor power supply	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch “ON”]** ● Engine stopped ● Shift lever position is “1st” ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch “ON”]** ● Engine stopped ● Shift lever position is “1st” ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Ignition switch “ON”] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V
30	B	Camshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch “ON”]**	Approximately 5V
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch “ON”]**	Approximately 5V
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch “ON”]**	Approximately 5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully depressed	Less than 4.75V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 2.1V
54	B	Sensor ground (Knock sensor shield circuit)	**[Engine is running]** ● Idle speed	Approximately 0V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

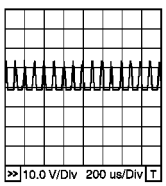
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly	7 - 10V★  PBIB0532E
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "1st" ● Accelerator pedal fully depressed	More than 0.36V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

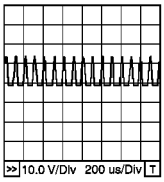
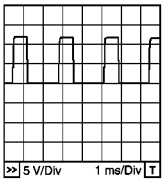
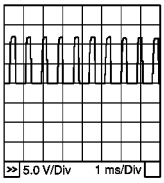
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V
85	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	R	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.3V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.8V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch "ON"]** ● Gear position is neutral	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V
109	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

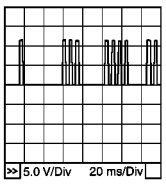
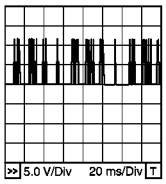
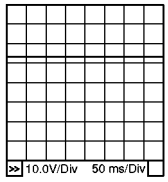
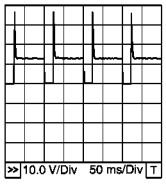
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
113	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 1 second after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

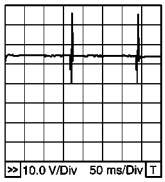
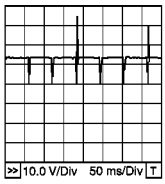
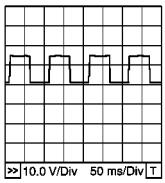
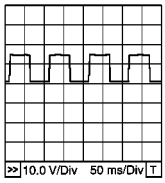
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

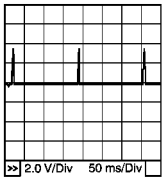
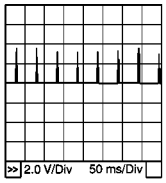
A/T Models

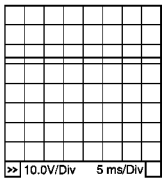
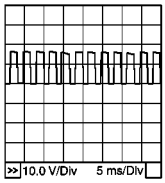
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
2	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
7	W/R	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14)
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
25	R/B	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V
30	B	Camshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch "ON"]**	Approximately 5V
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.5 - 2.1V
54	B	Sensor ground (Knock sensor shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  MBIB0052E
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly	7 - 10V★  PBIB0532E
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	More than 0.36V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON" (Compressor operates.)	1.0 - 4.0V
72	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V
85	LG	DATA link connector	**[Ignition switch "ON"]** ● CONSULT-II is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	R	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.3V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
94	L	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.8V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
102	P	PNP switch	**[Ignition switch "ON"]** ● Gear position is "P" or "N"	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
109	B/R	Ignition switch	**[Ignition switch “OFF”]**	0V
			[Ignition switch “ON”]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For a few seconds after turning ignition switch “OFF”	0 - 1.0V
			[Ignition switch “OFF”] ● More than a few seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)
113	B/P	Fuel pump relay	**[Ignition switch “ON”]** ● For 1 second after turning ignition switch “ON” **[Engine is running]**	0 - 1.0V
			[Ignition switch “ON”] ● More than 1 second after turning ignition switch “ON”.	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch “ON”]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch “OFF”]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function

EBS00QVF

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-II 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.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II 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.
ECM part number	ECM part number can be read.

*1: 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
- Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

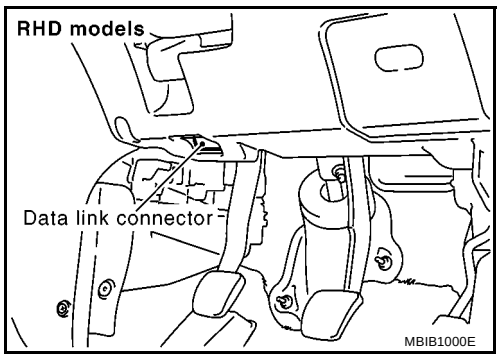
		Item	DIAGNOSTIC TEST MODE					
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2			
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×	
		Camshaft position sensor (PHASE)		×		×	×	
		Mass air flow sensor		×		×	×	
		Engine coolant temperature sensor		×	×	×	×	×
		Heated oxygen sensor 1		×		×	×	
		Heated oxygen sensor 2		×		×	×	
		Vehicle speed signal			×	×	×	
		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		×		×	×	
		Power steering pressure sensor				×	×	
		Battery voltage				×	×	
		Electrical load signal				×	×	
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×
		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-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-627 .

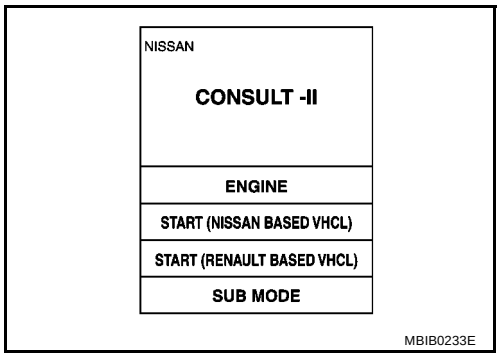
CONSULT-II INSPECTION PROCEDURE

1. Turn ignition switch OFF.

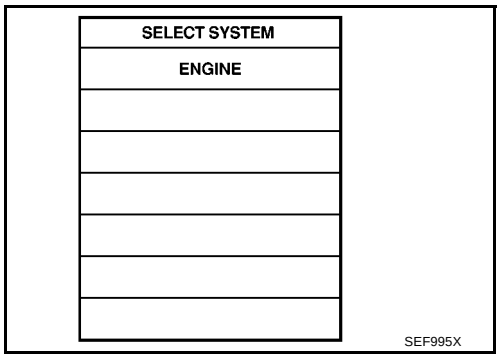
2. Connect “CONSULT-II” and “CONSULT-II CONVERTER” to data link connector, which is located under the driver’s side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

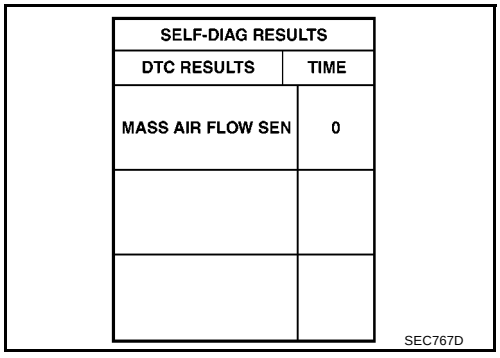


5. Touch “ENGINE”.
If “ENGIEN” is not indicated, go to “CONSULT-II Data Link Connector (DLC) Circuit”, GI-37.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation 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

WORK ITEM	CONDITION	USAGE
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control 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-554, "INDEX FOR DTC" .)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-554, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2*2	● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: 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 TRIM-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 TRIM-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.
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.

*1: The items are the same as those of 1st trip freeze frame data.
*2: A/T models.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
ENG SPEED [rpm]	×	×		● Indicates the engine speed computed from the signals 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.
B/FUEL SCHDL [msec]		×		● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
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. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]*		×			
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-circuit, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S1 (B2) [V]*	×				
HO2S2 (B1) [V]	×	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]*	×				
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.
HO2S1 MNTR (B2) [RICH/LEAN]*	×				
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.
HO2S2 MNTR (B2) [RICH/LEAN]*	×				
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.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
ACCEL SEN 1 [V]	×	×		● The accelerator pedal position sensor signal voltage is displayed.	
ACCEL SEN 2 [V]	×				
THRTL SEN 1 [V]	×	×		● The throttle position sensor signal voltage is displayed.	
THRTL SEN 2 [V]	×				
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 [ON/OFF] condition of the starter signal computed from the signals of the crankshaft position sensor (POS), camshaft position sensor (PHASE) 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 oil pressure switch as determined by the power steering oil pressure signal 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.	
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.
INJ PULSE-B2 [msec]*					
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.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	Description	Remarks
INT/V TIM (B1) [°CA]				● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]				● The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... intake valve timing control is operating. OFF ... Intake valve timing control is not operating.	
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 [ON/OFF]				● Indicates the condition of the cooling fan (determined by ECM according to the input signals). ON ... 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.	
HO2S1 HTR (B2) [ON/OFF]*					
HO2S2 HTR (B1) [ON/OFF]				● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]*					
VEHICLE SPEED [km/h] or [mph]	×			● The vehicle speed computed from the vehicle speed signal sent from TCM or combination meter 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.	
TRVL AFTER MIL [km] or [mile]				● Distance traveled while MI is activated.	
O2SEN 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.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	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					
CAN COMM [OK/NG]			×	● Indicates the communication condition of CAN communication line.	● These items are not displayed in "SELECTION FROM MENU" mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		

*: For A/T models.

NOTE:

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

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
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.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]*		×		

*: For A/T models

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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injectors ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	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: N (A/T models) Neutral (M/T models) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN*	● Ignition switch: ON ● Turn the cooling fan “ON” and “OFF” with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injectors
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II 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-II.	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-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

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

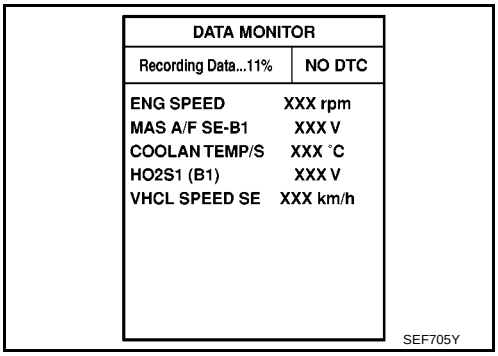
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

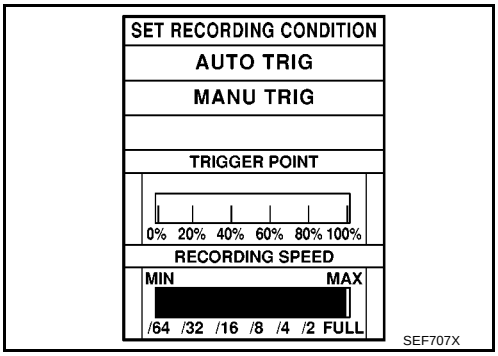
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.

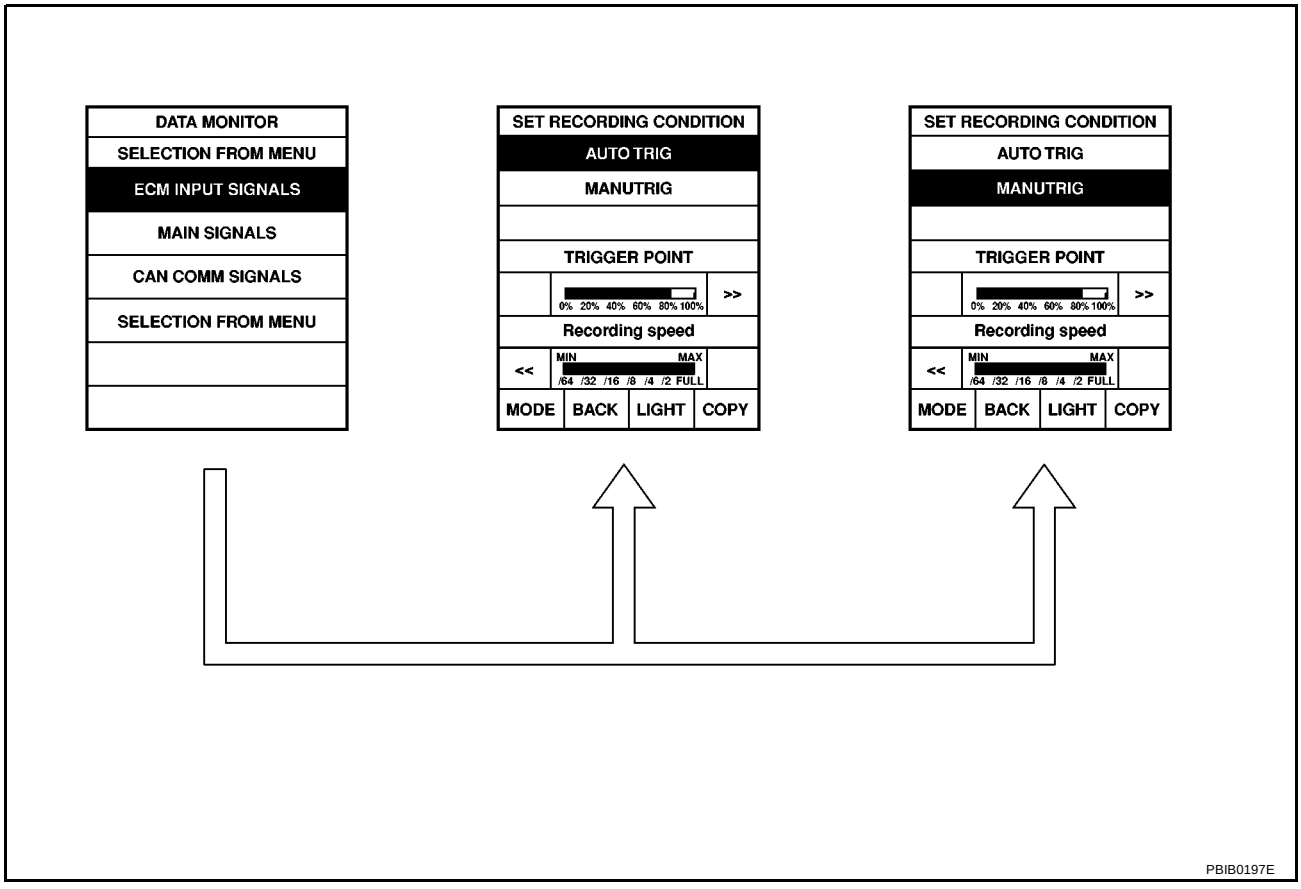


2. "MANU TRIG" (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.



Operation

1. "AUTO TRIG"
   - While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT", GI-21.)
2. "MANU TRIG"
   - If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QVG

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		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T models) Neutral (M/T models) ● No-load	Idle	Approx. 1.0 - 1.7V
		2,500 rpm	Approx. 1.5 - 2.1V
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.5 - 3.0 msec
		2,000 rpm	1.2 - 3.0 msec
A/F ALPHA-B1 A/F ALPHA-B2[*2]	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	75% - 125%
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)[*2]	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)*2	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1) HO2S2 MNTR (B2)*2	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1 ACCEL SEN2*1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
THRTL SEN1 THRTL SEN2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
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 (A/T models) Neutral (M/T models)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1 INJ PULSE-B2*2	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.5 msec
		2,000 rpm	1.5 - 3.5 msec

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	M/T: 8°±5° BTDC A/T: 10°±5° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	15 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	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 conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 99°C (210°F) or less	OFF
		Engine coolant temperature is 100°C (212°F) or more	ON
HO2S1 HTR (B1) HO2S1 HTR (B2)*2	● Engine: After warming up ● Engine speed: Below 3,600 rpm (M/T models) Below 3,200 rpm (A/T models)		ON
	● Engine speed: Above 3,600 rpm (M/T models) Above 3,200 rpm (A/T models)		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)*2	● Engine speed: Below 3,600 rpm after the following conditions are met (A/T models). Below 3,800 rpm after the following conditions are met (M/T models). – Engine: After warming up – Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load		ON
	● Engine speed: Above 3,600 rpm (A/T models) Above 3,800 rpm (M/T models)		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,280 km (0 - 40,565 mile)
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80° (176°F) ● Engine speed: Below 3,600 rpm (M/T models) Below 3,200 rpm (A/T models)		Approx. 50%
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● Air conditioner switch: OFF		1.0 - 4.0V
VEH SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
CAN COMM	● Ignition switch: ON		OK
CAN CIRC 1			OK
CAN CIRC 2			OK or UNKWN
CAN CIRC 3			UNKWN
CAN CIRC 4			OK
CAN CIRC 5			UNKWN
CAN CIRC 6			OK
CAN CIRC 7			UNKWN

*1: 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.
*2: These items are displayed with A/T models

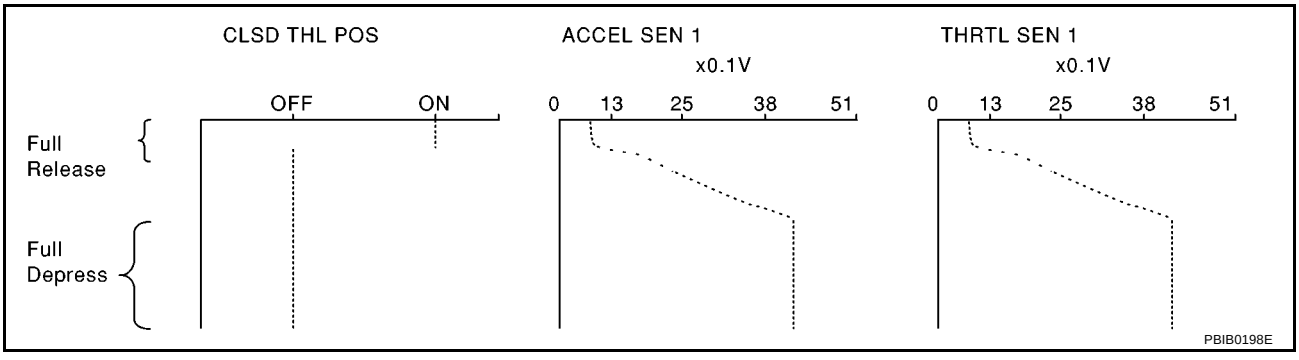
Major Sensor Reference Graph in Data Monitor Mode

EBS00QVH

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

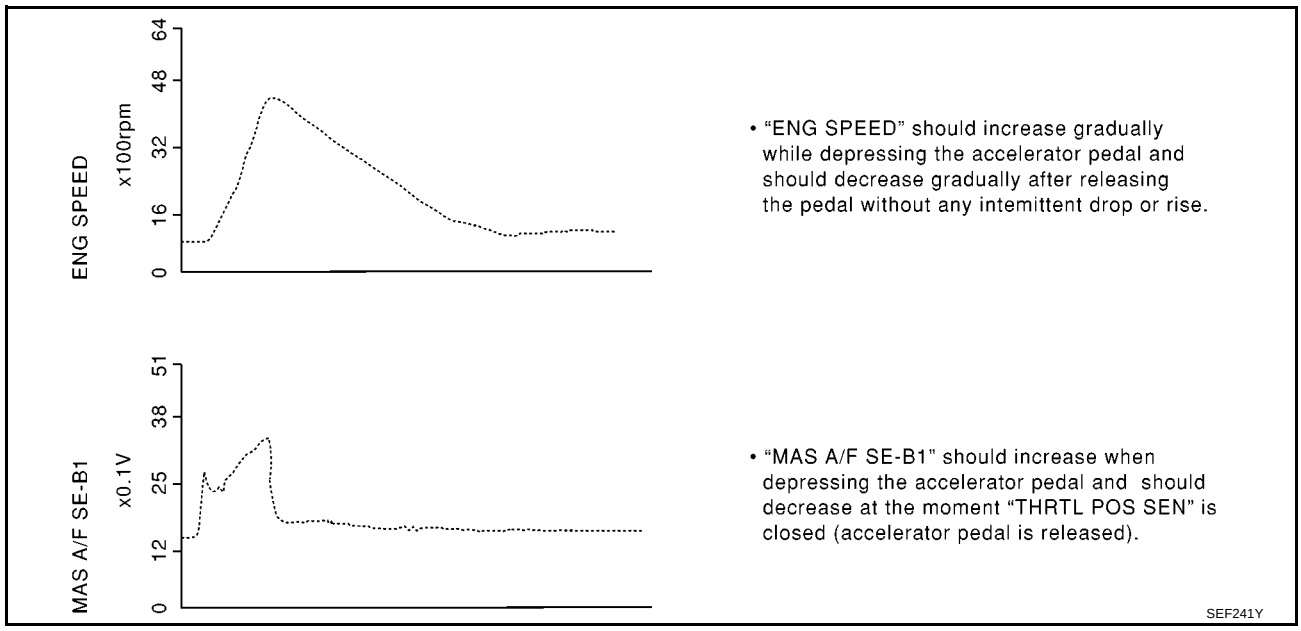
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch “ON” and with selector lever in “D” position (A/T models) or with shift lever in “1st” position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

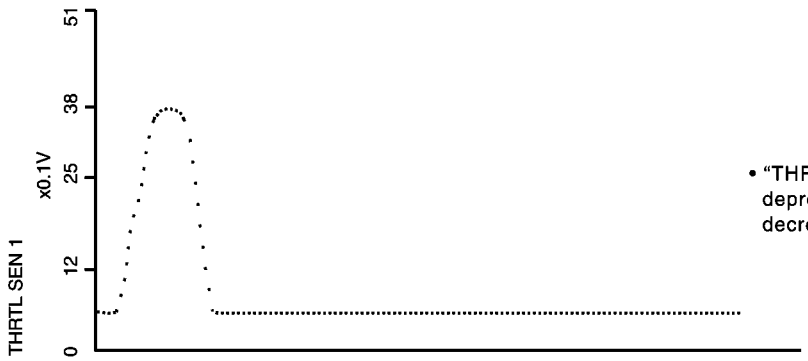


ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

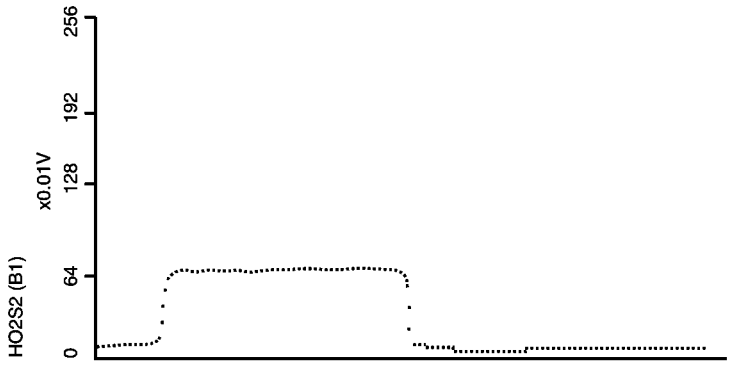
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

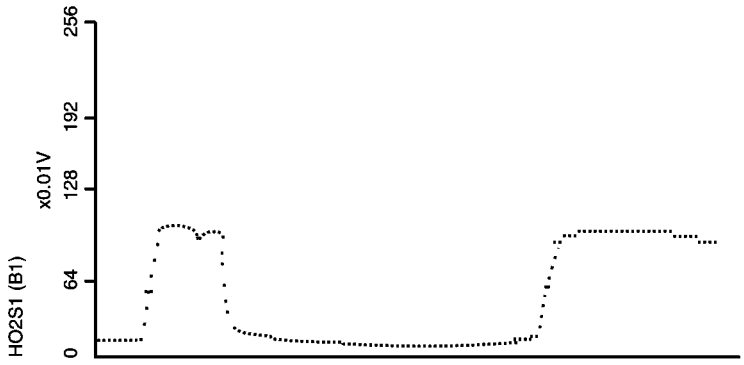




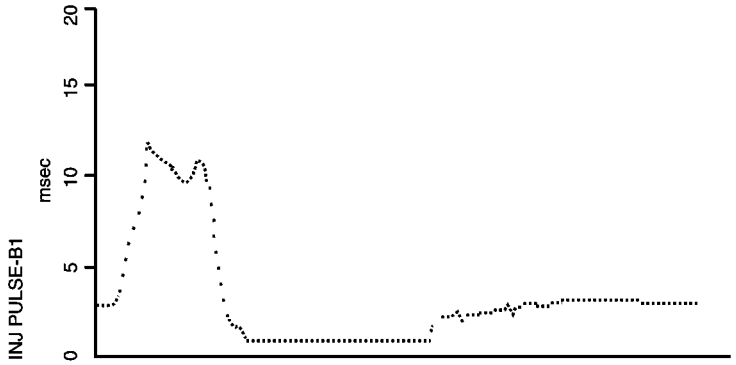
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB0668E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

EBS00QVI

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” 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/B2 (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)

Testing Condition

EBS00QVJ

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (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*1
- Electrical load: Not applied*2
- Engine speed: Idle

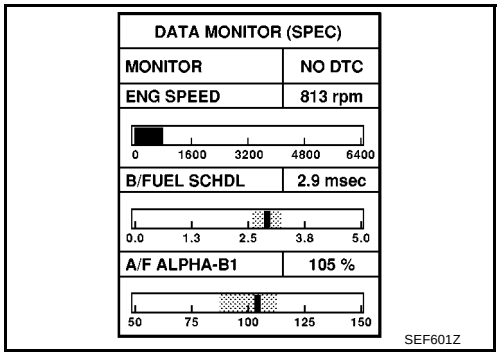
*1: For A/T models , after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Steering wheel is straight ahead.

Inspection Procedure

EBS00QVK

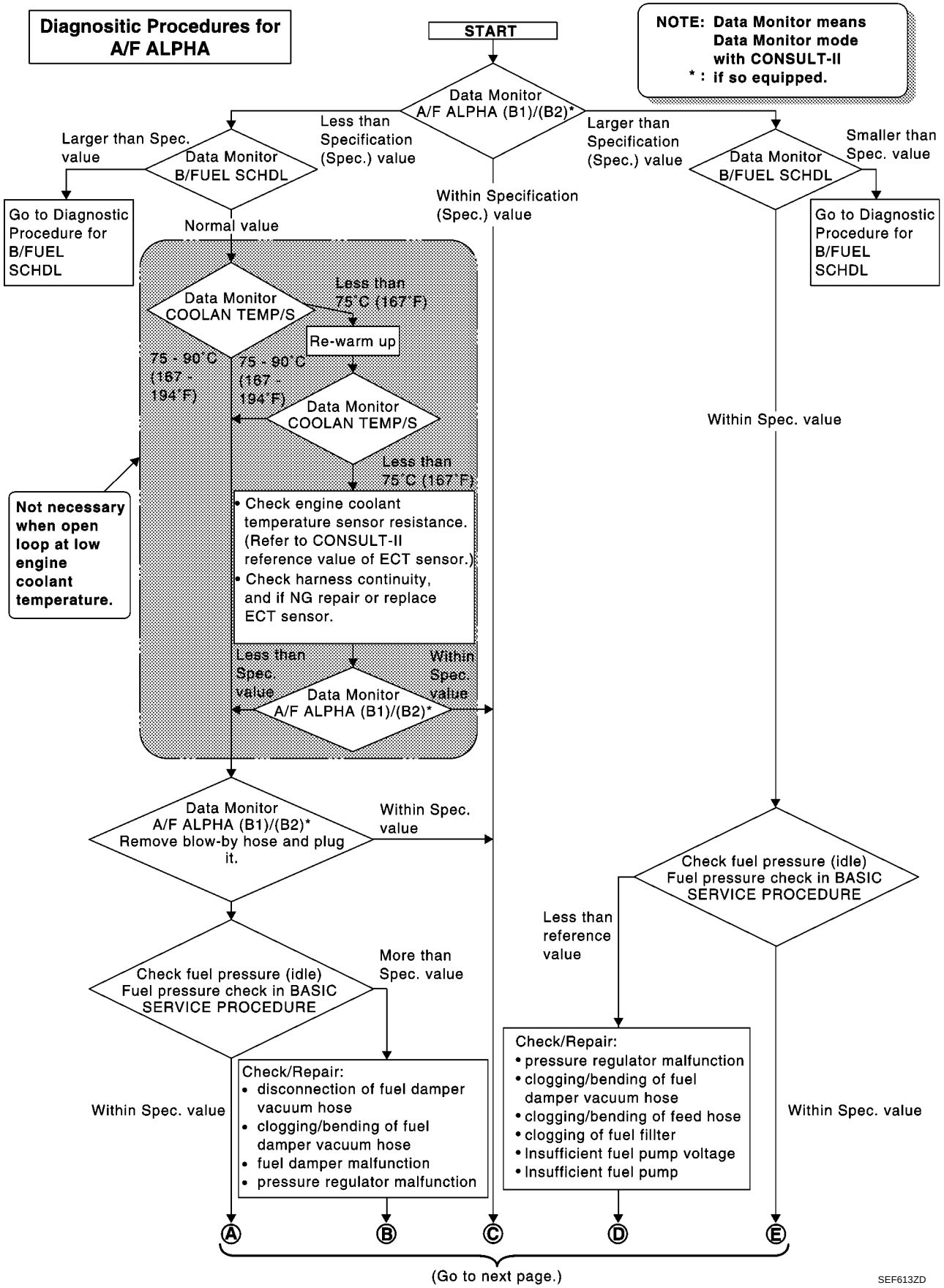
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

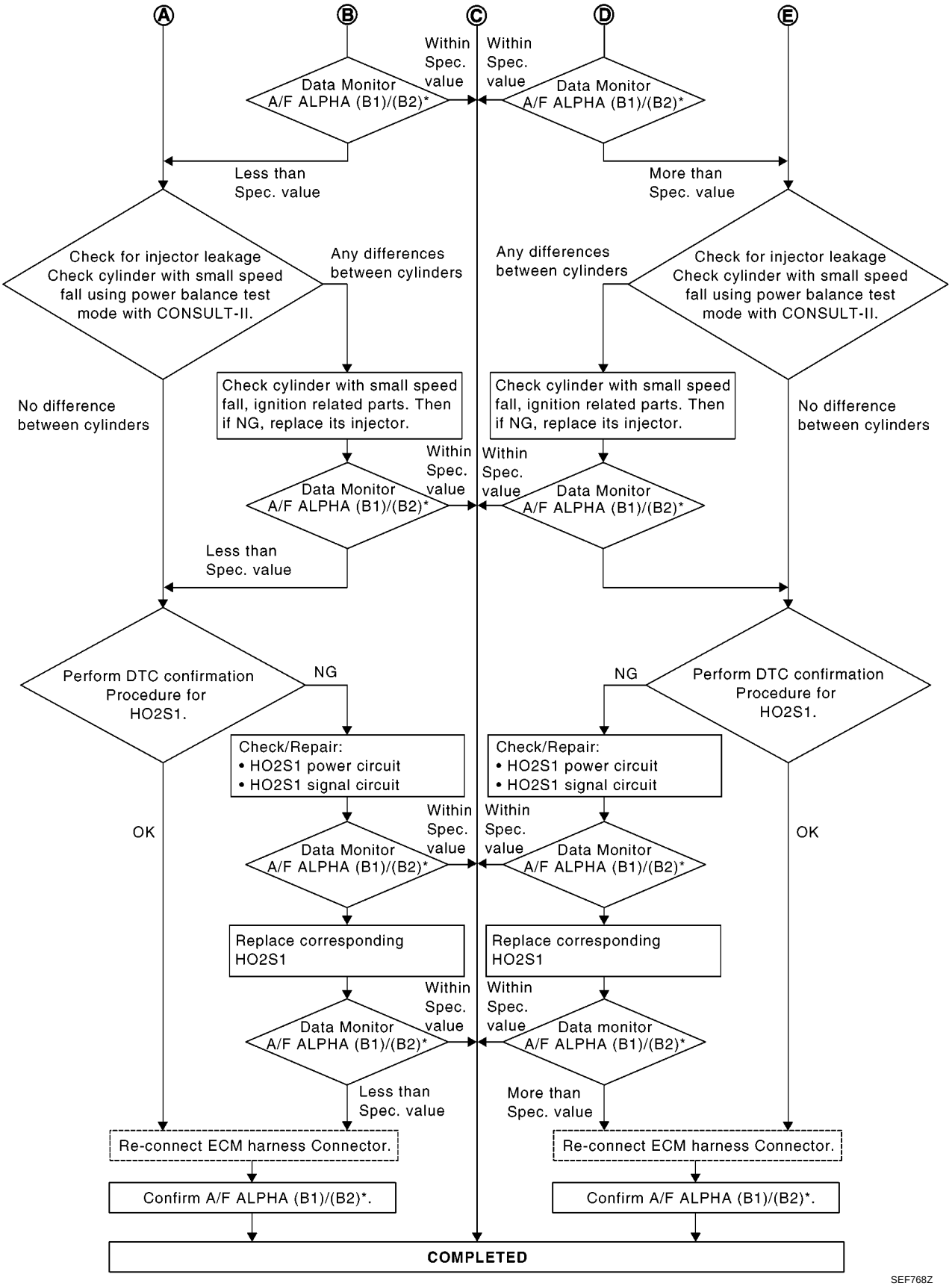
1. Perform EC-595, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1/B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-641, "Diagnostic Procedure" .



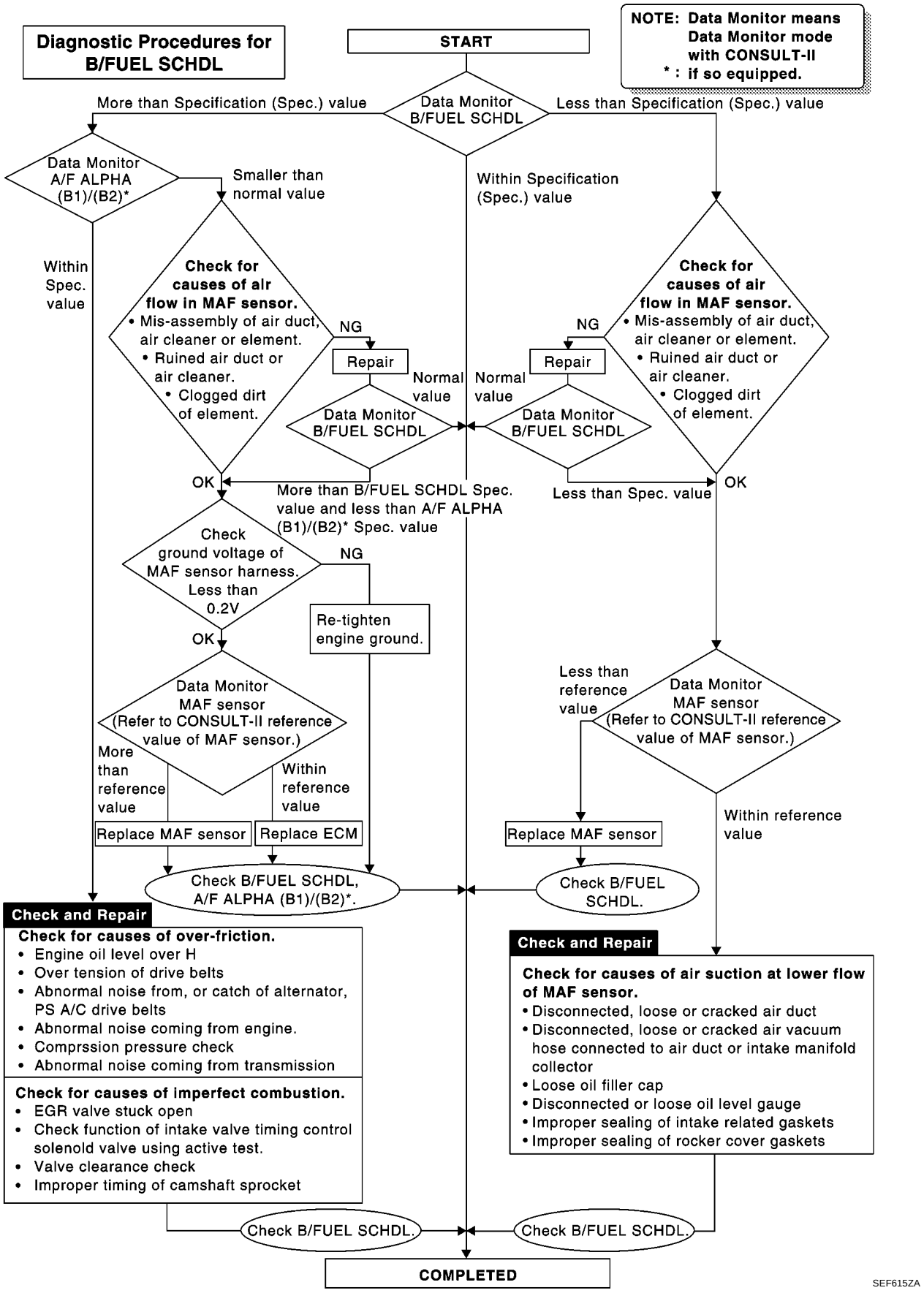
Diagnostic Procedure

EBS00QVL




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
NG
Re-tighten engine ground.
OK
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check B/FUEL SCHDL.
Less than Spec. value
Less than reference value
Replace MAF sensor
Check B/FUEL SCHDL.
Within reference value
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS00QVM

Intermittent incidents (I/I) may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common I/I Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “[1t]”.
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

EBS00QVN

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCEDENT”, GI-21, “Incident Simulation Tests”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, GI-21, “Incident Simulation Tests”.

OK or NG

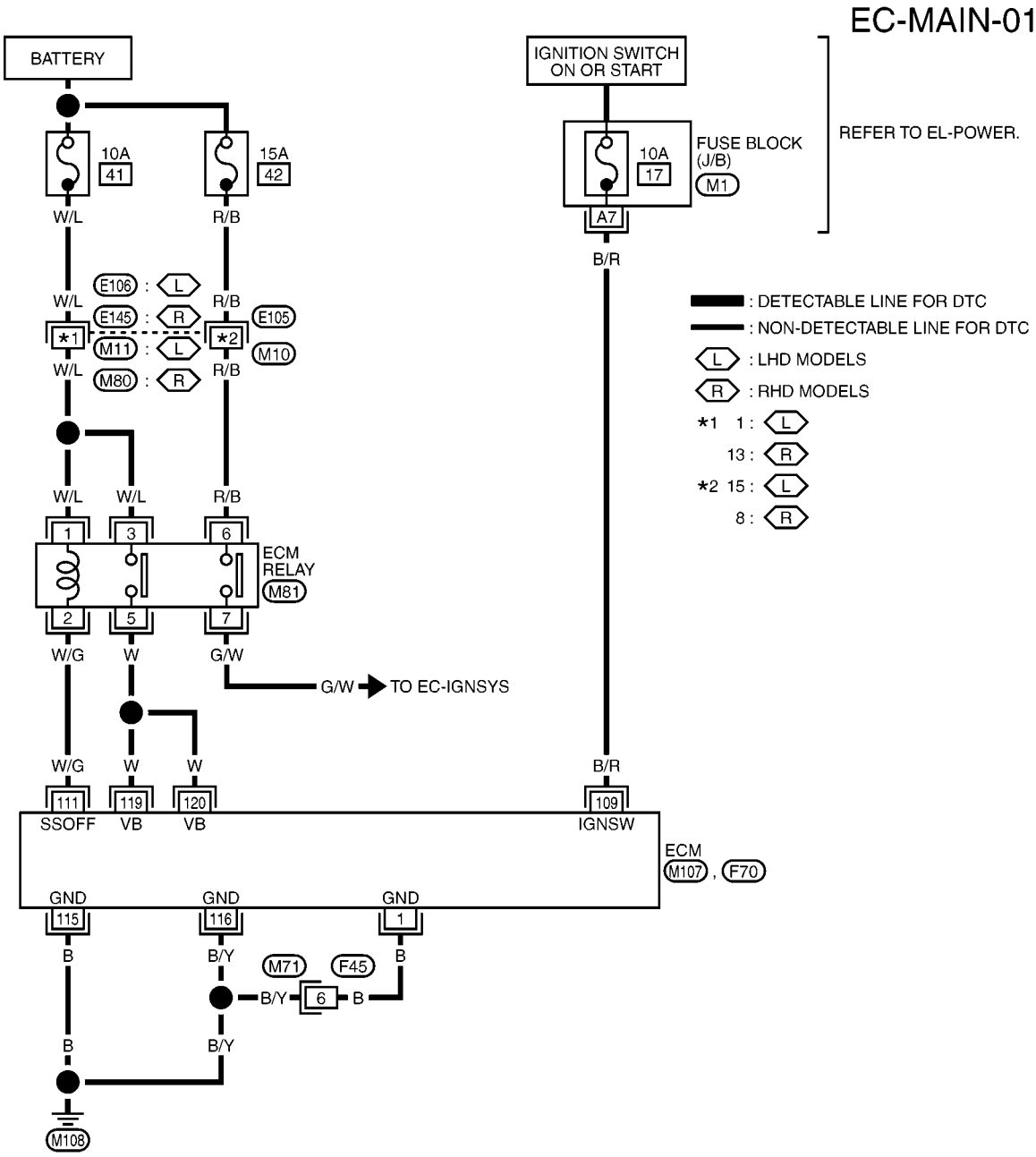
OK >> **INSPECTION END**
NG >> Repair or replace.

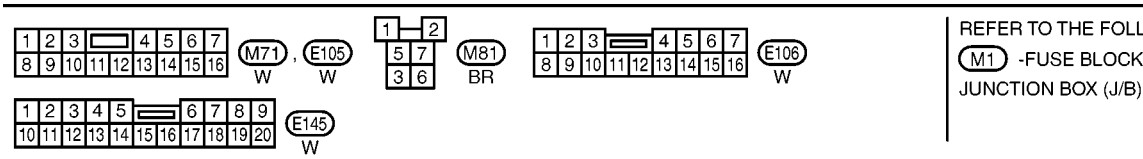
POWER SUPPLY CIRCUIT FOR ECM

PFP:24110

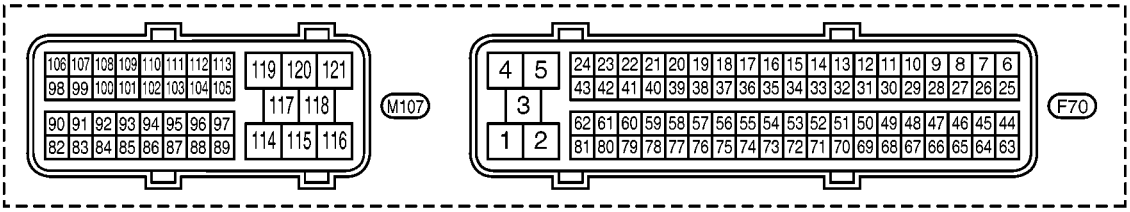
Wiring Diagram

EBS00QVO





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)



YEC432A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
109	B/R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
115 116	B B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QVP

1. INSPECTION START

Start engine.

Is engine running?

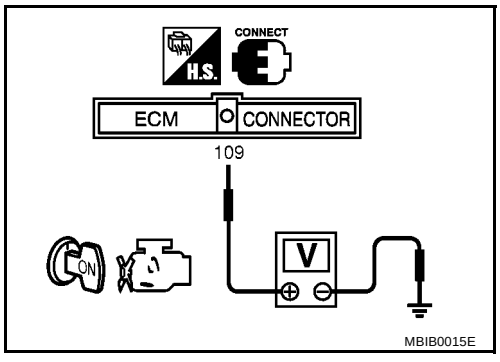
Yes or No

Yes >> GO TO 10.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- 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 ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

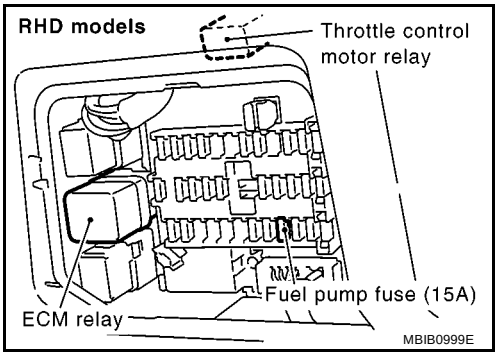
Check the following.

- Harness connectors M71, F45
- Harness for open or short between ECM and engine ground

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

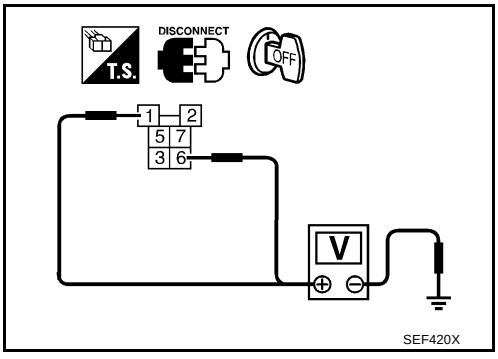
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminals 1 and 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- 15A fuse
- Harness for open or short between ECM relay and battery

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

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM RELAY

Refer to EC-650, "Component Inspection" .

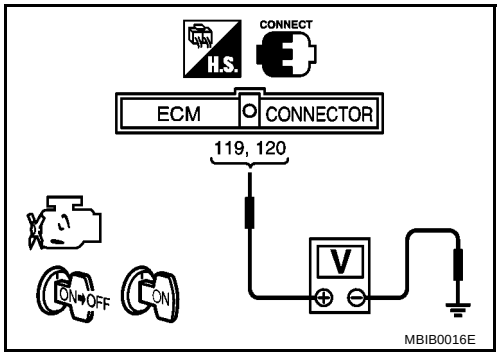
OK or NG

OK >> Go to EC-874, "IGNITION SIGNAL" .
NG >> Replace ECM relay.

10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Stop engine and wait at least 10 seconds.
2. Turn ignition switch “ON” and then “OFF”.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

   Voltage: After turning ignition switch “OFF”, battery voltage will exist for a few seconds, then drop approximately 0V.

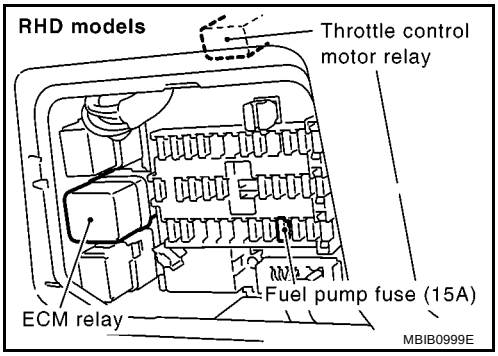


OK or NG

OK >> GO TO 15.
NG (Battery voltage does not exist.)>>GO TO 11.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

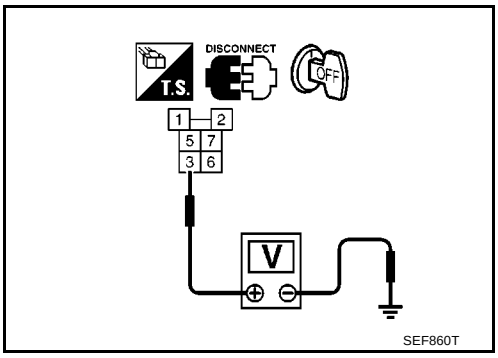
11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and M113 (LHD models)
- Harness for open or short between ECM relay and M80 (RHD models)

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

13. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK ECM RELAY

Refer to EC-650, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace ECM relay.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and engine ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following

- Harness connectors M71, F45
- Harness for open or short between ECM and engine ground

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

17. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

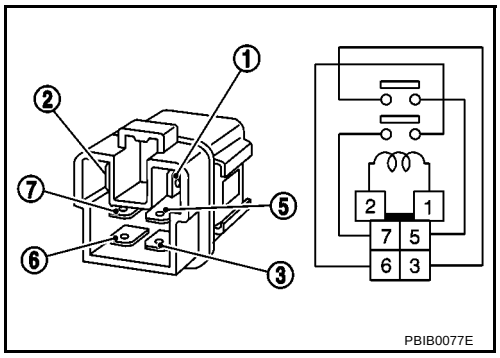
EBS00QVQ

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

EBS00QVR

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.

On Board Diagnosis Logic

EBS00QVS

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted.)
U1001* 2 1001 *2			

***1: This self-diagnosis has the one trip detection logic.**
***2: The MI will not light up for this diagnosis.**

DTC Confirmation Procedure

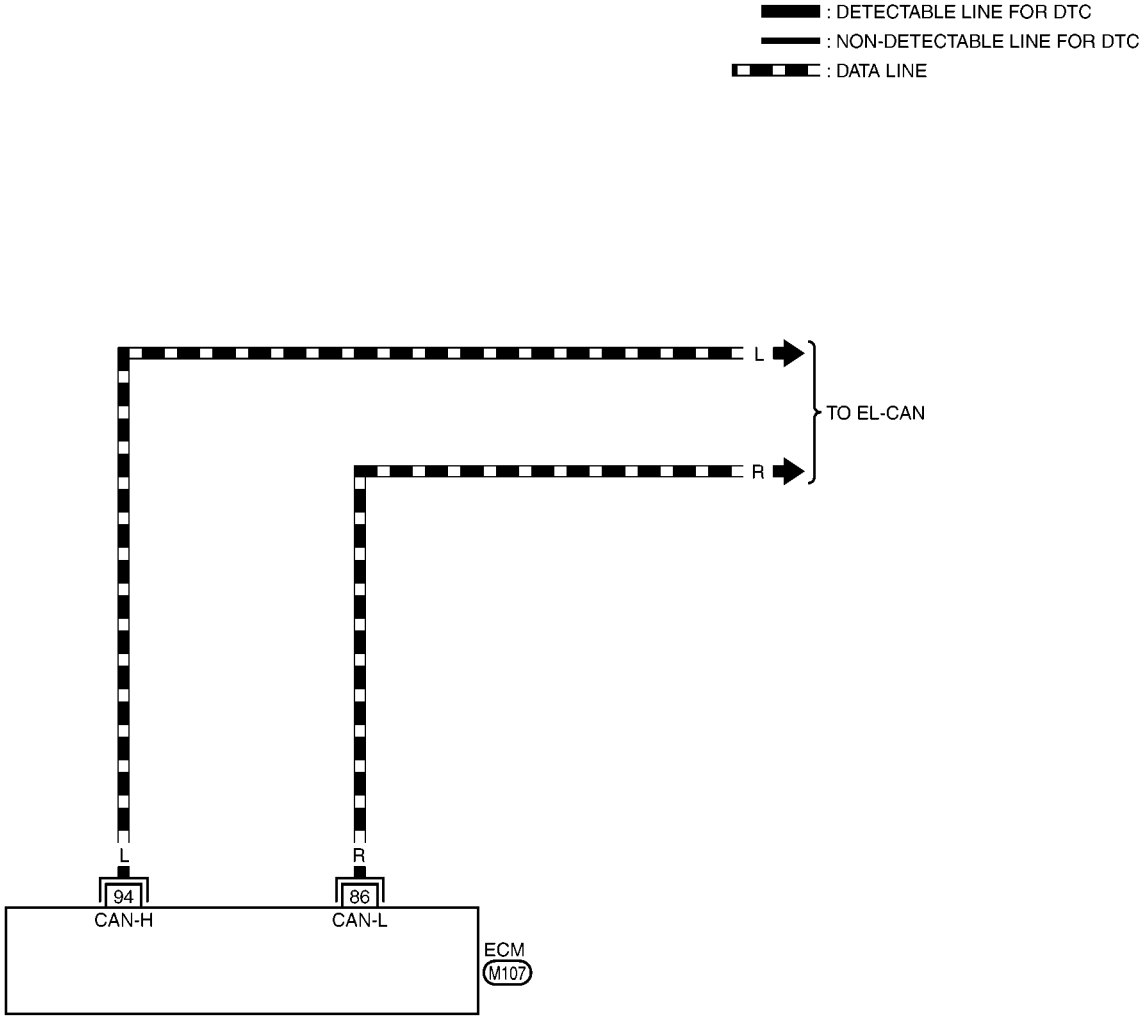
EBS00QVT

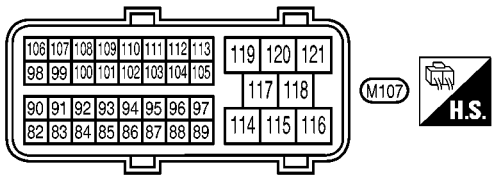
1. Turn ignition switch “ON” and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-653, "Diagnostic Procedure" .

Wiring Diagram

EBS00QVU

EC-CAN-01





YEC433A

Diagnostic Procedure

EBS00QVV

1. INSPECTION START

1. Turn ignition switch “ON”.
2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II.
3. Print out the CONSULT-II screen.

A/T models

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	OK
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0180E

M/T models

OK data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	OK
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	NO DTC
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0179E

>> Go to “CAN COMMUNICATION”, EL-459.

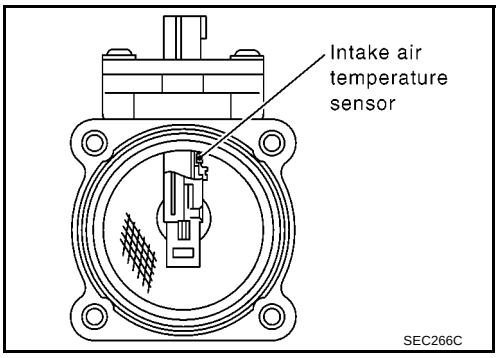
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

EBS00QVW

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QVX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T models) Neutral (M/T models) ● No-load	Idle	Approx. 1.0 - 1.7V
		2,500 rpm	Approx. 1.5 - 2.1V

On Board Diagnosis Logic

EBS00QVY

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	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

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

EBS00QVZ

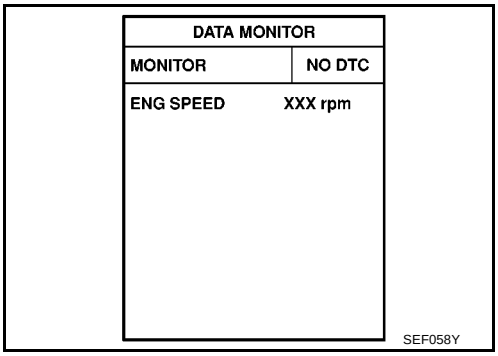
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch “ON”.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-657, "Diagnostic Procedure" .



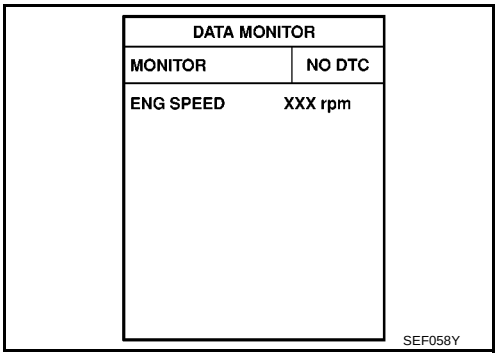
Without CONSULT-II

1. Start engine and wait 5 seconds at most.
2. Tarn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-657, "Diagnostic Procedure" .

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-657, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-657, "Diagnostic Procedure" .



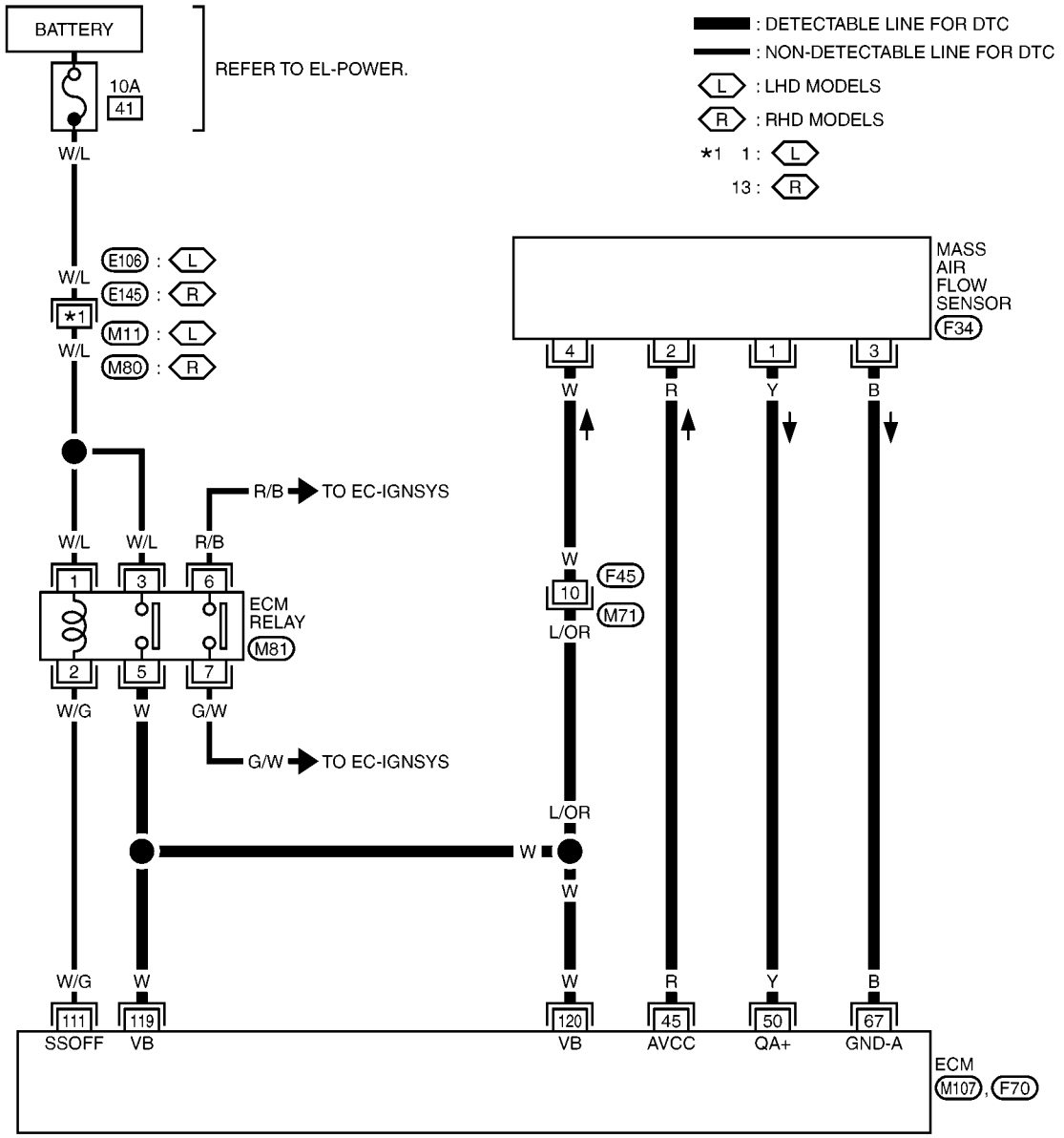
Without CONSULT-II

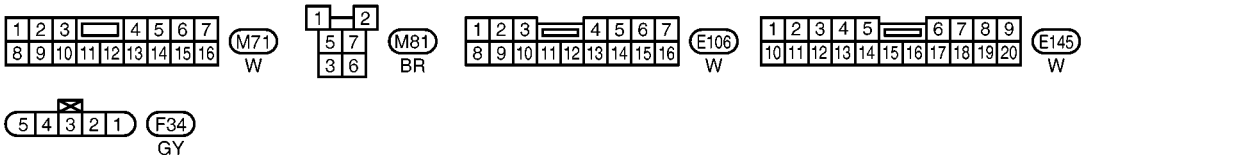
1. Turn ignition switch “ON” and wait at least 5 seconds.
2. Tarn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-657, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine and wait at least 5 seconds.
7. Tarn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
8. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
9. If DTC is detected, go to EC-657, "Diagnostic Procedure" .

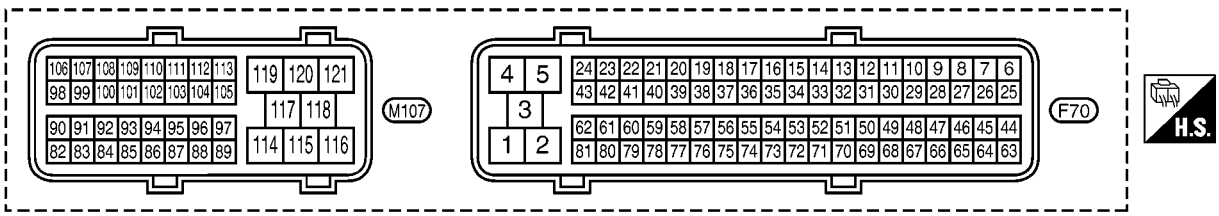
Wiring Diagram

EBS00QW0

EC-MAFS-01







YEC440A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	R	Sensor power supply (Mass air flow sensor)	**[Ignition switch "ON"]**	Approximately 5V
50	Y	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 2.1V
67	B	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00QW1

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

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

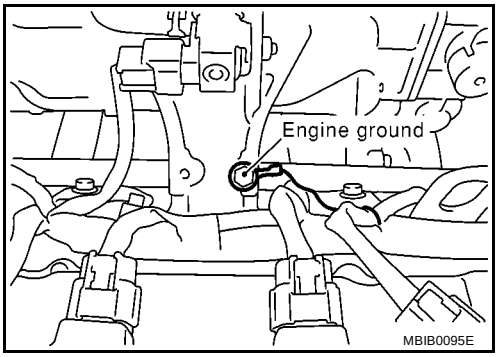
OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

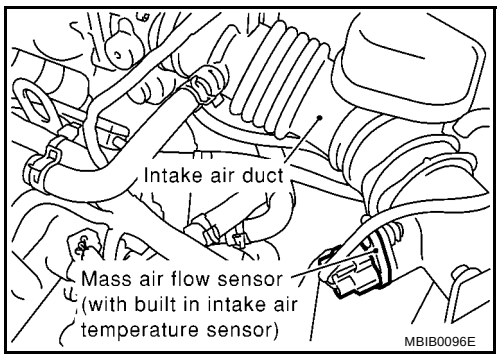
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



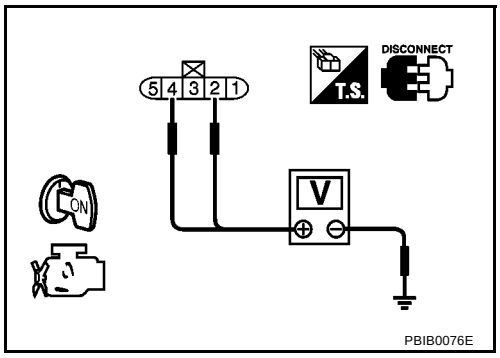
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.

Terminal	Voltage
2	Approximately 5V
4	Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

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

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> 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 harness continuity between MAF sensor terminal 1 and ECM terminal 50. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-659, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

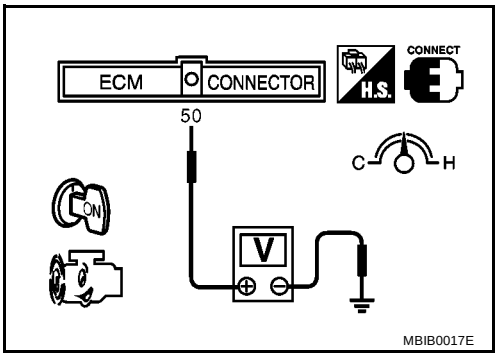
EBS00QW2

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 50 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch “ON” (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.1
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for liner voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Turn ignition switch “OFF”.
b. Disconnect mass air flow sensor harness connector and reconnect it again.
c. Perform steps 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.
6. If NG, clean or replace mass air flow sensor.

Removal and Installation

EBS00QW3

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

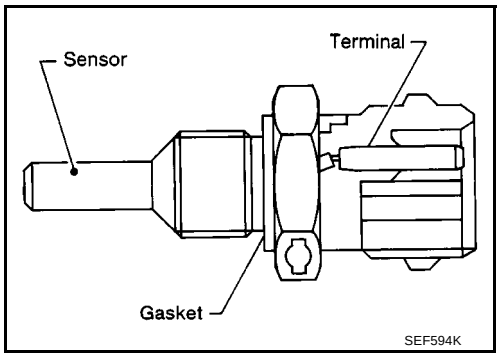
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

EBS00QW4

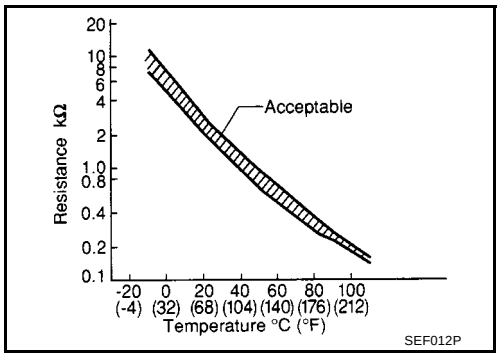
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 72 (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.

On Board Diagnosis Logic

EBS00QW5

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	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 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode	
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-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II 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.	

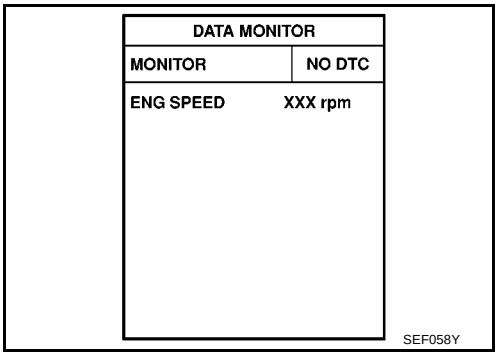
DTC Confirmation Procedure

EBS00QW6

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-663, "Diagnostic Procedure" .



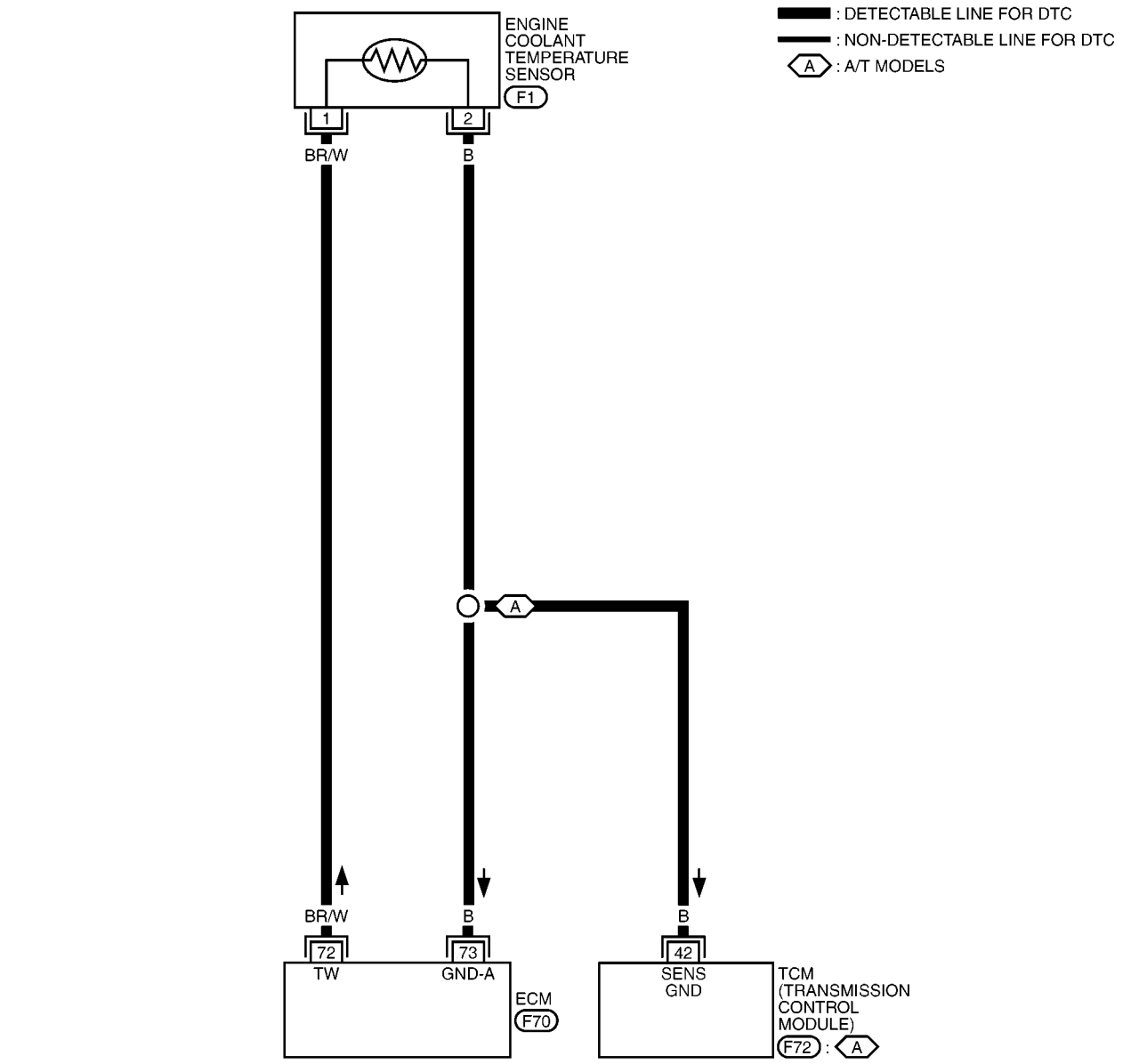
WITHOUT CONSULT-II

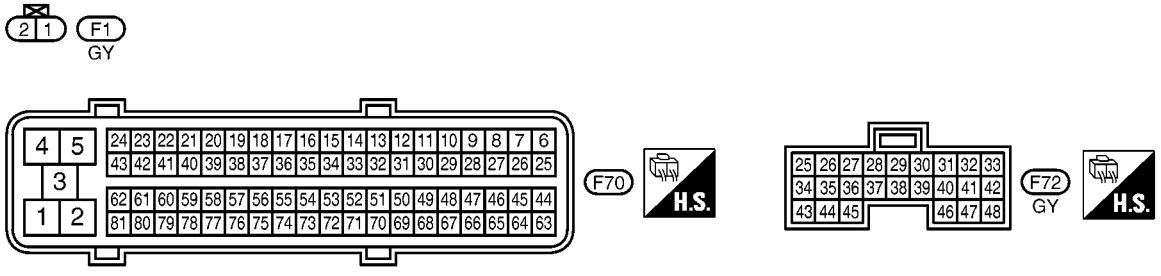
1. Turn ignition switch “ON” and wait at least 5 seconds.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-663, "Diagnostic Procedure" .

Wiring Diagram

EBS00QW7

EC-ECTS-01





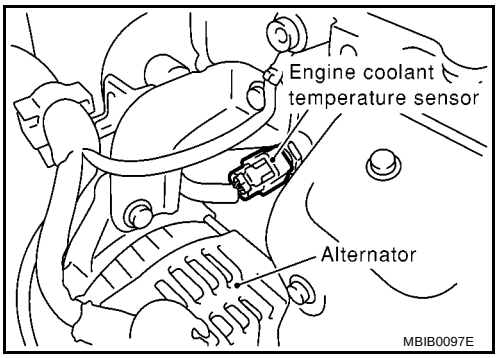
YEC442A

Diagnostic Procedure

EBS00QW8

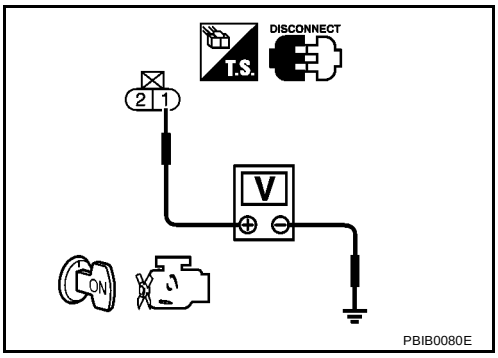
1. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECT sensor terminal 2 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM (A/T models only)

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

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-664, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

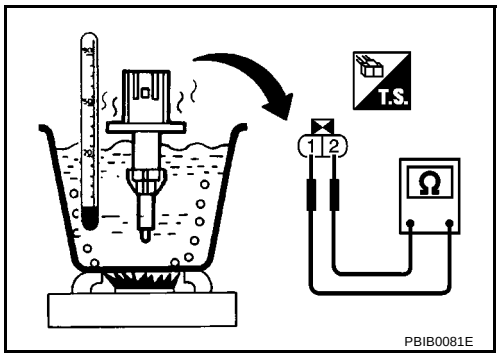
>> **INSPECTION END**

Component Inspection

EBS00QW9

ENGINE COOLANT TEMPERATURE SENSOR

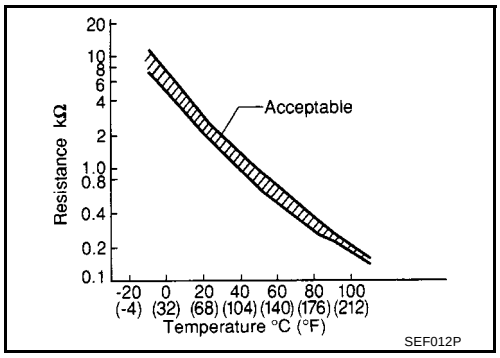
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<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 72 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS00QWA

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-60, "CYLINDER HEAD" .

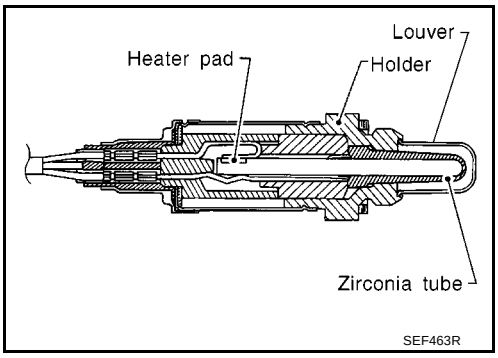
DTC P0132 HO2S1 (M/T MODELS)

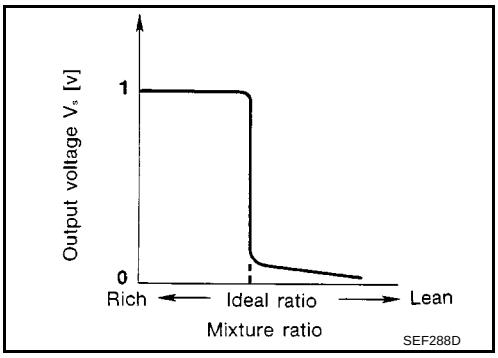
PFP:22690

Component Description

EBS00QWB

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QWC

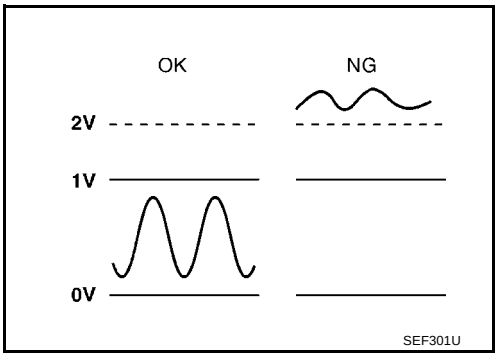
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QWD

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	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

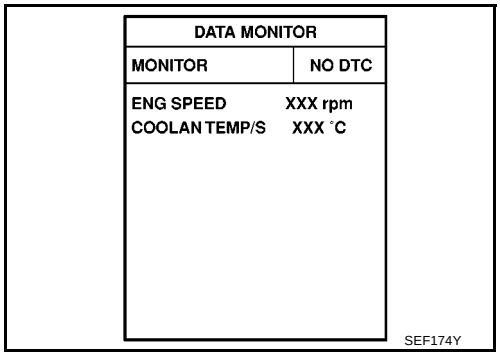
DTC Confirmation Procedure

EBS00QWE

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

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-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-668, "Diagnostic Procedure" .



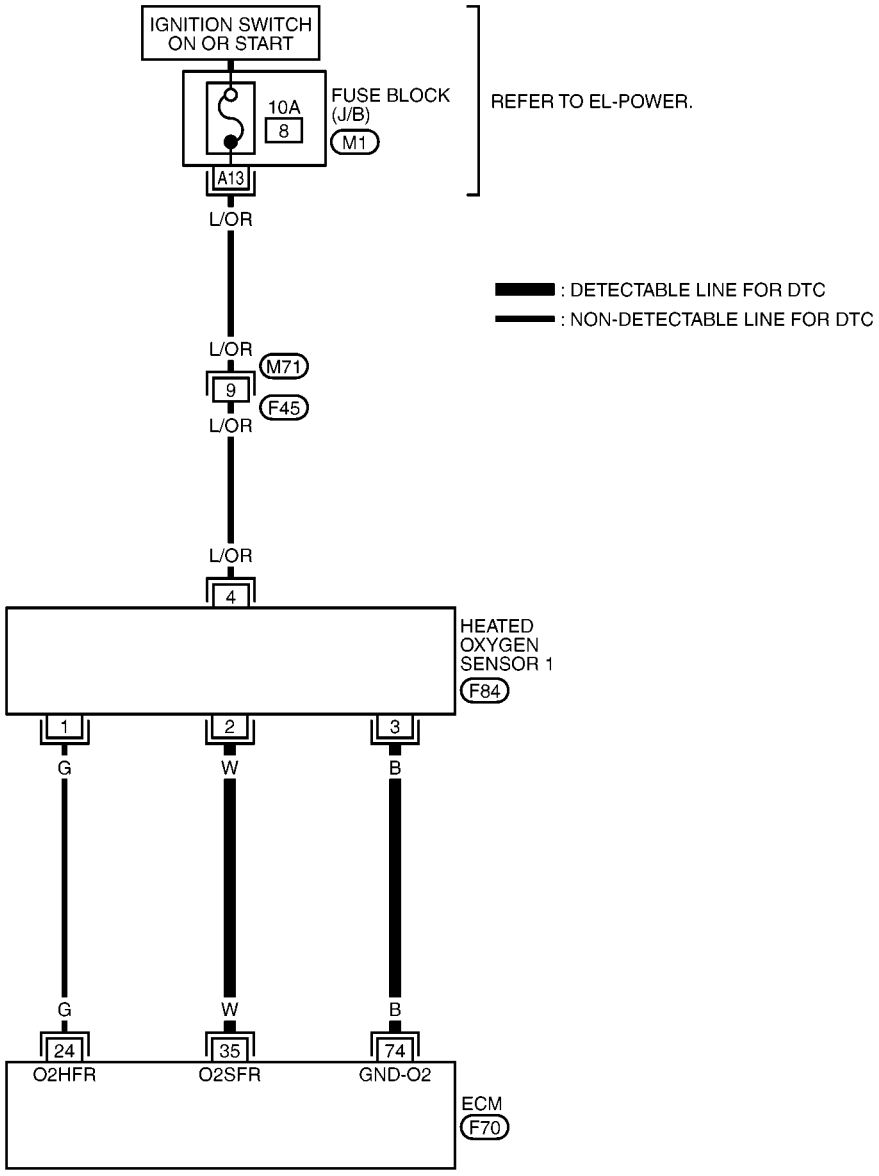
WITHOUT CONSULT-II

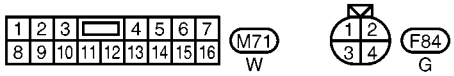
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6. If 1st trip DTC is detected, go to EC-668, "Diagnostic Procedure" .

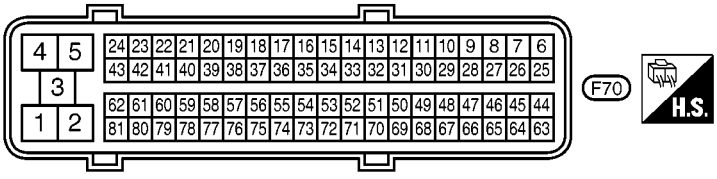
Wiring Diagram

EBS00QWF

EC-HO2S1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC443A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

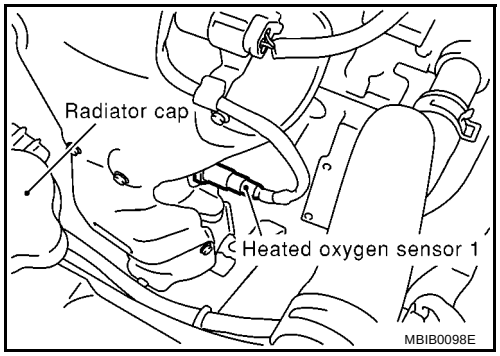
EBS00QWG

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

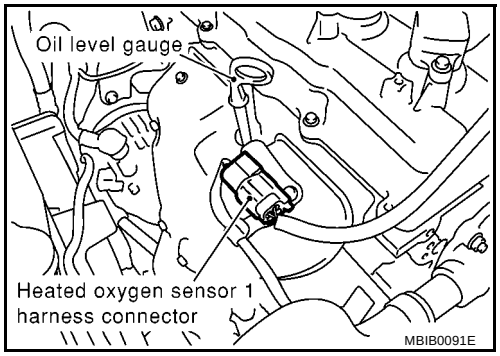
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-669, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

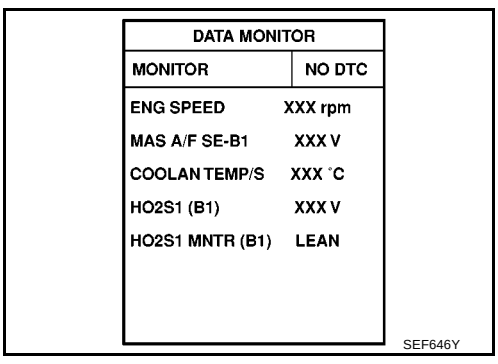
Component Inspection

EBS00QWH

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.



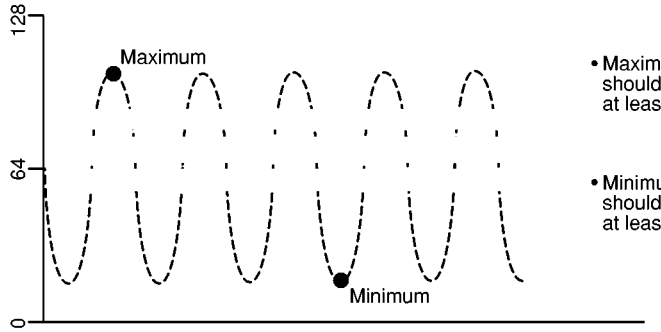
6. Check the following.
   - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - "HO2S1 (B1)" voltage goes above 0.6V at least once.
   - "HO2S1 (B1)" voltage goes below 0.3V at least 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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



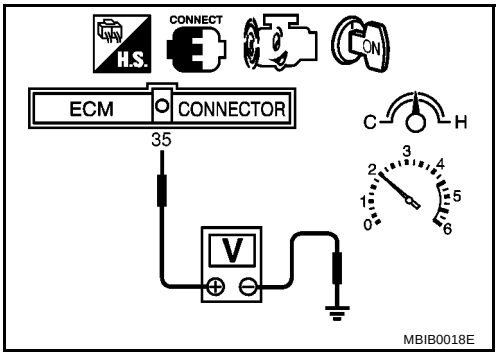
SEF648Y

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0018E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QWI

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

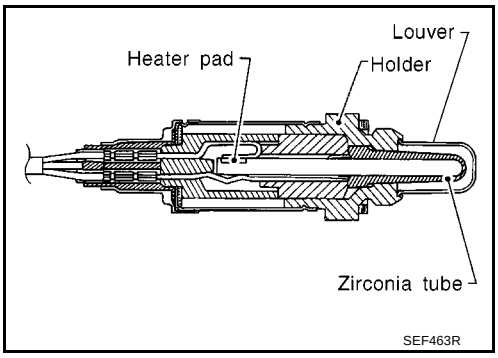
DTC P0132, P0152 HO2S1 (A/T MODELS)

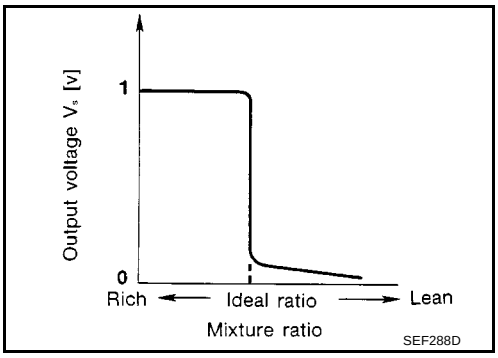
PFP:22690

Component Description

EBS00QWJ

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QWK

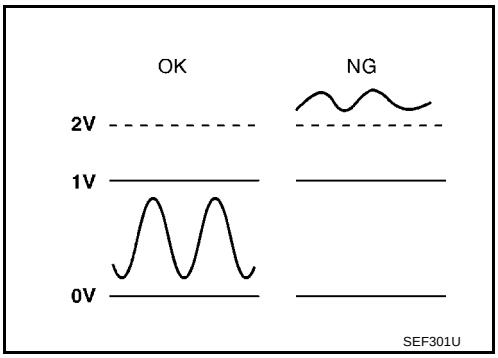
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QWL

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132 (Bank 1)	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
P0152 0152 (Bank 2)			

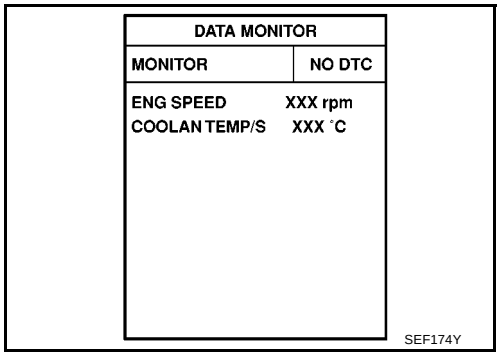
DTC Confirmation Procedure

EBS00QWM

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

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-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-676, "Diagnostic Procedure" .



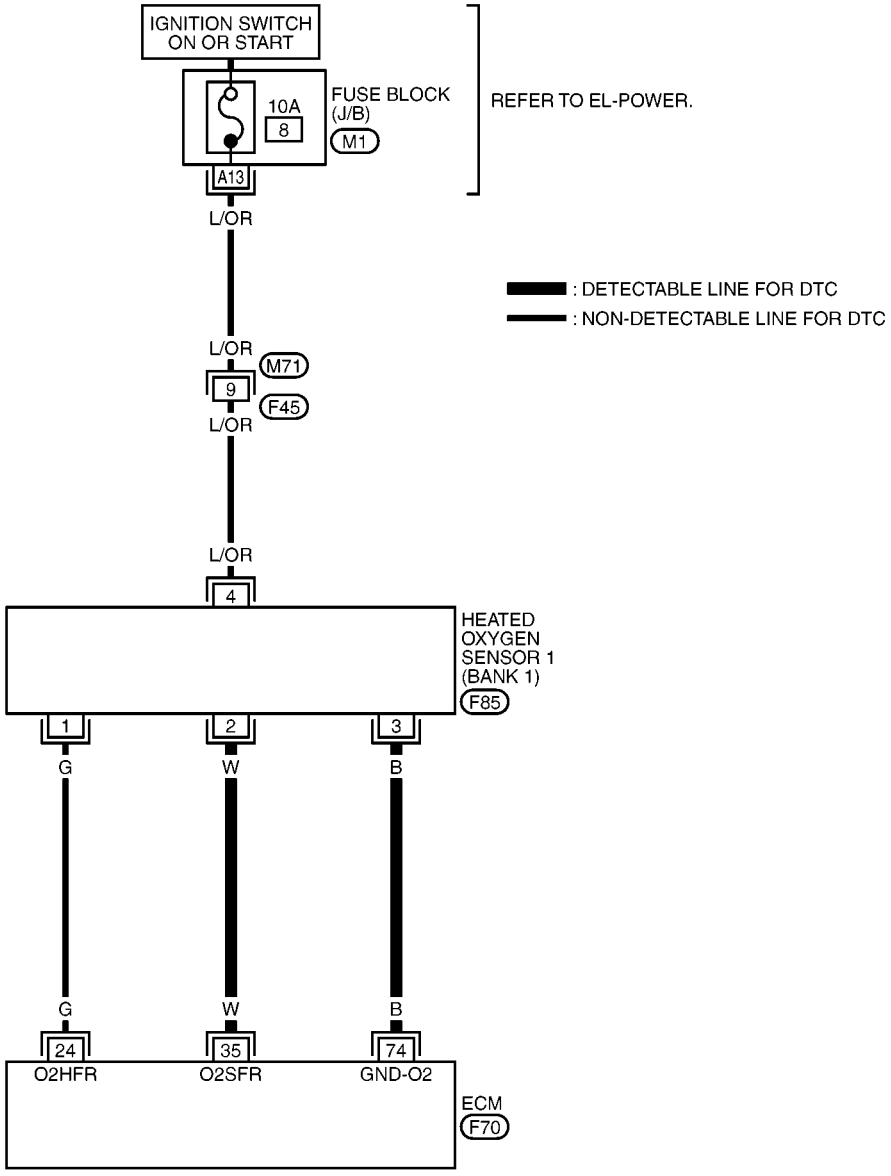
WITHOUT CONSULT-II

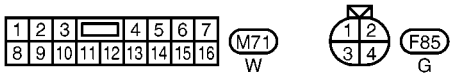
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6. If 1st trip DTC is detected, go to EC-676, "Diagnostic Procedure" .

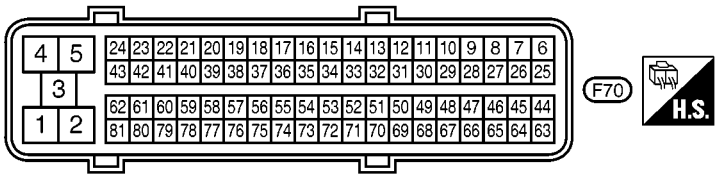
Wiring Diagram
BANK 1

EBS00QWN

EC-O2S1B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC444A

Specification data are reference values and are measured between each terminal and ground.

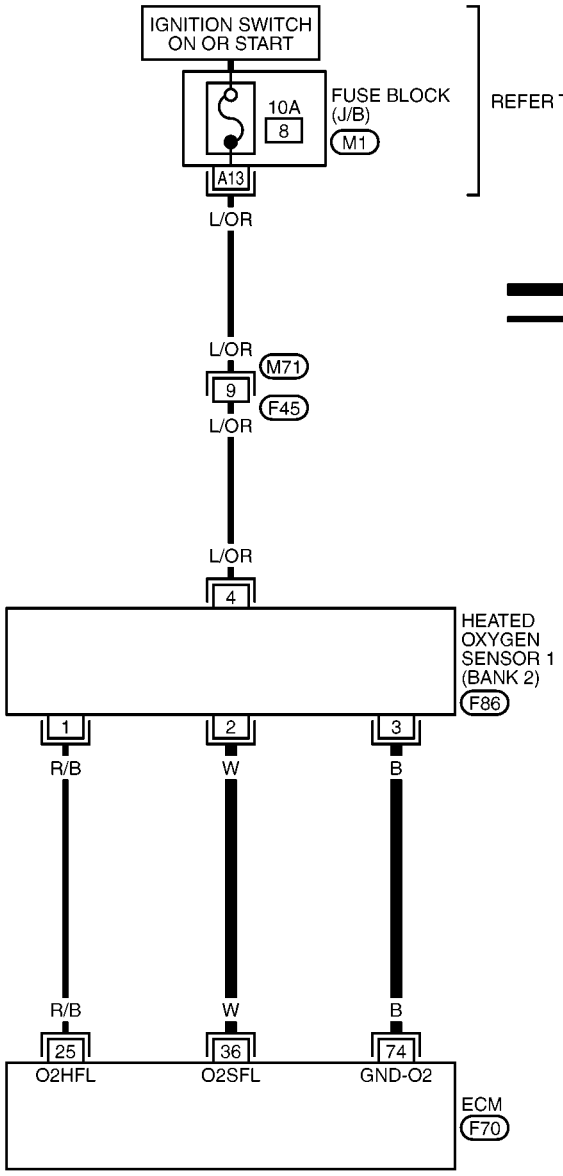
CAUTION:

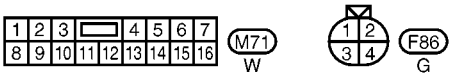
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

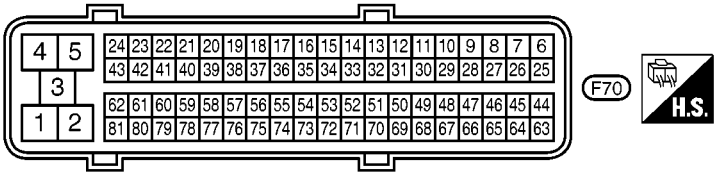
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S1B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC445A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

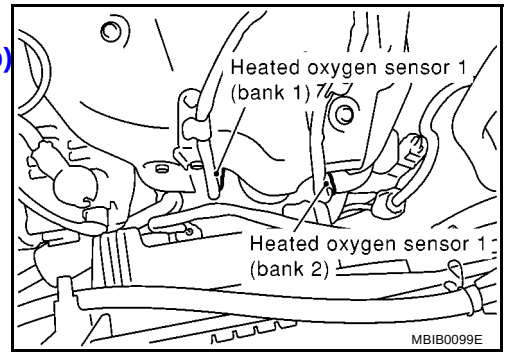
EBS00QWO

1. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Turn ignition switch “OFF”.
2. Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

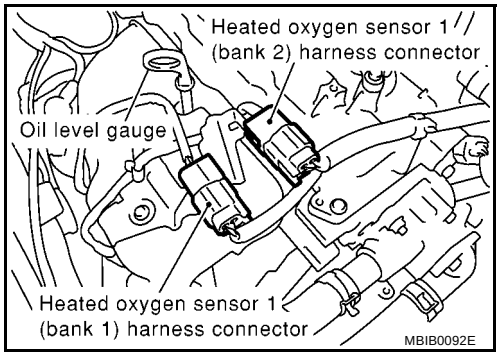
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	2	1
P0152	36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	35	2	1
P0152	36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-677, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QWP

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.

5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1						
cycle	1	2	3	4	5	
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					

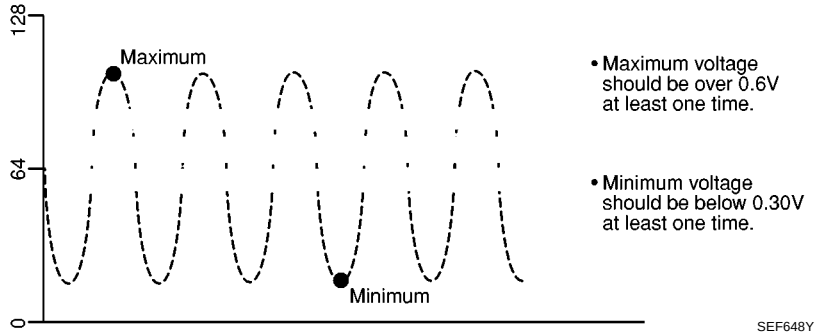
Bank 2						
cycle	1	2	3	4	5	
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

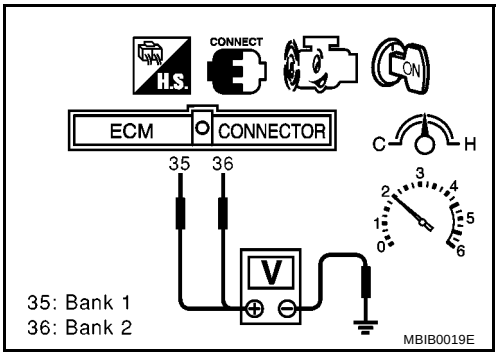
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0019E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QWQ

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

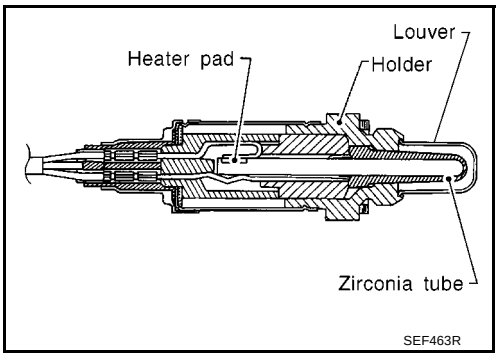
DTC P0134 HO2S1 (M/T MODELS)

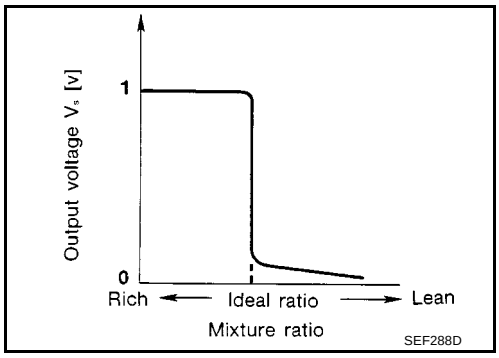
PFP:22690

Component Description

EBS00QWR

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QWS

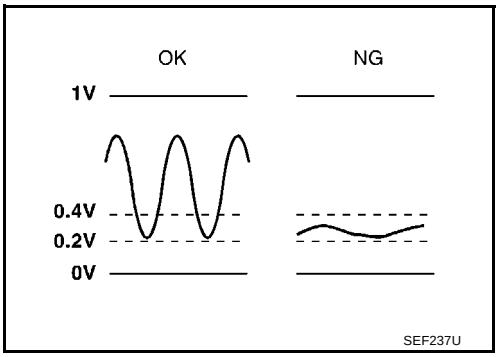
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QWT

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

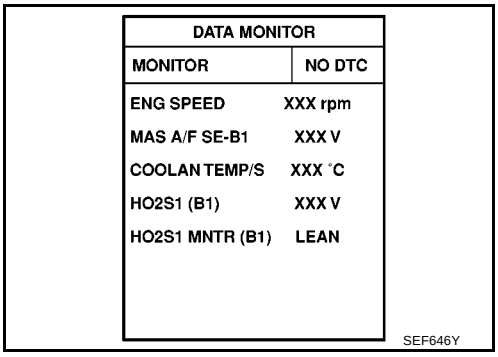
Overall Function Check

EBS00QWU

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, 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 0.2 to 0.4V.
5. If NG, go to EC-683, "Diagnostic Procedure" .

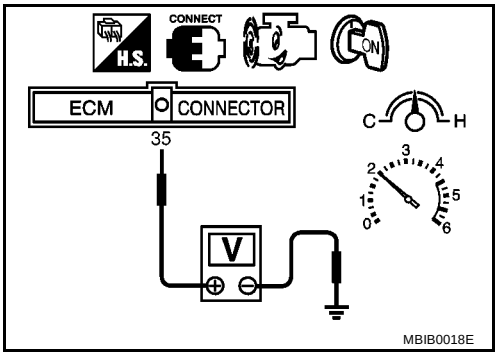


WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage does not remain in the range of 0.2 to 0.4V.

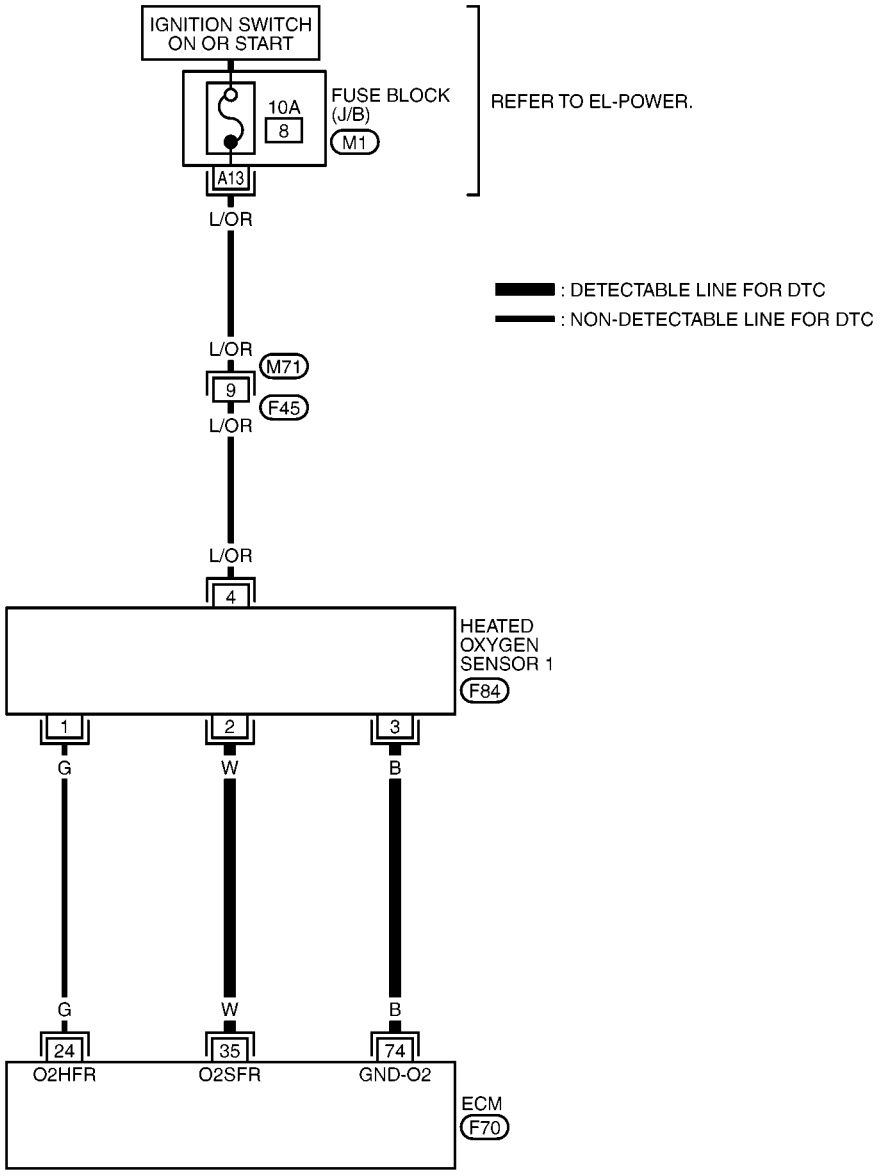
4. If NG, go to EC-683, "Diagnostic Procedure" .

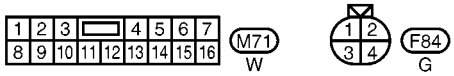


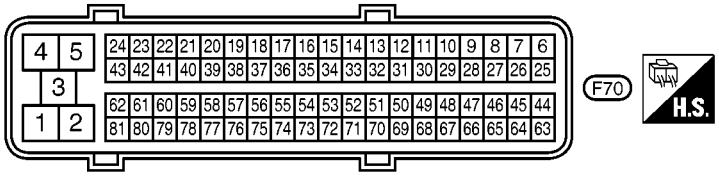
Wiring Diagram

EBS00QWV

EC-HO2S1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC443A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

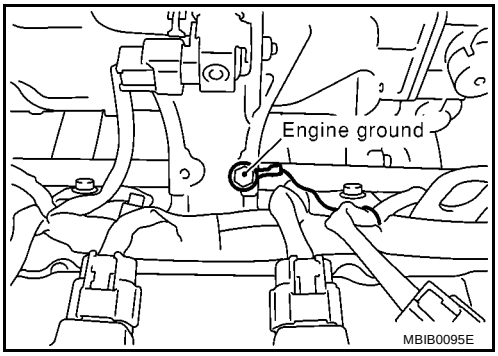
Diagnostic Procedure

EBS00QWW

1. INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

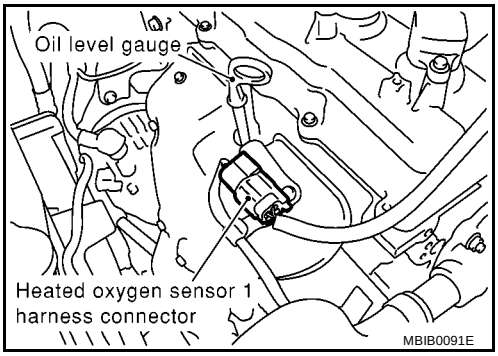
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-683, "Diagnostic Procedure" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QWX

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

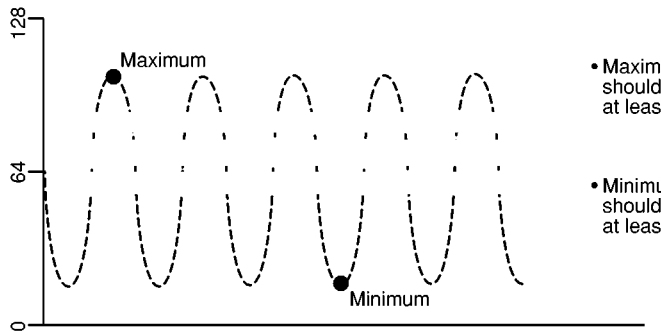
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

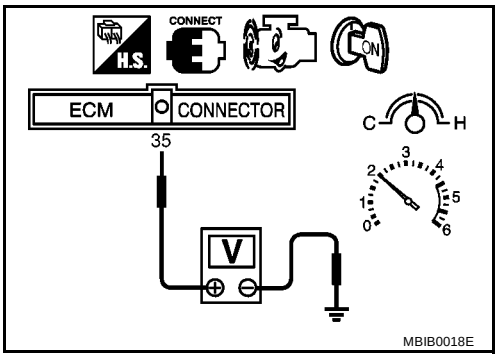
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Check the following with 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 at least one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QWY

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

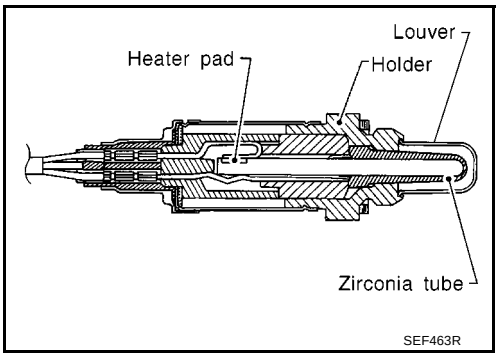
DTC P0134, P0154 HO2S1 (A/T MODELS)

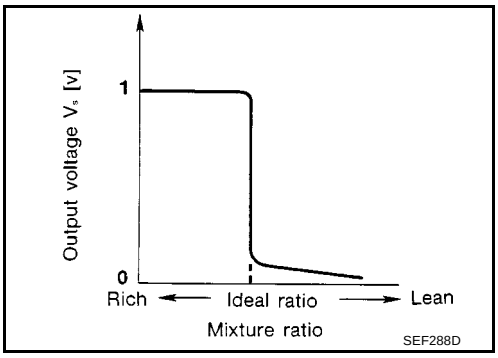
PFP:22690

Component Description

EBS00QWZ

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00QX0

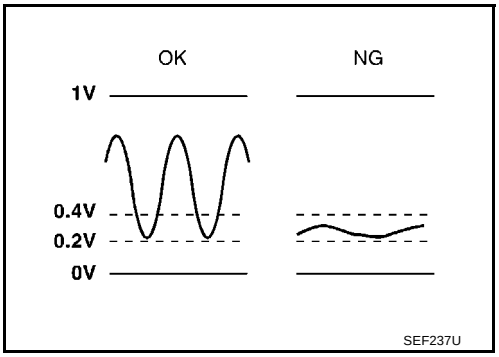
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

EBS00QX1

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 (Bank 1)	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
P0154 0154 (Bank 2)			

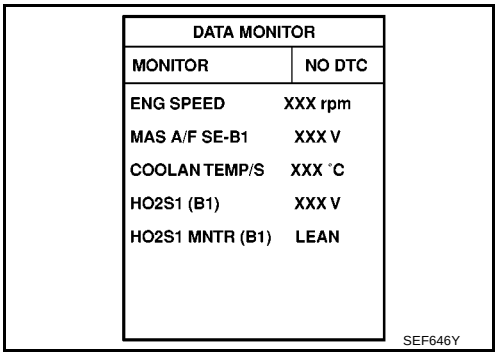
Overall Function Check

EBS00QX2

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)” and “HO2S1 (B2)”.
3. Hold engine speed at 2,000 rpm under no load.
4. Make sure that the indications do not remain in the range between 0.2 to 0.4V.
5. If NG, go to EC-691, "Diagnostic Procedure" .

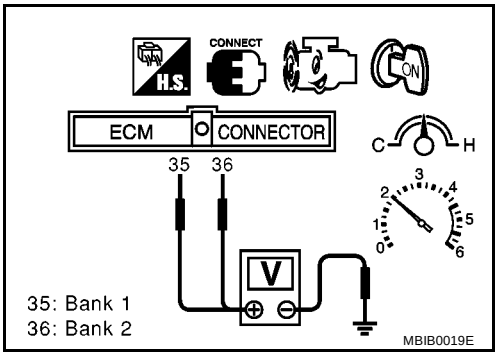


WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage does not remain in the range of 0.2 to 0.4V.

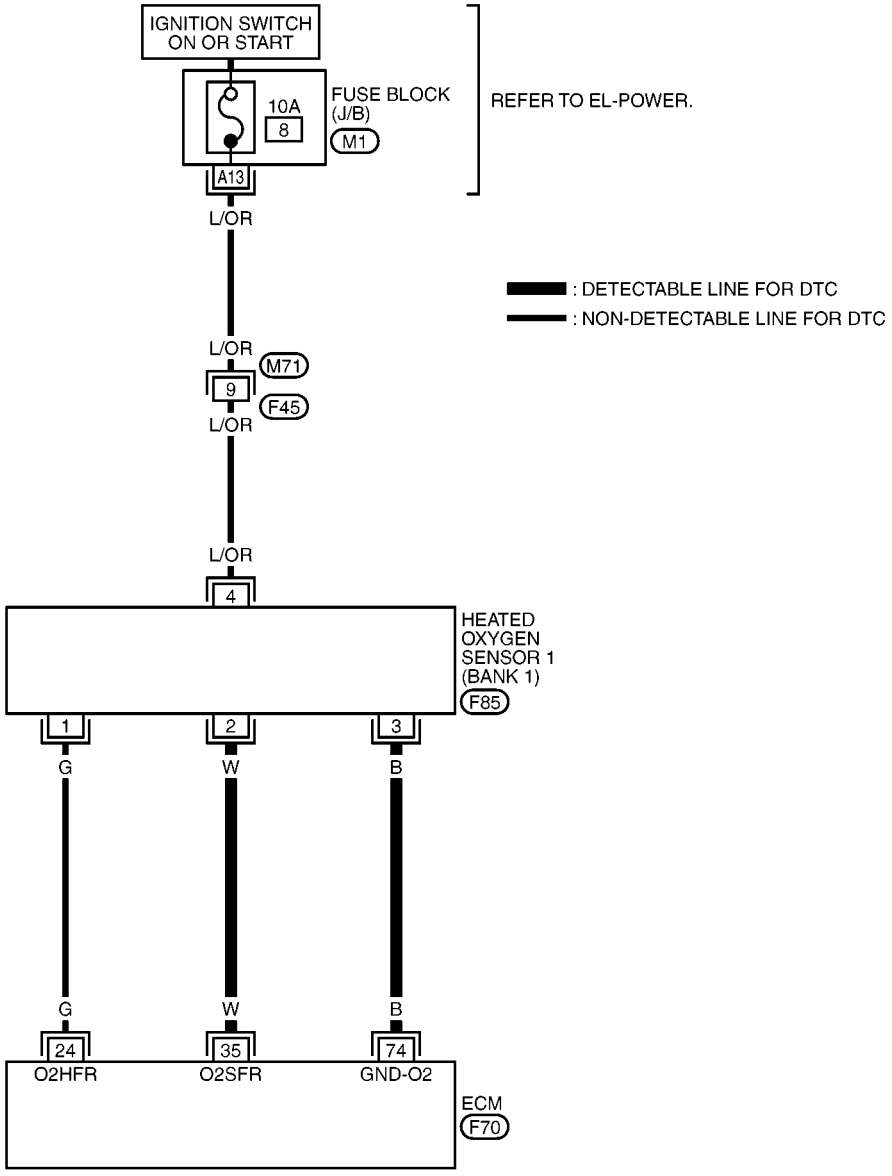
4. If NG, go to EC-691, "Diagnostic Procedure" .

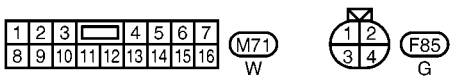


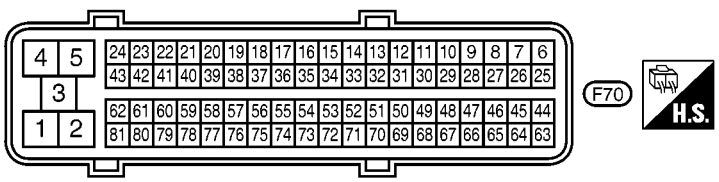
Wiring Diagram
BANK 1

EBS00QX3

EC-O2S1B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC444A

Specification data are reference values and are measured between each terminal and ground.

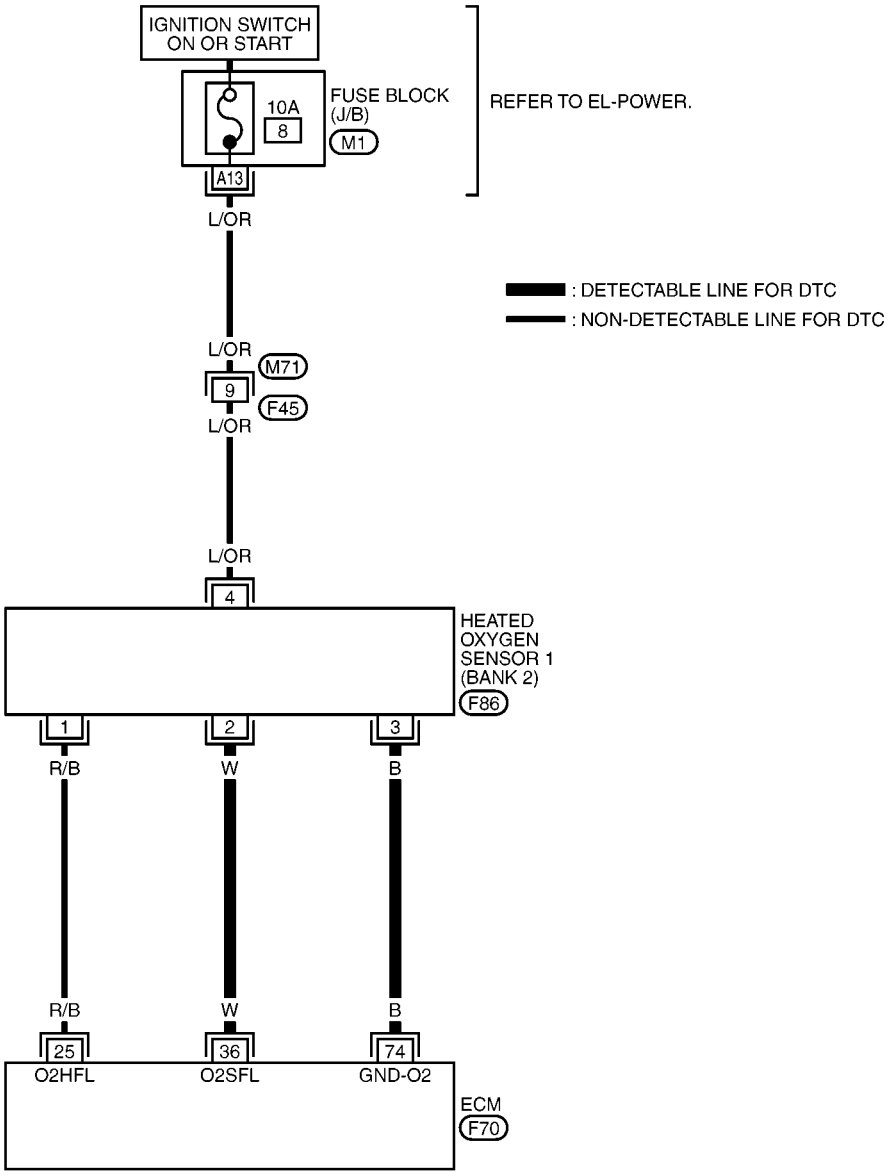
CAUTION:

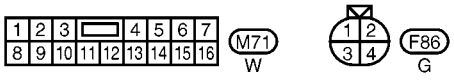
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

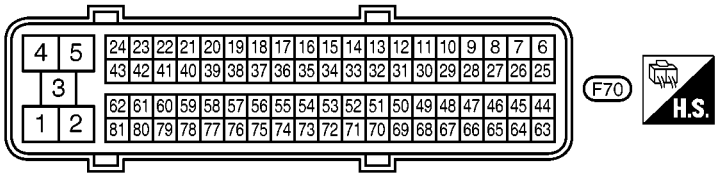
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S1B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC445A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

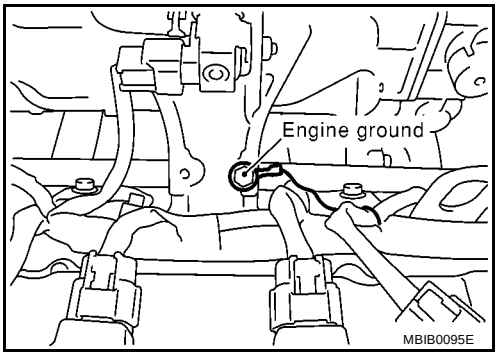
Diagnostic Procedure

EBS00QX4

1. INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



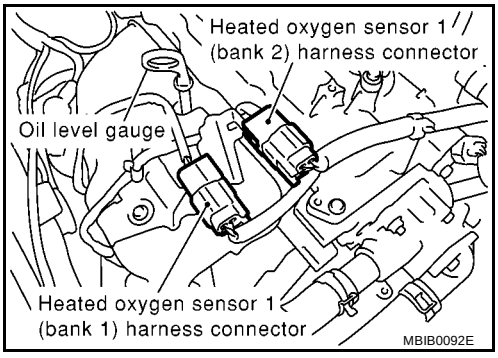
2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> 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 ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	2	1
P0154	36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	35	2	1
P0154	36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-692, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QX5

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.

5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

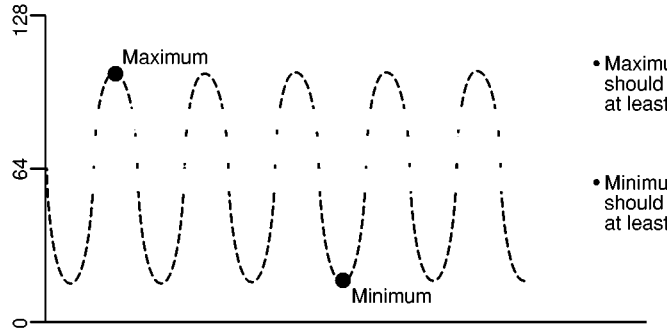
cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

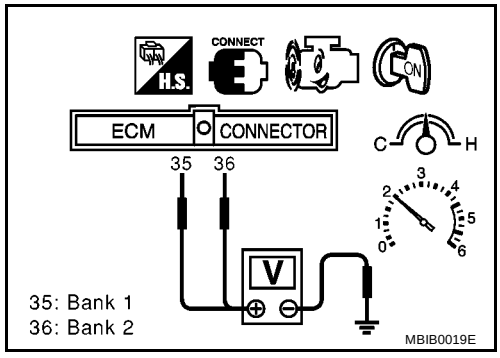
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



MBIB0019E

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QX6

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

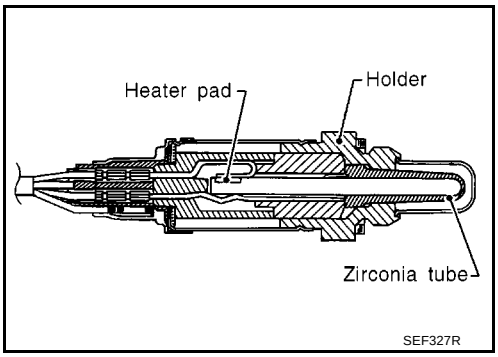
DTC P0138 HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00QX7

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QX8

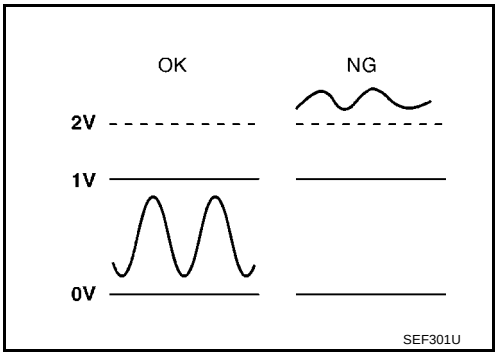
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QX9

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 0138	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

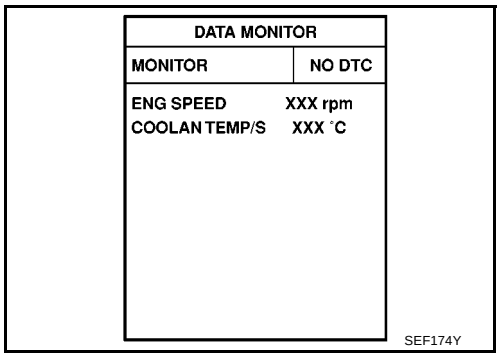
EBS00QXA

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to EC-698, "Diagnostic Procedure" .



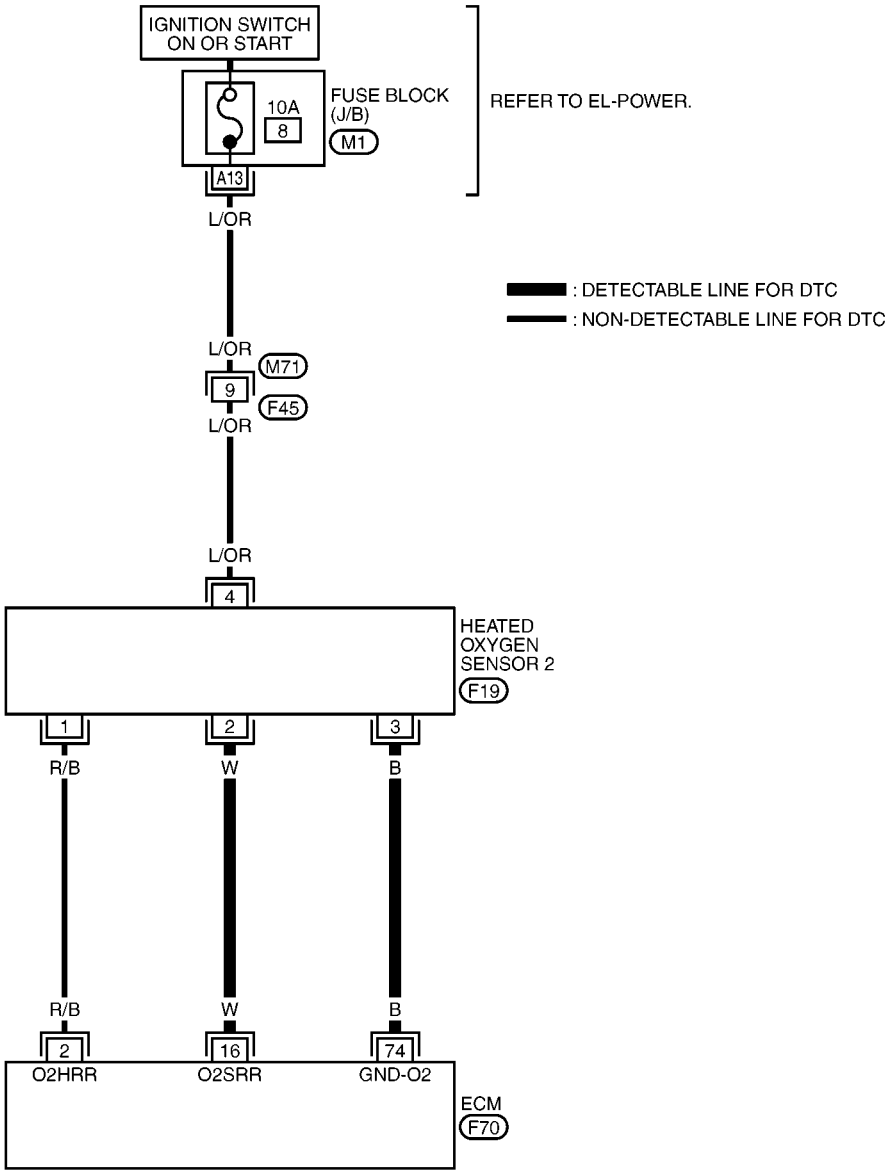
WITHOUT CONSULT-II

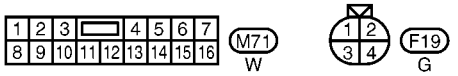
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under on load.
4. Let engine idle for two minutes.
5. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6. If 1st trip DTC is detected, go to EC-698, "Diagnostic Procedure" .

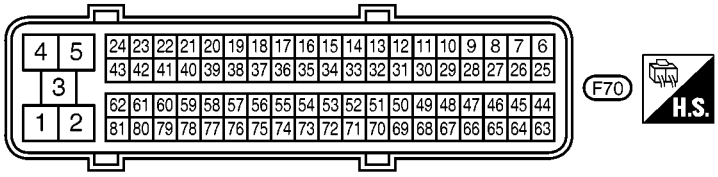
Wiring Diagram

EBS00QXB

EC-HO2S2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC446A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

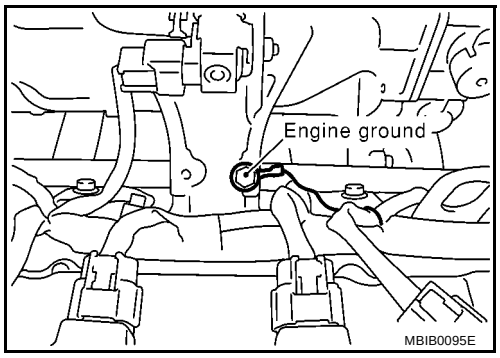
Diagnostic Procedure

EBS00QXC

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



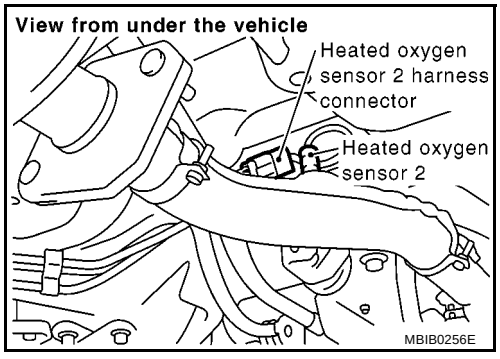
2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-699, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QXD

HEATED OXYGEN SENSOR 2

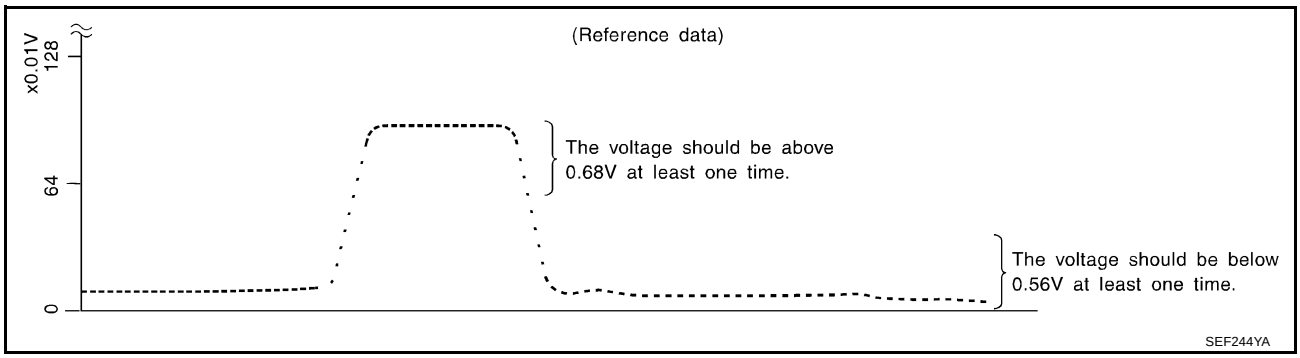
With CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



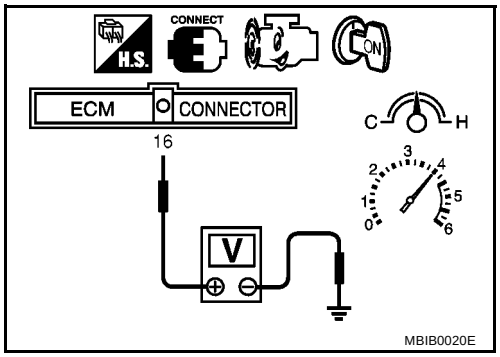
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QXE

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

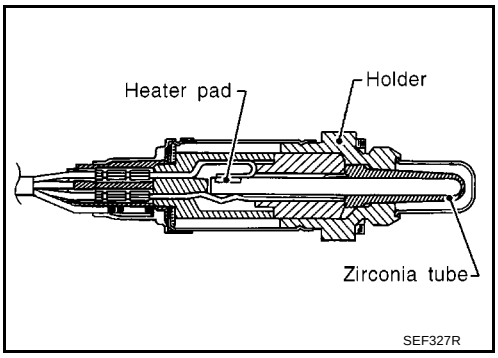
DTC P0138, P0158 HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00QXF

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QXG

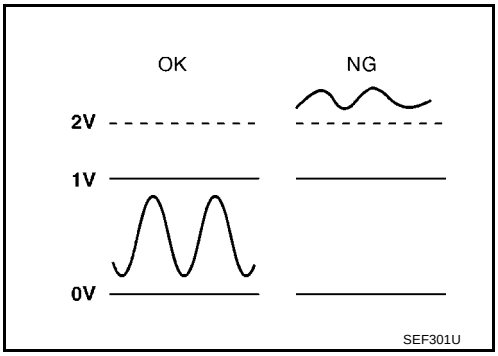
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for one minute under no load	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

EBS00QXH

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 0138 (Bank 1)	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
P0158 0158 (Bank 2)			

DTC Confirmation Procedure

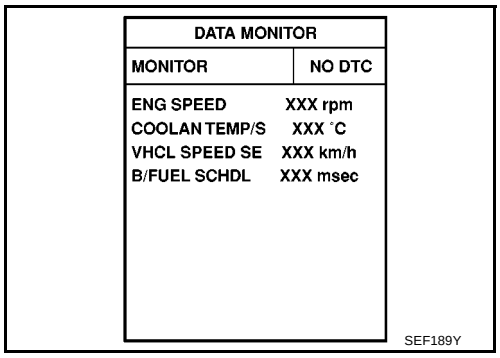
EBS00QXI

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .



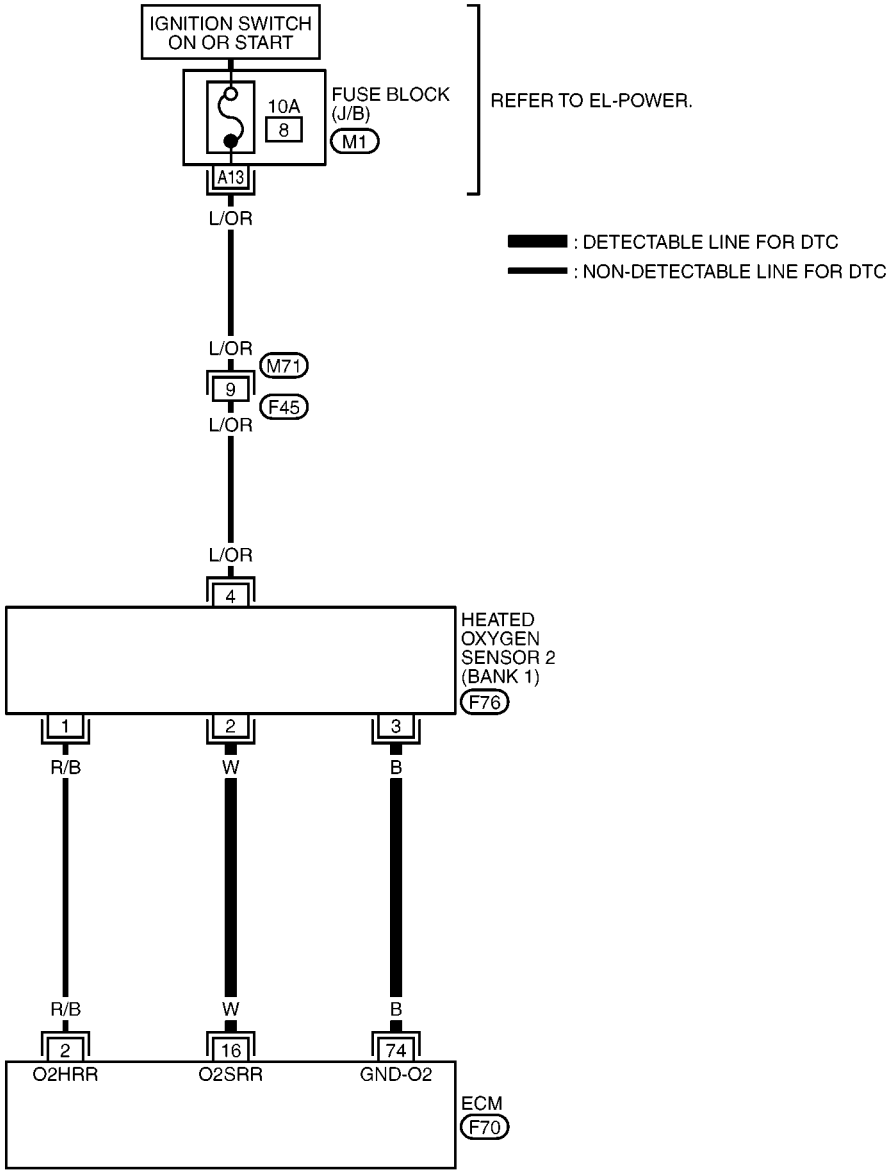
WITHOUT CONSULT-II

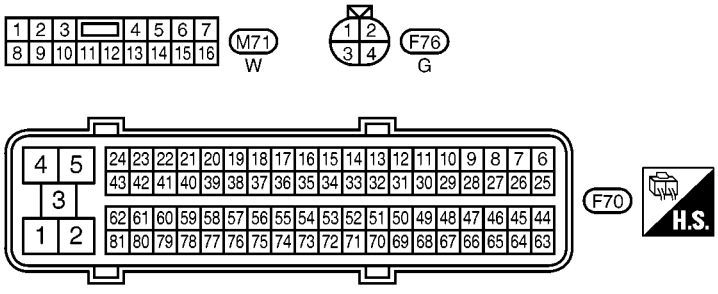
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for two minutes.
5. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

EBS00QXJ

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC447A

Specification data are reference values and are measured between each terminal and ground.

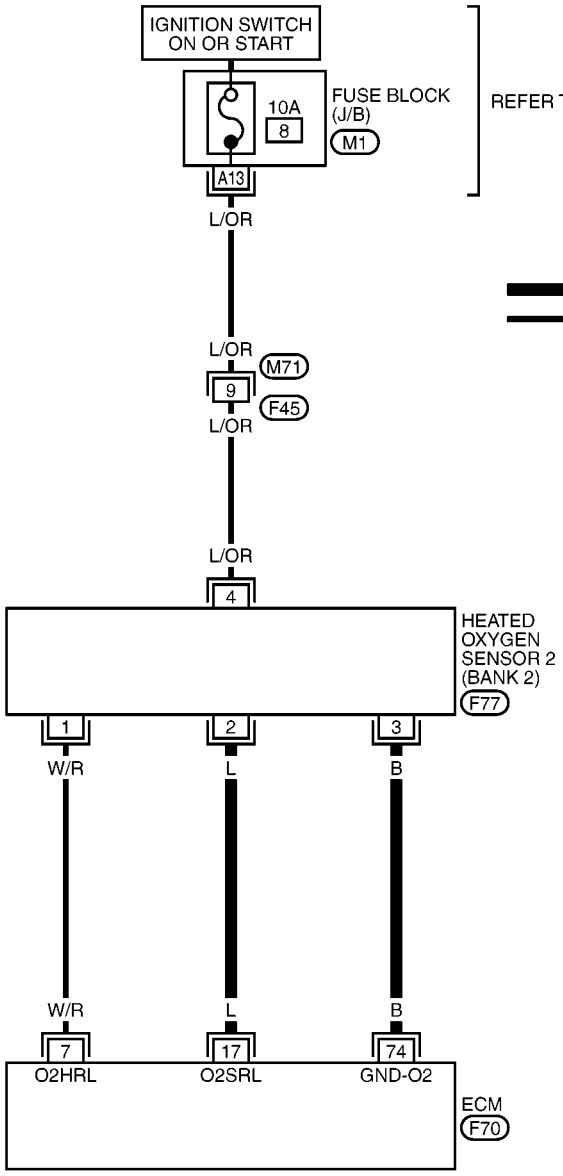
CAUTION:

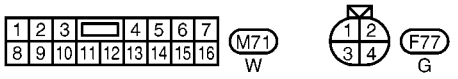
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

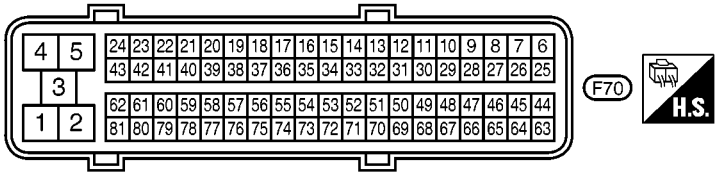
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-O2S2B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC448A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

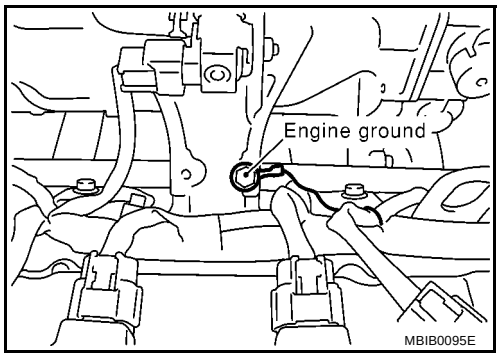
Diagnostic Procedure

EBS00QXK

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

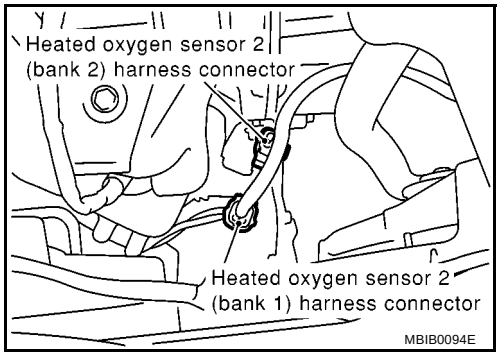
1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	16	2	1
P0158	17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	16	2	1
P0158	17	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-707, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QXL

HEATED OXYGEN SENSOR 2

With CONSULT-II

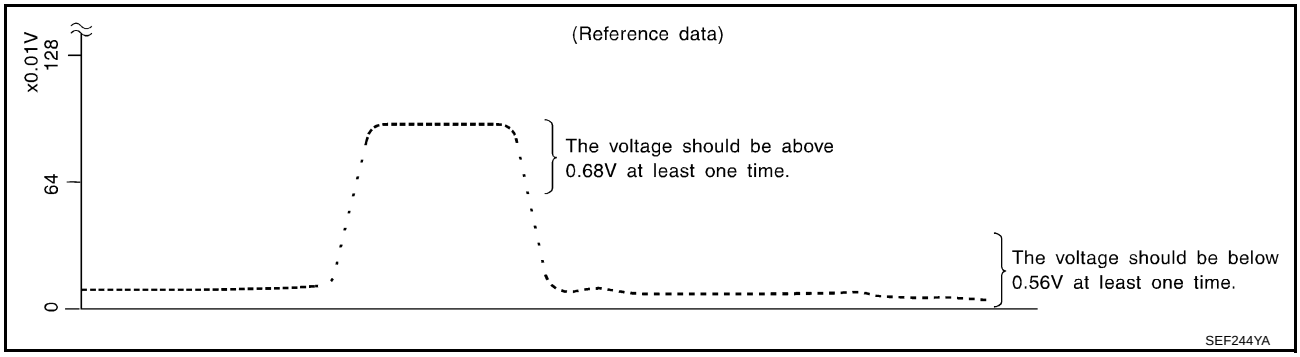
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



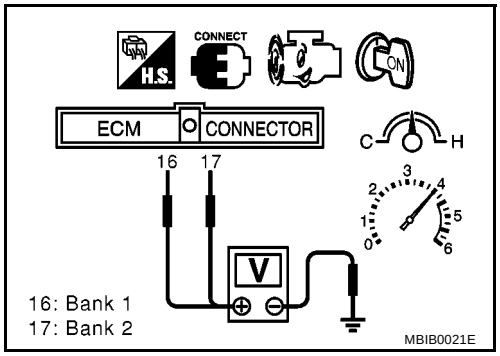
“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00QXM

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

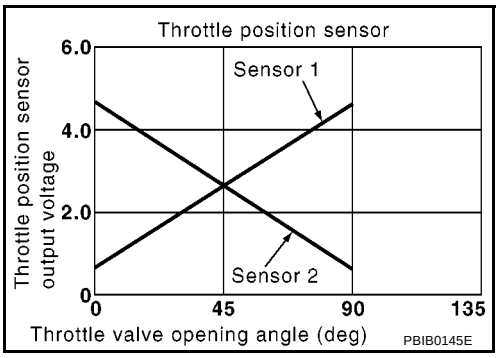
DTC P0221 TP SENSOR

PFP:16119

Component Description

EBS00QXN

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QXO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QXP

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0221 0221	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

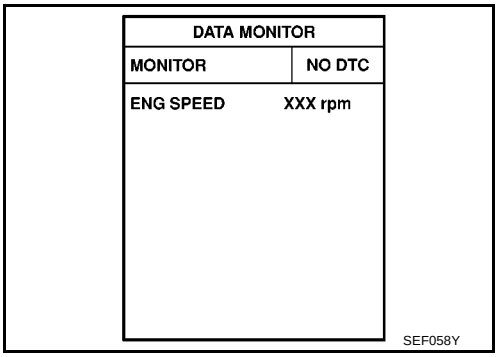
DTC Confirmation Procedure

EBS00QXQ

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-713, "Diagnostic Procedure" .



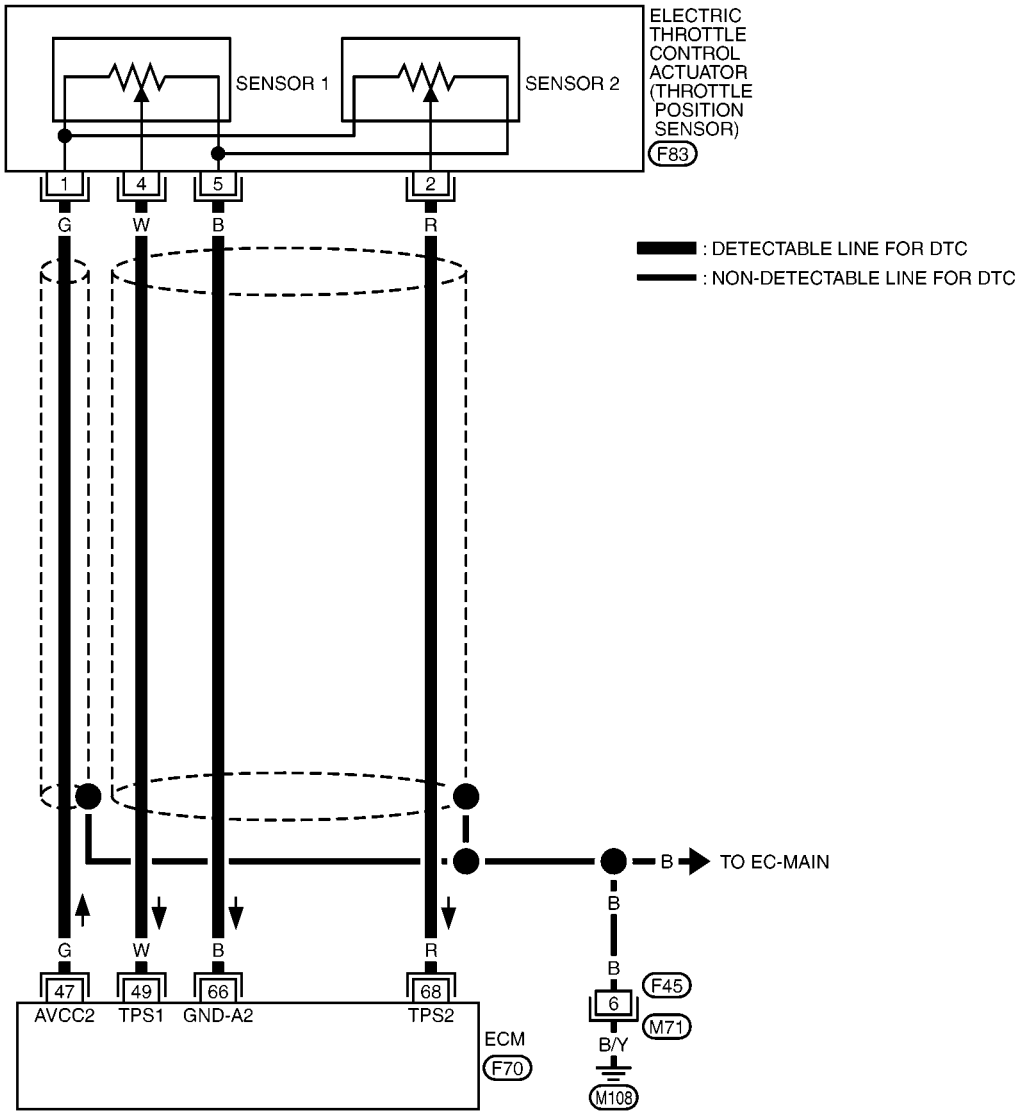
WITHOUT CONSULT-II

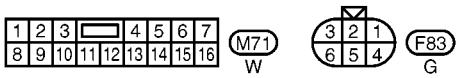
1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-713, "Diagnostic Procedure" .

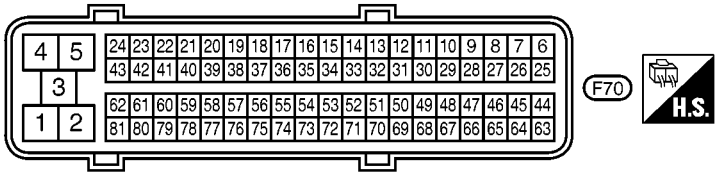
Wiring Diagram

EBS00QXR

EC-TPS3-01







YEC452A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

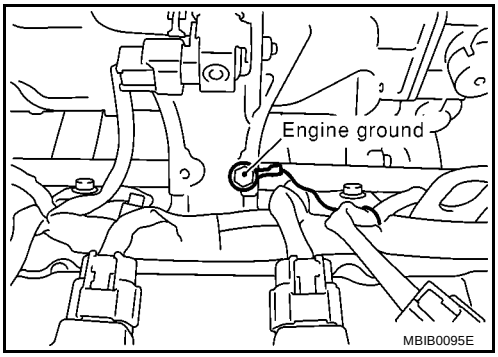
Diagnostic Procedure

EBS00QXS

1. RETIGHTEN GROUND SCREWS

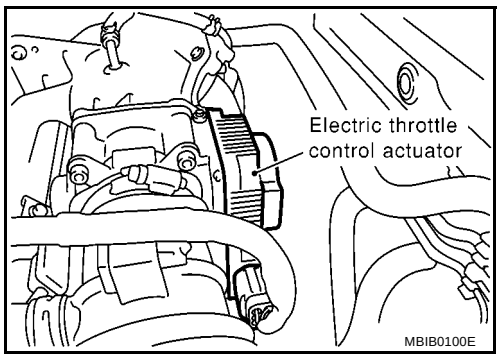
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

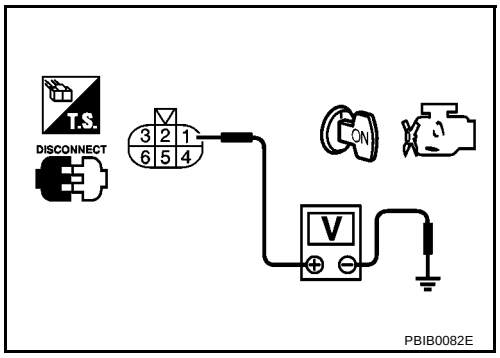


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4, ECM terminal 68 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-715, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

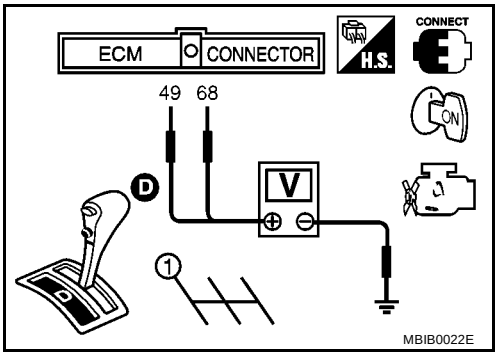
Component Inspection

EBS00QXT

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-576, "Throttle Valve Closed Position Learning" .
8. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00QXU

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

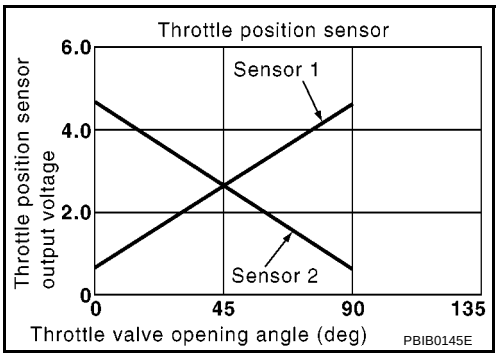
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

EBS00QXV

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QXW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QXX

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 1)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

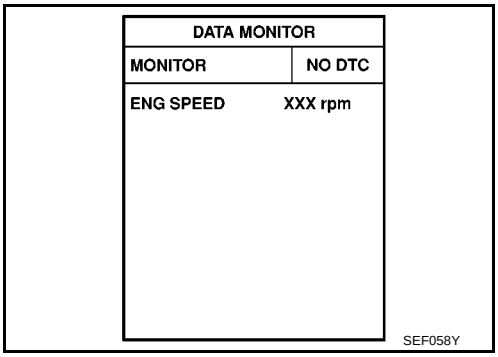
DTC Confirmation Procedure

EBS00QXY

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-719, "Diagnostic Procedure" .



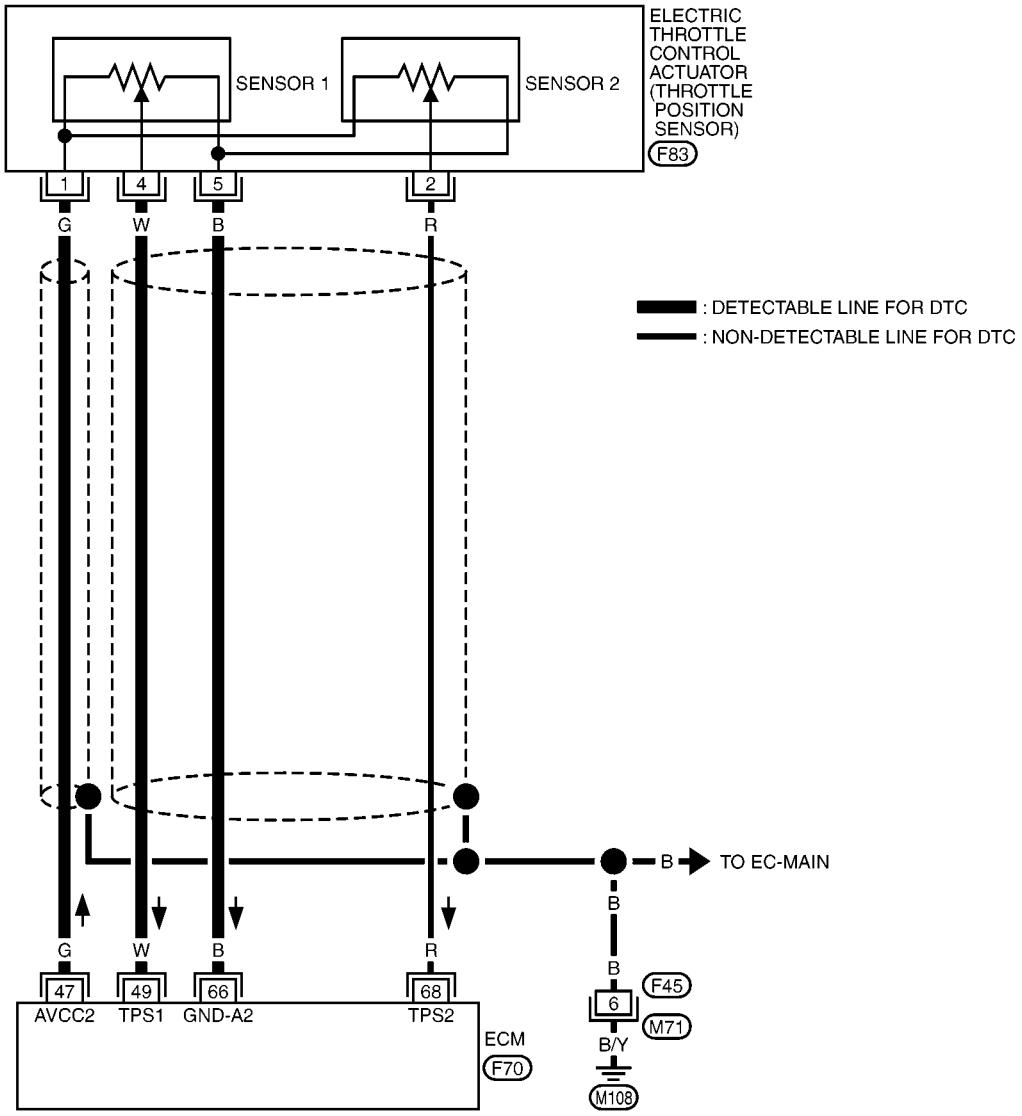
WITHOUT CONSULT-II

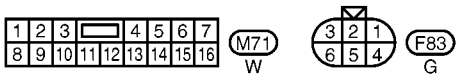
1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-719, "Diagnostic Procedure" .

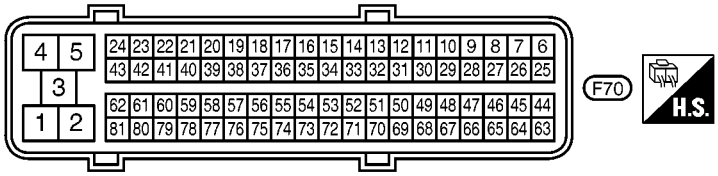
Wiring Diagram

EBS00QXZ

EC-TPS1-01







YEC453A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Throttle position sensor power supply	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Throttle position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

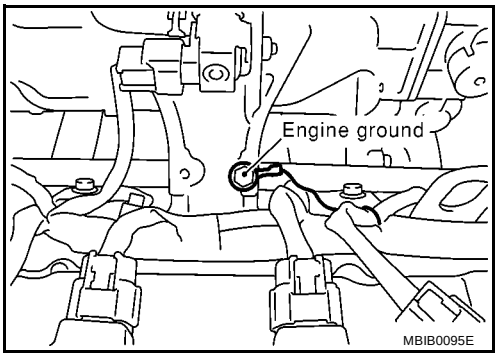
Diagnostic Procedure

EBS00QY0

1. RETIGHTEN GROUND SCREWS

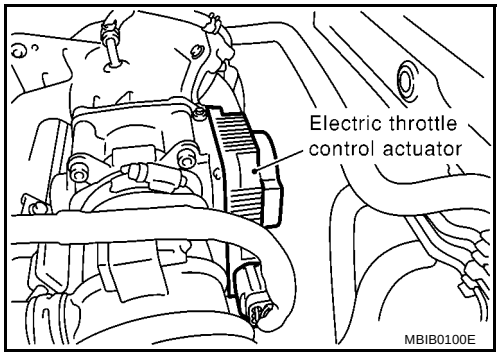
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.

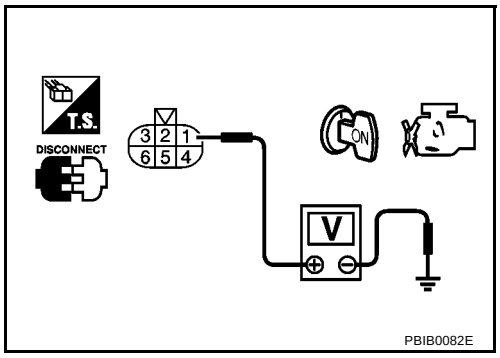


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 49 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-721, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

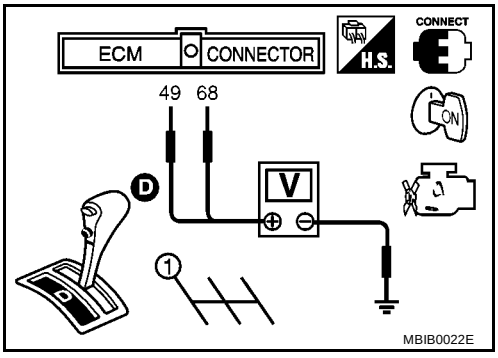
Component Inspection

EBS00QY1

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-576, "Throttle Valve Closed Position Learning" .
8. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00QY2

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

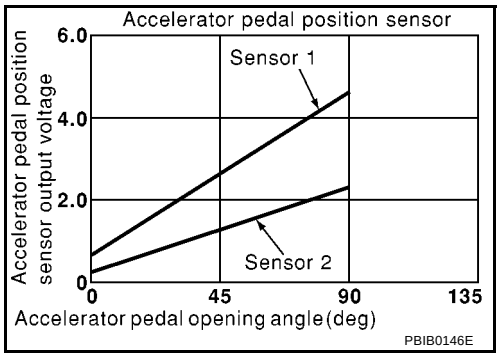
DTC P0226 APP SENSOR

PFP:18002

Component Description

EBS00QY3

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QY4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QY5

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0226 0226	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) ● Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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 throttle valve to be slower than the normal condition. So, the acceleration will be poor.

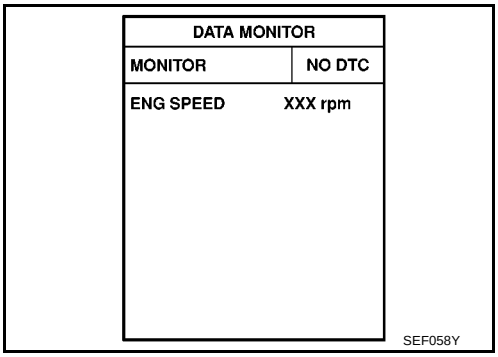
DTC Confirmation Procedure

EBS00QY6

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-725, "Diagnostic Procedure" .

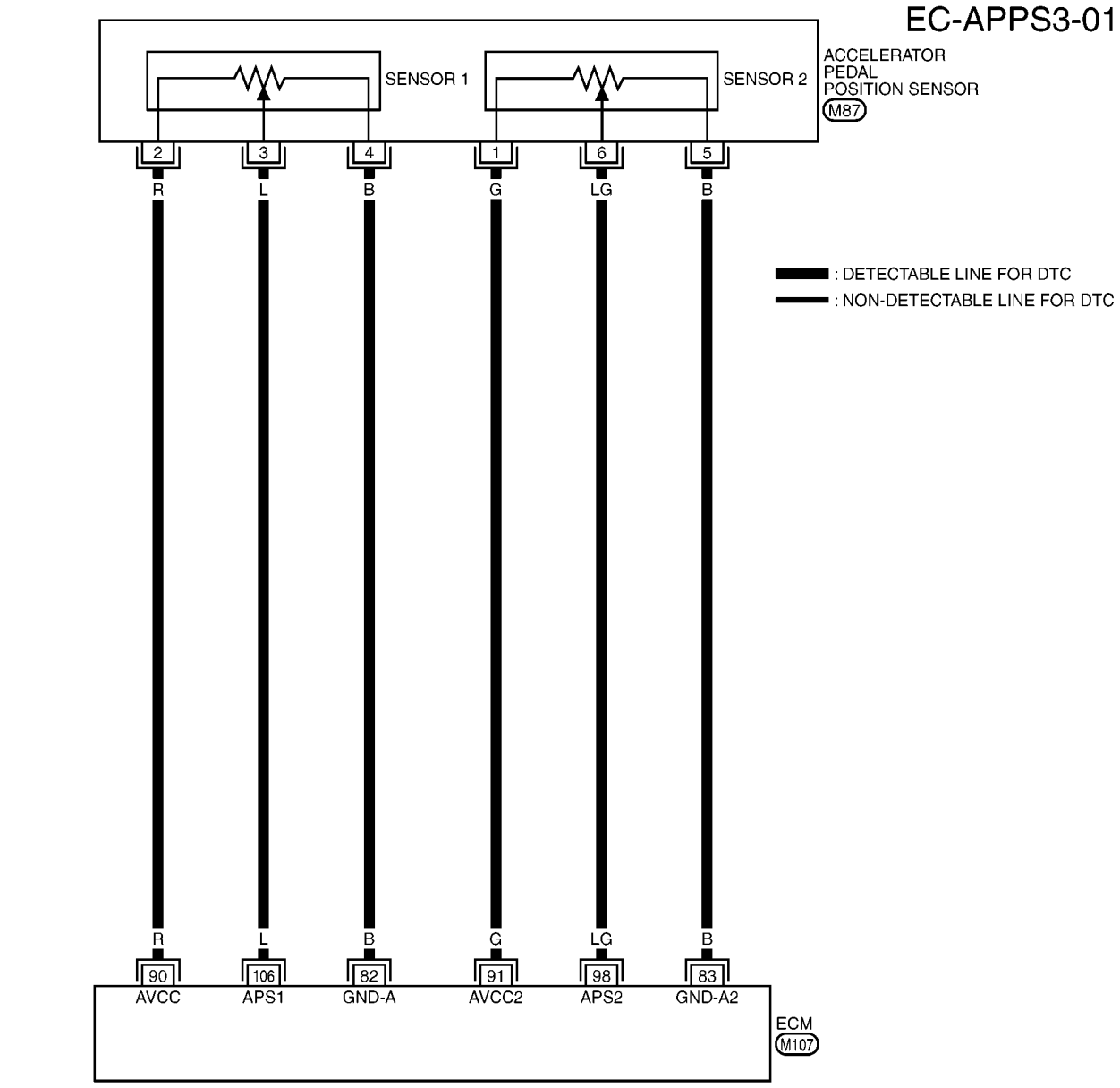


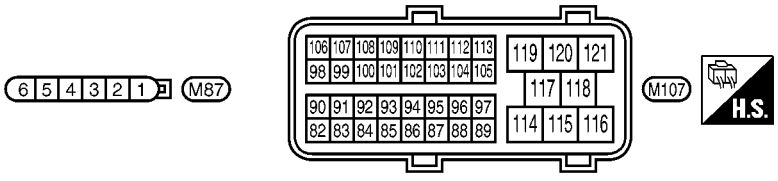
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-725, "Diagnostic Procedure" .

Wiring Diagram

EBS00QY7





YEC454A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

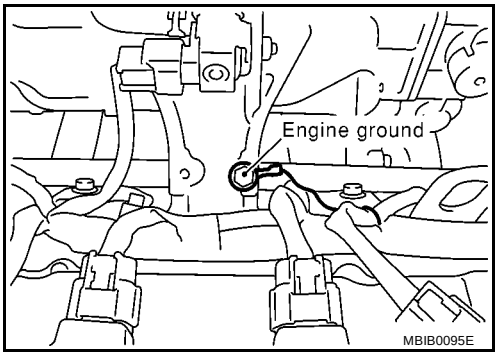
Diagnostic Procedure

EBS00QY8

1. RETIGHTEN GROUND SCREWS

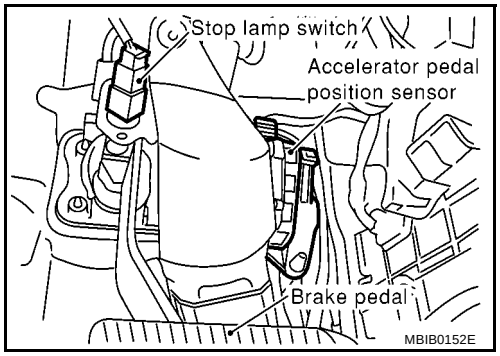
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



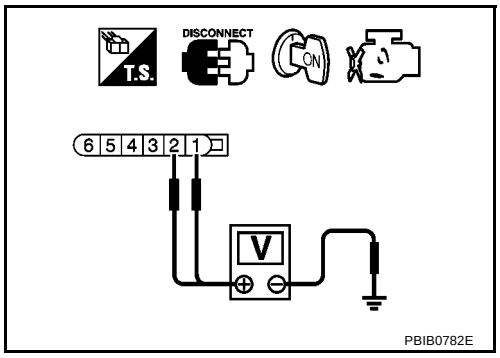
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

APP sensor terminal	Voltage (V)
1	Approximately 2.5
2	Approximately 5



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 4, ECM terminal 83 and APP sensor terminal 5.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-727, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-576, "Accelerator Pedal Released Position Learning" .
3. Perform EC-576, "Throttle Valve Closed Position Learning" .
4. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

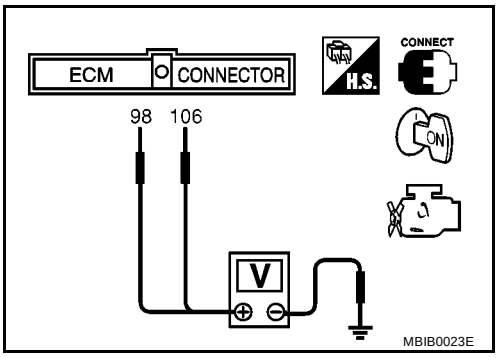
>> **INSPECTION END**

Component Inspection

EBS00QY9

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-576, "Accelerator Pedal Released Position Learning" .
6. Perform EC-576, "Throttle Valve Closed Position Learning" .
7. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00QYA

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

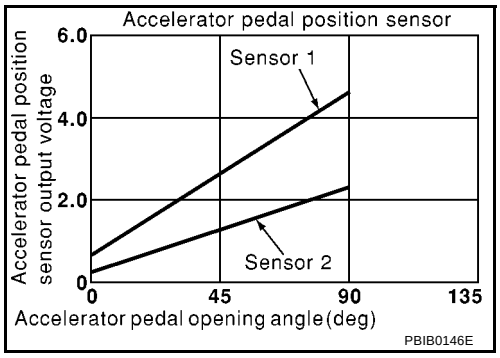
DTC P0227, P0228 APP SENSOR

PFP:18002

Component Description

EBS00QYB

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00QYC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00QYD

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0227 0227	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0228 0228	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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 throttle valve to be slower than the normal condition. So, the acceleration will be poor.

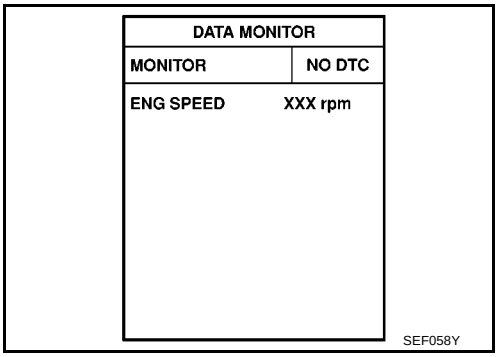
DTC Confirmation Procedure

EBS00QYE

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-731, "Diagnostic Procedure" .

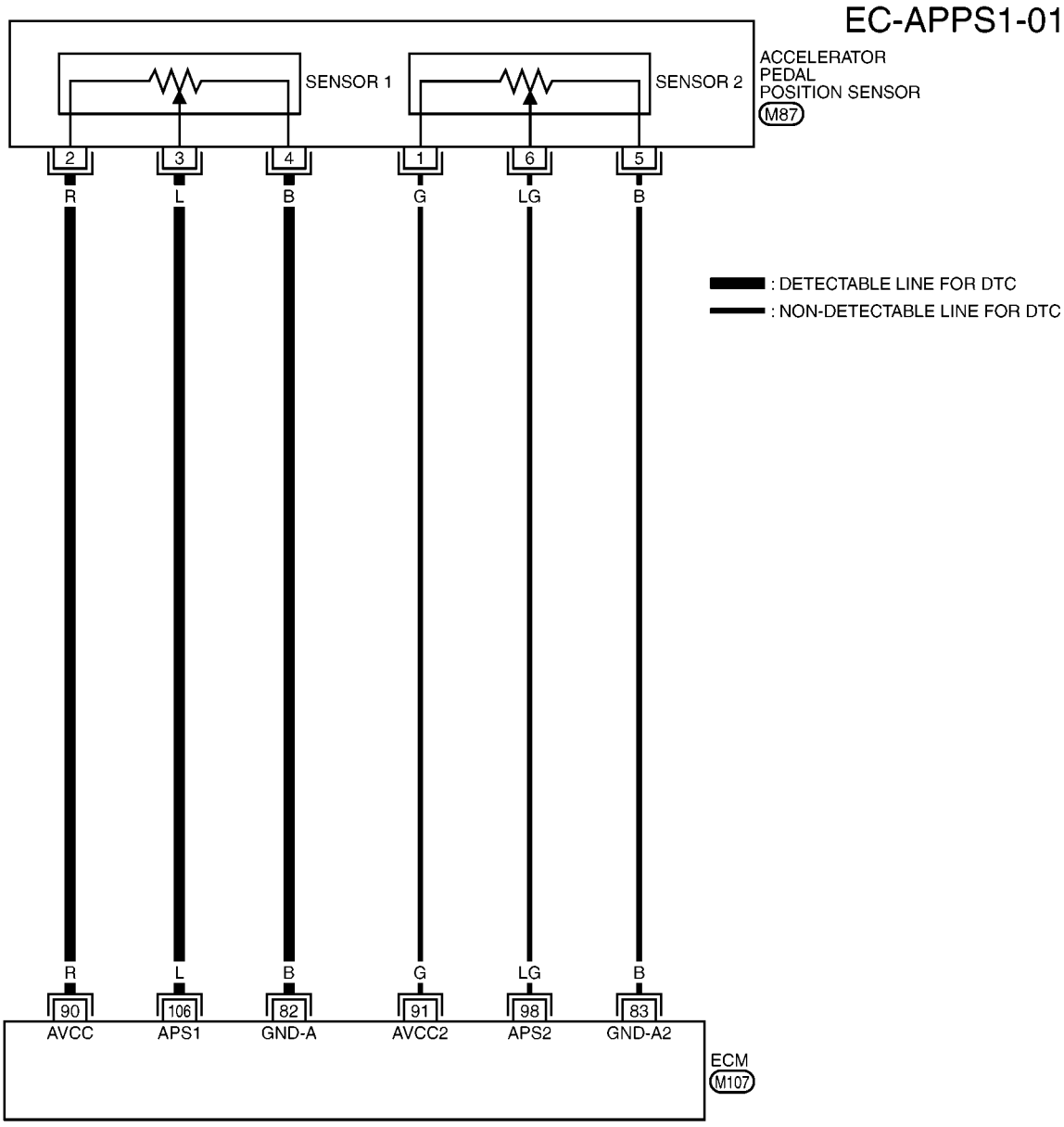


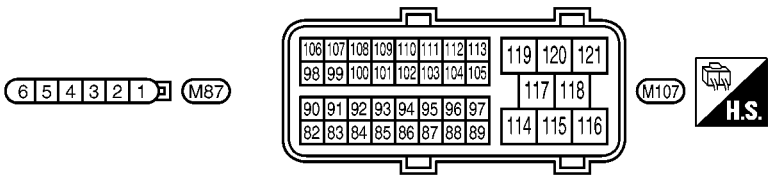
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-731, "Diagnostic Procedure" .

Wiring Diagram

EBS00QYF





YEC455A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

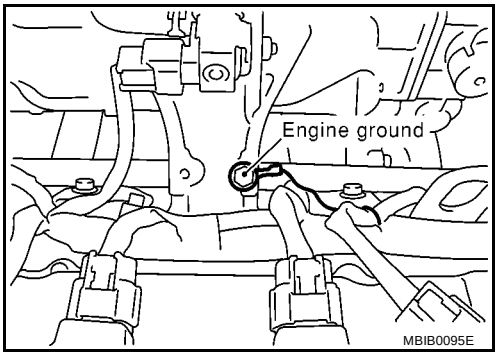
Diagnostic Procedure

EBS00QYG

1. RETIGHTEN GROUND SCREWS

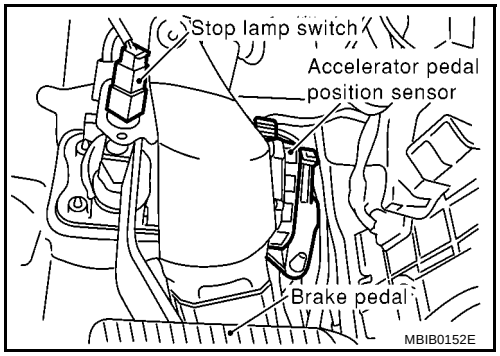
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



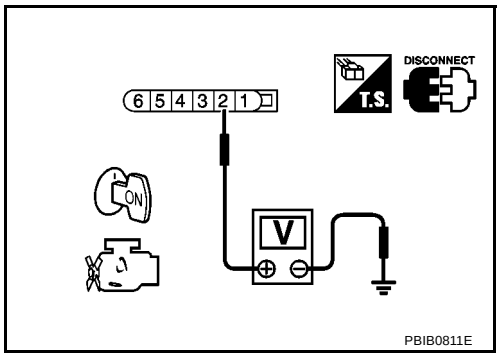
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 82 and APP sensor terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-733, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-576, "Accelerator Pedal Released Position Learning" .
3. Perform EC-576, "Throttle Valve Closed Position Learning" .
4. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

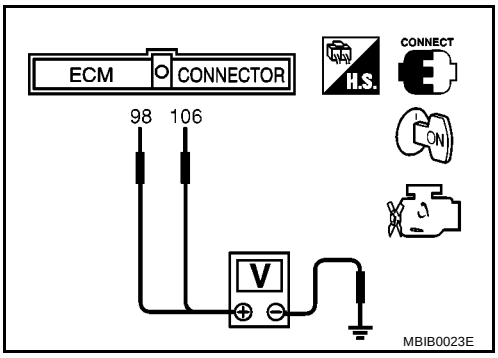
>> **INSPECTION END**

Component Inspection

EBS00QYH

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-576, "Accelerator Pedal Released Position Learning" .
6. Perform EC-576, "Throttle Valve Closed Position Learning" .
7. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00QYI

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

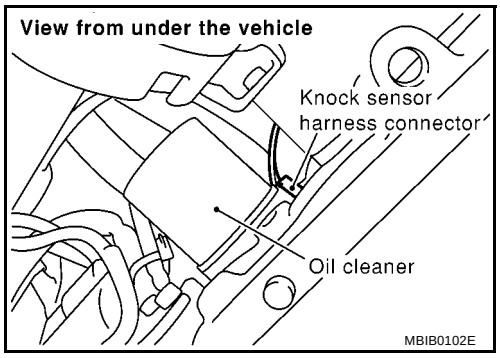
DTC P0327, P0328 KS

PFP:22060

Component Description

EBS00QYJ

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.



On Board Diagnosis Logic

EBS00QYK

The MI will not light up for this diagnosis.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	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 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

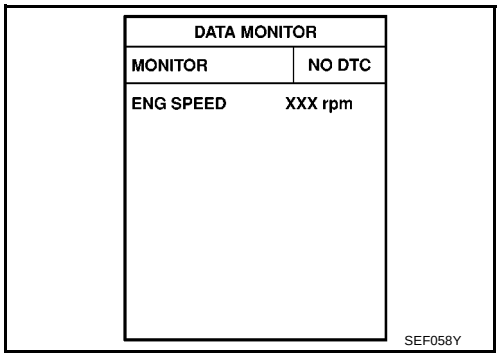
EBS00QYL

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-736, "Diagnostic Procedure" .



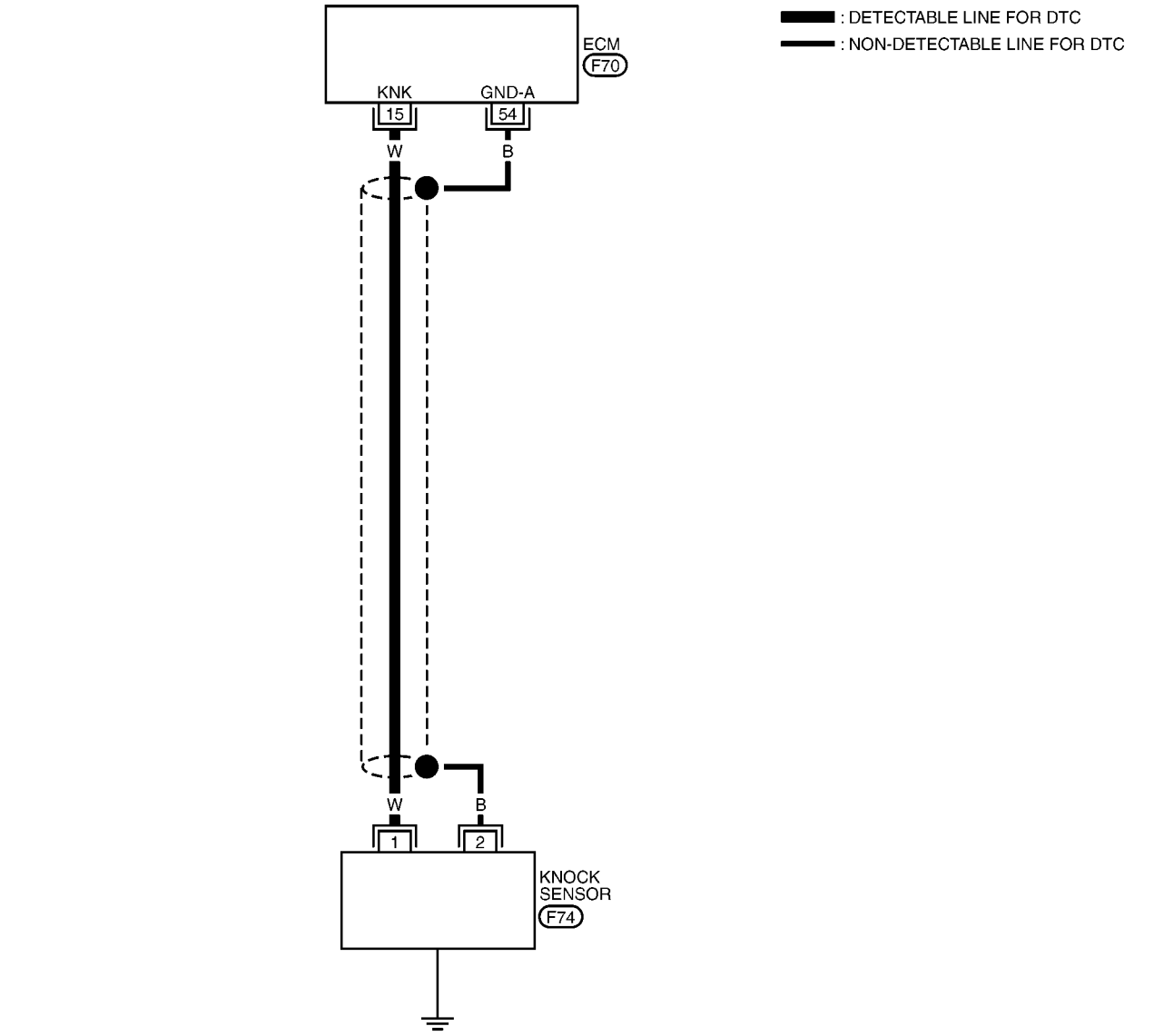
WITHOUT CONSULT-II

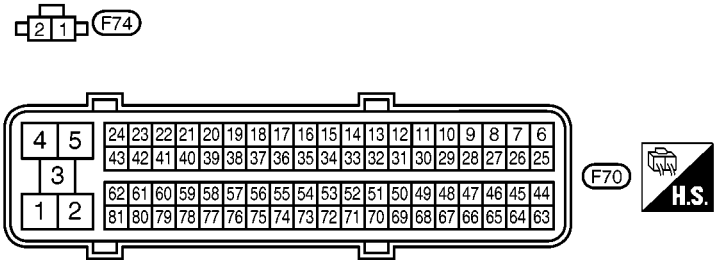
1. Start engine and run it for at least 5 seconds at idle speed.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-736, "Diagnostic Procedure" .

Wiring Diagram

EBS00QYM

EC-KS-01





YEC456A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
54	B	Knock sensor shield circuit ground	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00QYN

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and engine ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

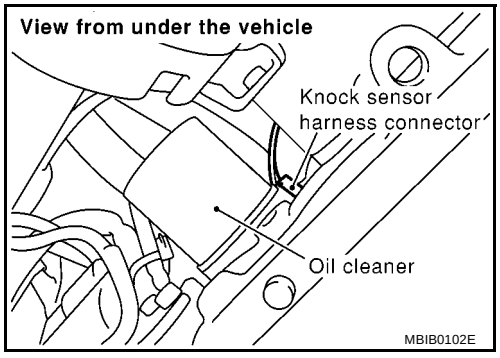
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

Refer to EC-737, "Component Inspection" .

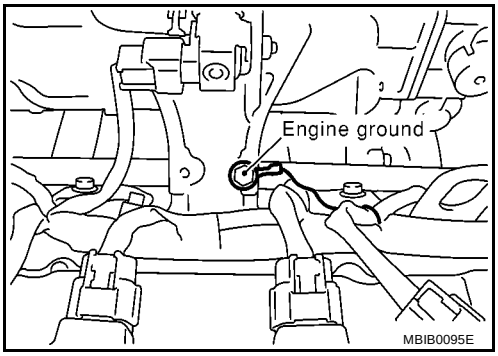
OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

4. RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

>> GO TO 5.



5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 54 and engine ground. Refer to Wiring Diagram.
3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00QYO

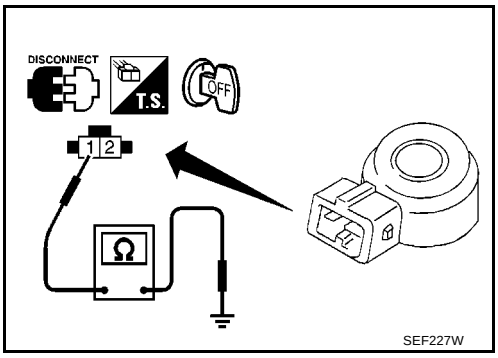
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

EBS00QYP

KNOCK SENSOR

Refer to EM-74, "CYLINDER BLOCK" .

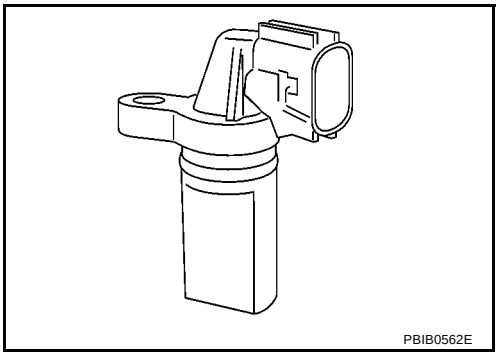
DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

EBS00QYQ

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the 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.


PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

EBS00QYR

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

EBS00QYS

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	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 (The sensor circuit is open or shorted.) ● Crankshaft position sensor (POS) ● Signal plate

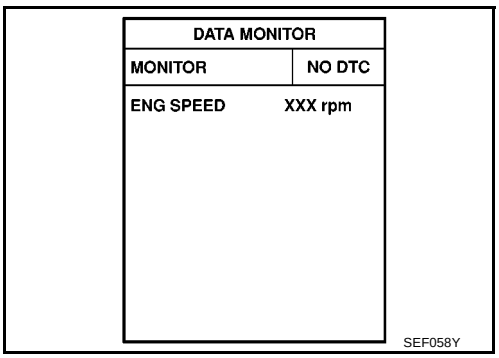
DTC Confirmation Procedure

EBS00QYT

NOTE:
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”.

WITH CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-741, "Diagnostic Procedure" .



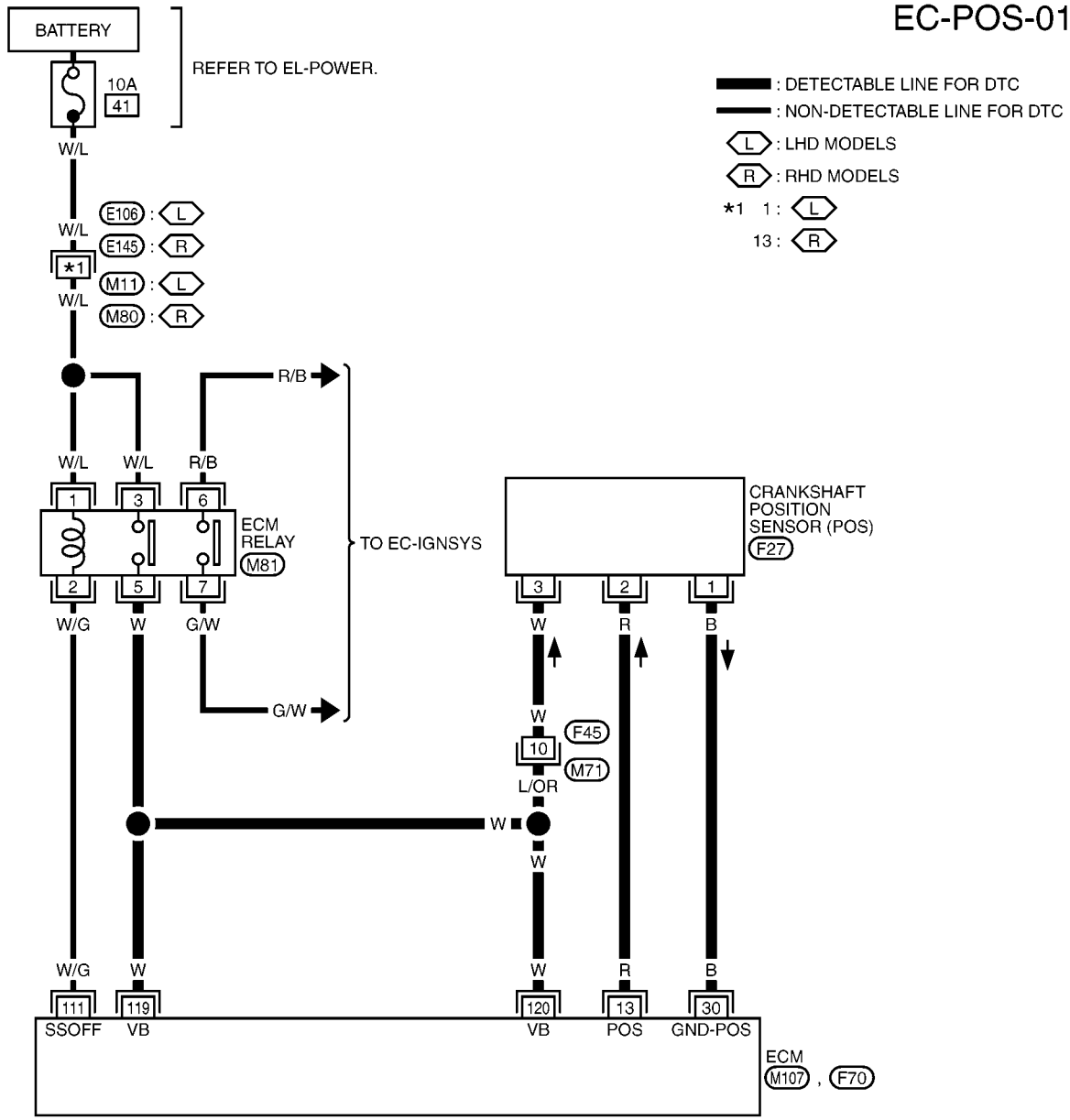
SEF058Y

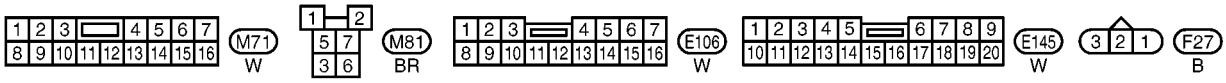
WITHOUT CONSULT-II

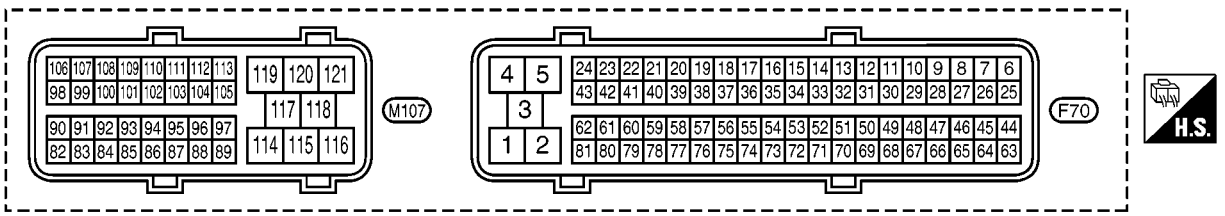
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-741, "Diagnostic Procedure" .

Wiring Diagram

EBS00QYU





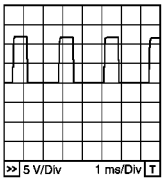
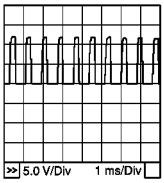


YEC457A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3V★  PBIB0528E
30	B	Crankshaft position sensor (POS) ground	**[Engine is running]** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

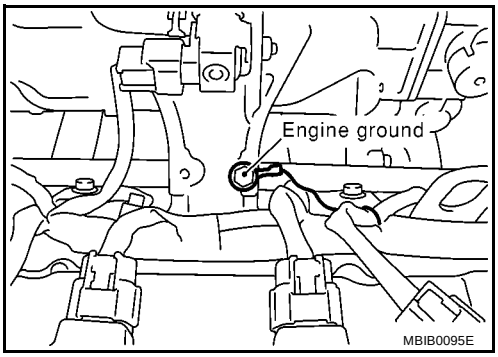
Diagnostic Procedure

EBS00QYV

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

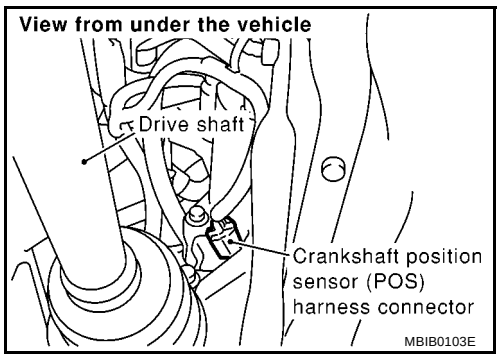
>> GO TO 2.



MBIB0095E

2. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

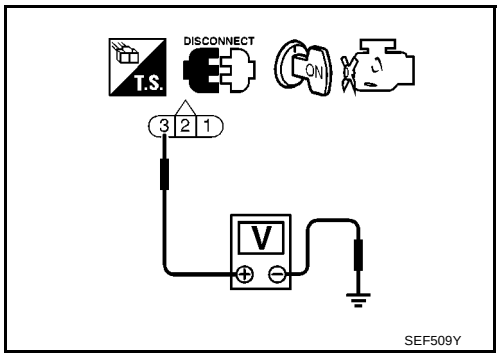
1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

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

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 30 and CKP sensor (POS) terminal 1
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-743, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

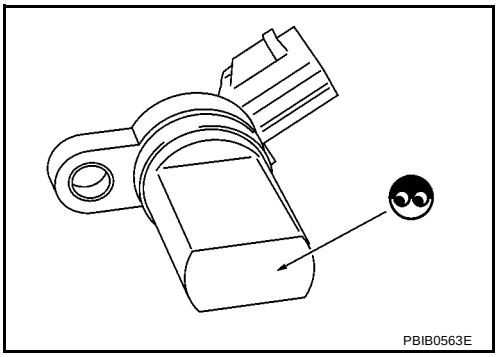
>> **INSPECTION END**

Component Inspection

EBS00QYW

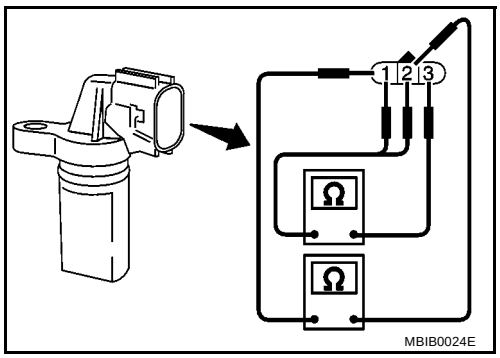
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

EBS00QYX

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-74, "CYLINDER BLOCK" .

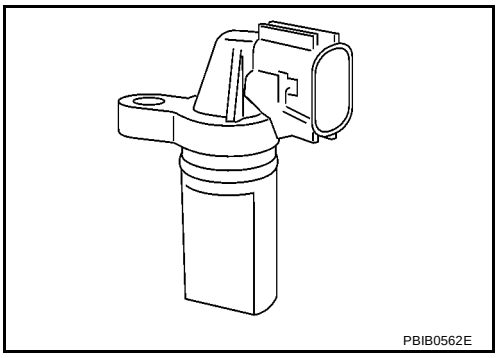
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

EBS00QYY

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft 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.


PBIB0562E

On Board Diagnosis Logic

EBS00QYZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set 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 (Intake) ● Starter motor (Refer to SC-13.) ● Starting system circuit (Refer to SC-13.) ● Dead (Weak) battery

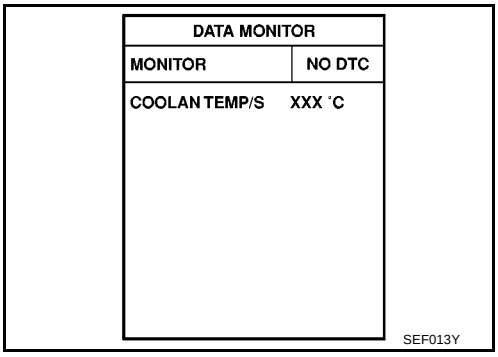
DTC Confirmation Procedure

EBS00QZ0

NOTE:
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”.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Maintain engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .



SEF013Y

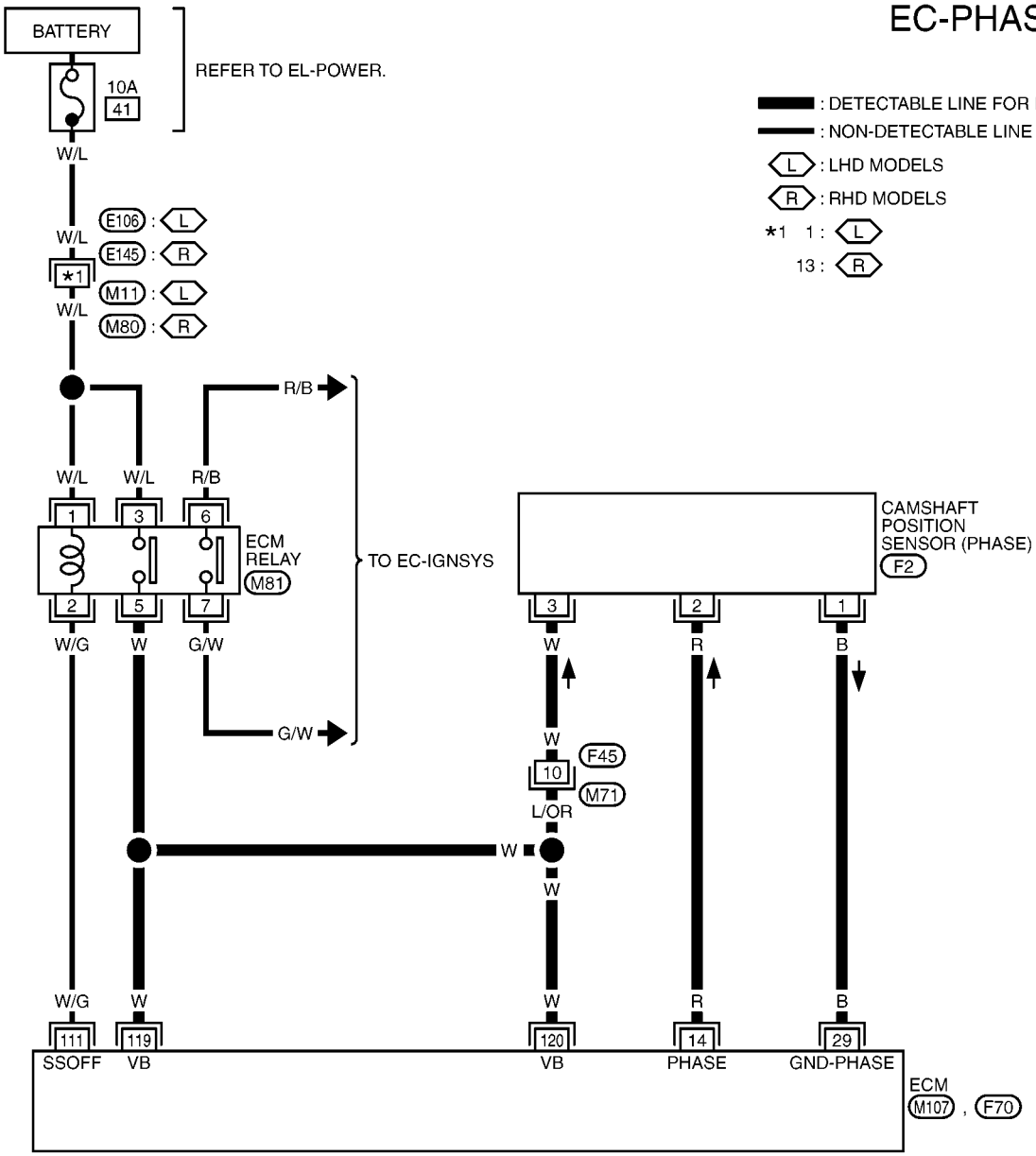
WITHOUT CONSULT-II

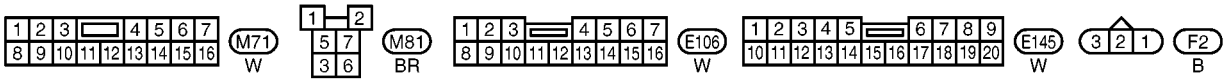
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Turn ignition switch “OFF” and wait at least 10 seconds.
6. Start engine and maintain engine speed at more than 800 rpm for at least 5 seconds.

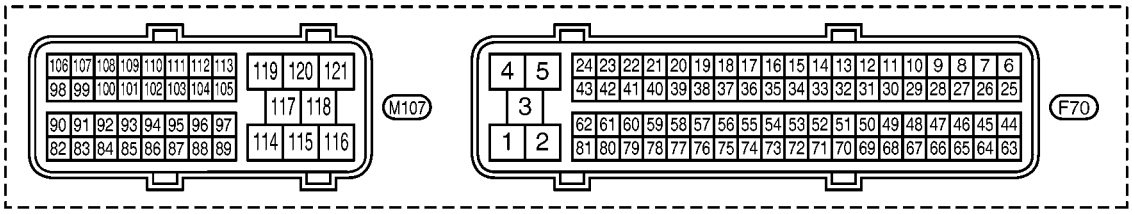
7. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
8. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
9. If 1st trip DTC is detected, go to EC-748, "Diagnostic Procedure" .

Wiring Diagram

EBS00QZ1





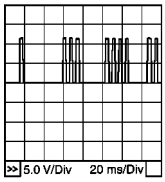
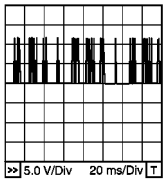


YEC458A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
29	B	Camshaft position sensor (PHASE) ground	**[Engine is running]** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00QZ2

1. CHECK STARTING SYSTEM

Turn ignition switch to “START” position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

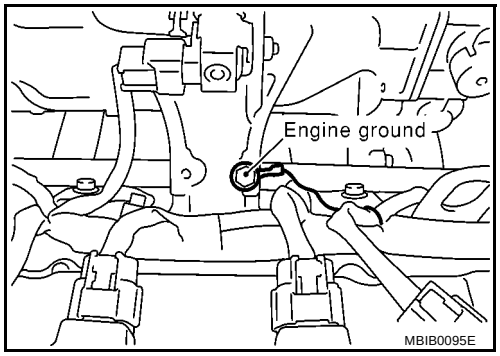
Yes >> GO TO 2.

No >> Check starting system. (Refer to “STARTING SYSTEM”, SC-13.)

2. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

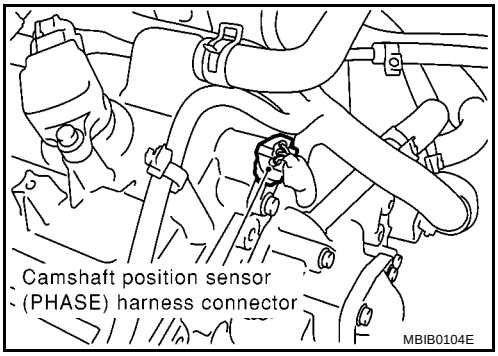
>> GO TO 3.



MBIB0095E

3. CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch “ON”.



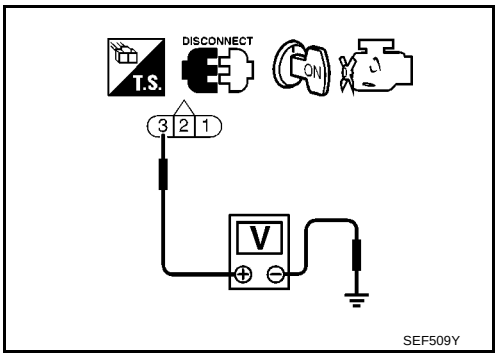
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

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

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and CMP sensor (PHASE) terminal 1.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-750, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor (PHASE).

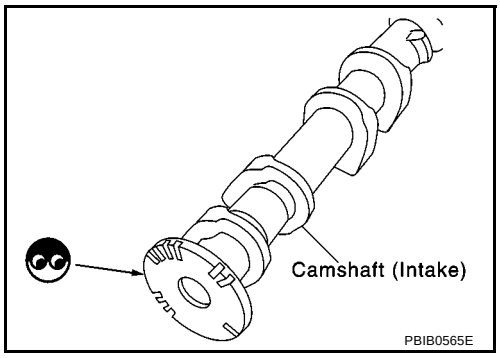
8. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 9.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

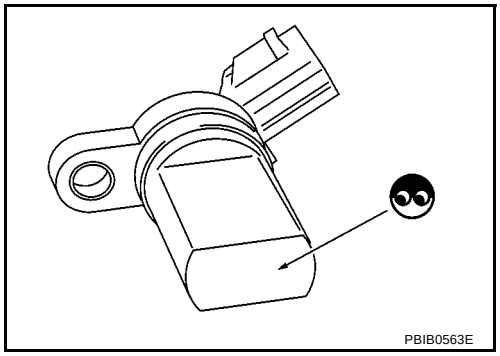
>> **INSPECTION END**

Component Inspection

EBS00QZ3

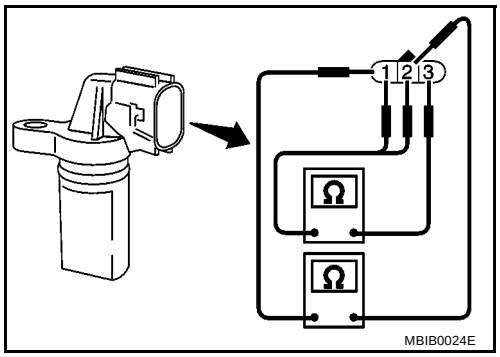
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation

EBS00QZ4

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-32, "ROCKER COVER" .

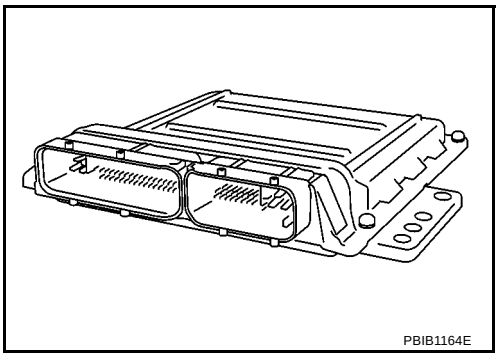
DTC P0605 ECM

PFP:23710

Component Description

EBS00QZ5

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

EBS00QZ6

This self-diagnosis has one or tow trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	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.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

EBS00QZ7

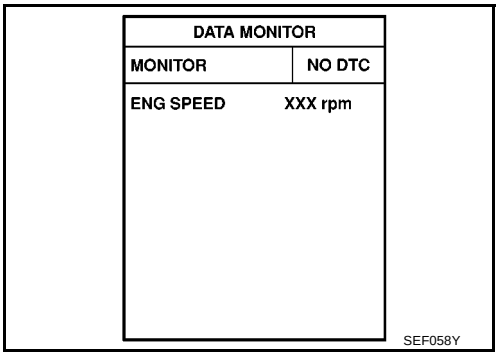
Perform “PROCEDURE FOR MALFUNCTION A” first. If the DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”. If there is no problem on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-754, "Diagnostic Procedure" .



SEF058Y

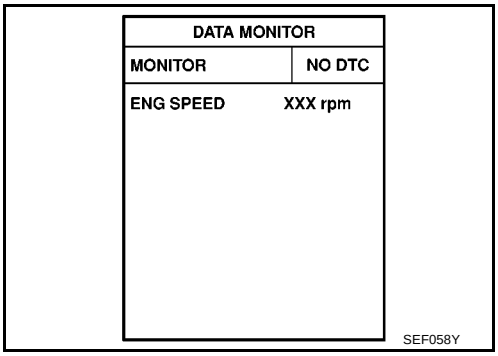
Without CONSULT-II

1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-754, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
4. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .



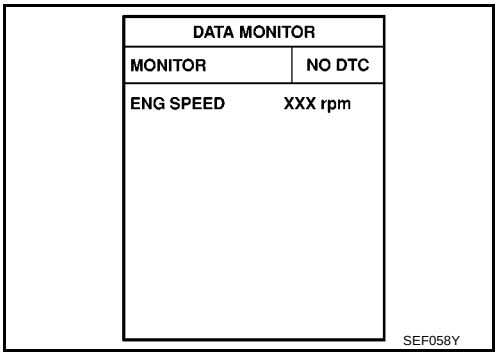
Without CONSULT-II

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. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .



Without CONSULT-II

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. Repeat step 2 for 32 times.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If 1st trip DTC is detected, go to EC-754, "Diagnostic Procedure" .

Diagnostic Procedure

EBS00QZ8

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-752 .
5. Is the 1st trip DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Erase the “Diagnostic Test Mode II (Self-diagnostic results)” memory. Refer to EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
3. **Perform “DTC Confirmation Procedure”.**
   See EC-752 .
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-583, "NATS (Nissan Anti-theft System)" .
3. Perform EC-576, "Accelerator Pedal Released Position Learning" .
4. Perform EC-576, "Throttle Valve Closed Position Learning" .
5. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

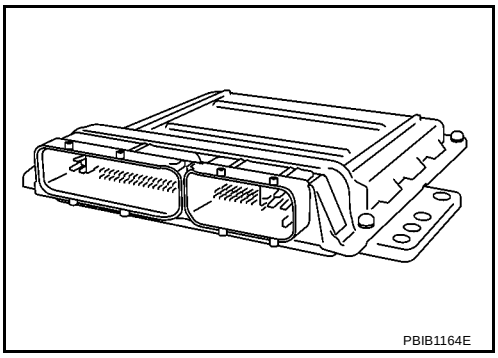
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

EBS00QZ9

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

EBS00QZA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

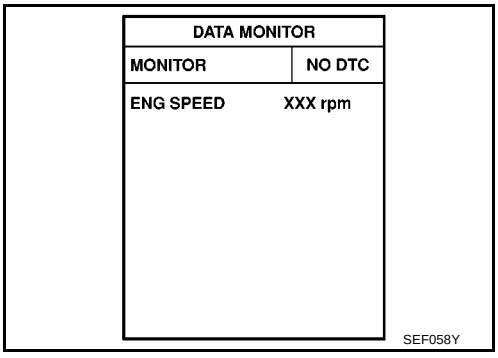
DTC Confirmation Procedure

EBS00QZB

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-757, "Diagnostic Procedure" .



SEF058Y

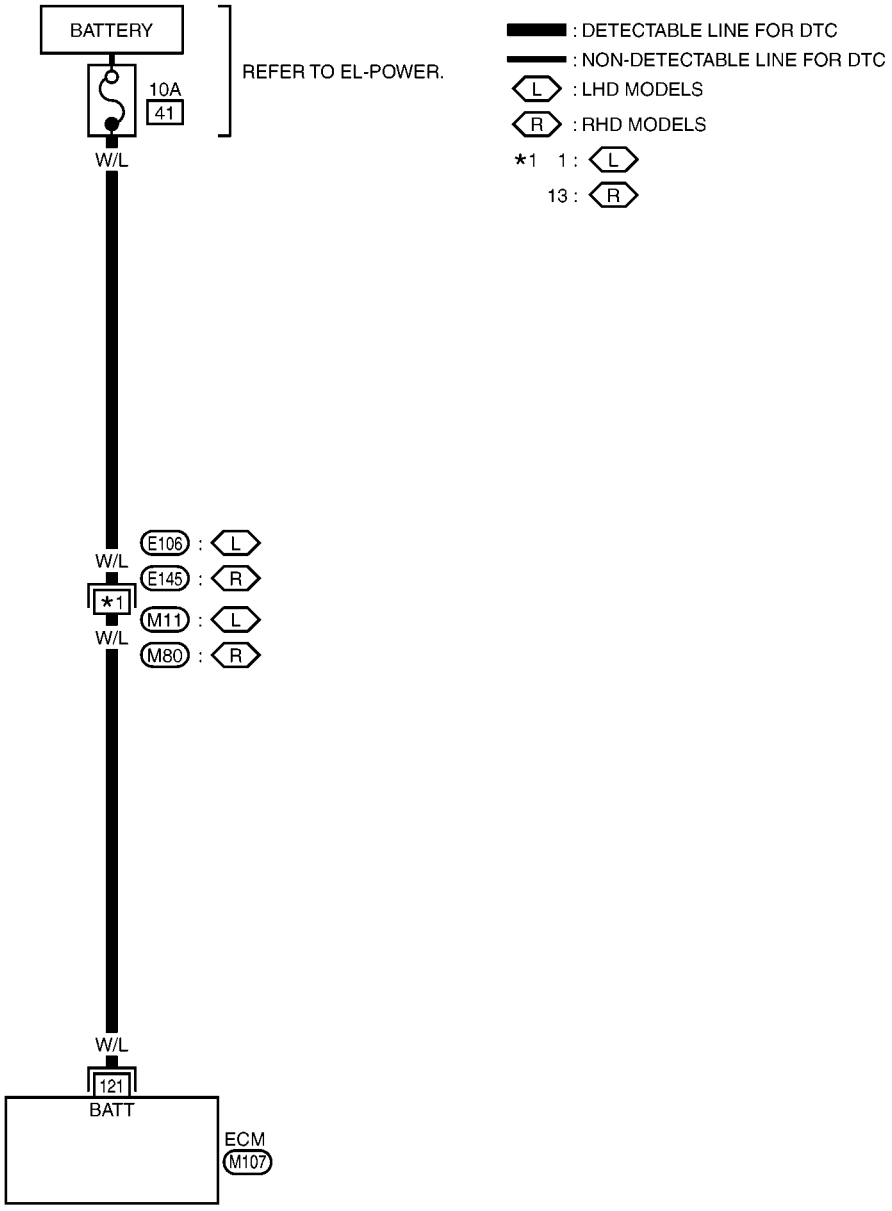
WITHOUT CONSULT-II

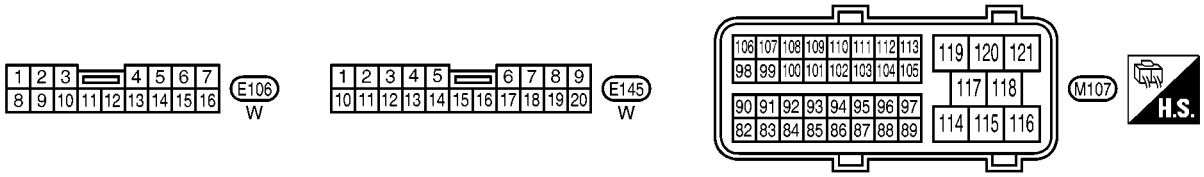
1. Turn ignition switch “ON” and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
4. Repeat steps 2 and 3 for 4 times.
5. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
6. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
7. If 1st trip DTC is detected, go to EC-757, "Diagnostic Procedure" .

Wiring Diagram

EBS00QZC

EC-ECM/PW-01





YEC461A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

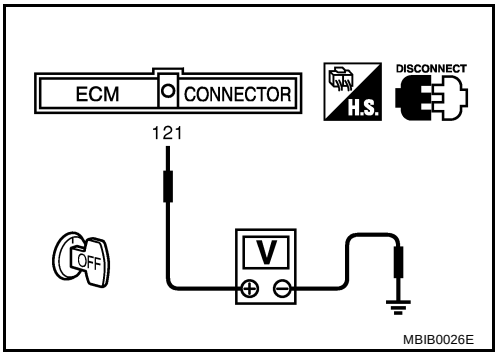
Diagnostic Procedure

EBS00QZD

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- Harness for open or short between ECM and battery

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

3. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-755 .
5. Is the 1st trip DTC P1065 displayed again?

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Erase the “Diagnostic Test Mode II (Self-diagnostic results)” memory. Refer to EC-582, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
3. **Perform “DTC Confirmation Procedure”.**
   See EC-755 .
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-583, "NATS (Nissan Anti-theft System)" .
3. Perform EC-576, "Accelerator Pedal Released Position Learning" .
4. Perform EC-576, "Throttle Valve Closed Position Learning" .
5. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

EBS00QZE

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.

On Board Diagnosis Logic

EBS00QZF

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	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. **This self-diagnosis has the one trip detection logic.**	

FAIL-SAFE MODE

When the malfunction A or B is detected in the two consecutive trips, the ECM enters fail-safe mode and MI lights up.
When the malfunction C is detected even in the 1st trip, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The 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.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	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” position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

EBS00QZG

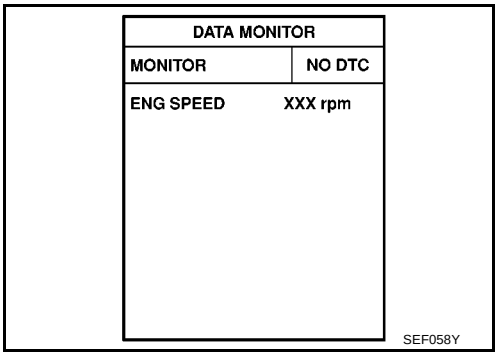
NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A AND B” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION C”.**
  If there is no problem on “PROCEDURE FOR MALFUNCTION A AND B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition witch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T models), “1st” position (M/T models) and wait at least 2 seconds.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. If 1st trip DTC is detected, go to EC-760, "Diagnostic Procedure" .



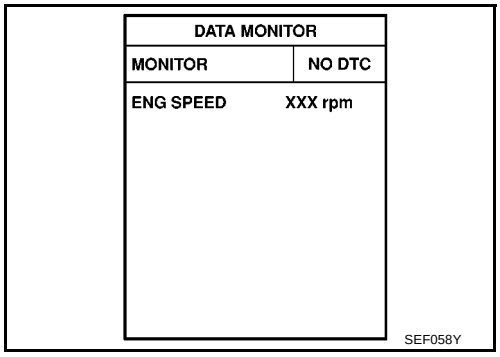
Without CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Shift selector lever to “D” position (A/T models), “1st” position (M/T models) and wait at least 2 seconds.
3. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If 1st trip DTC is detected, go to EC-760, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to “D” position (A/T models), “1st” position (M/T models) and wait at least 2 seconds.
4. Shift selector lever to “N” or “P” position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-760, "Diagnostic Procedure" .



Without CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Shift selector lever to “D” position (A/T models), “1st” position (M/T models) and wait at least 2 seconds.
3. Shift selector lever to “N” or “P” position.
4. Start engine and let it idle for the 3 seconds.
5. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
6. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
7. If DTC is detected, go to EC-760, "Diagnostic Procedure" .

Diagnostic Procedure

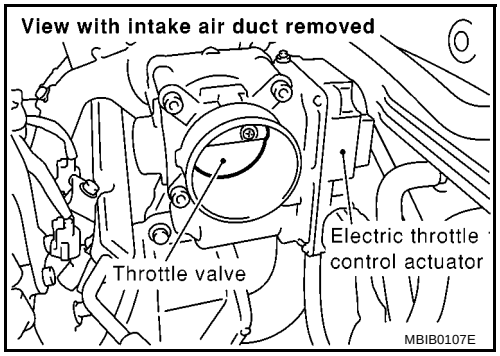
EBS00QZH

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00QZI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

EBS00QZJ

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-759 or EC-769 .

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.

On Board Diagnosis Logic

EBS00QZK

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted.) ● Harness or connectors (Throttle control motor relay circuit is open or shorted.) ● Electric throttle control actuator ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

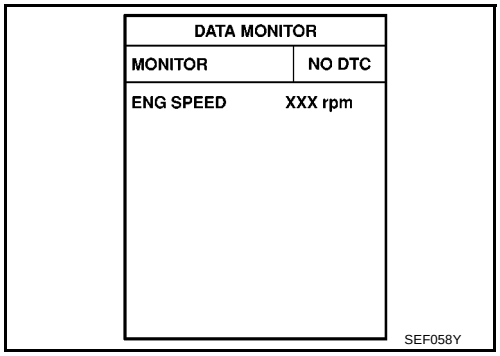
DTC Confirmation Procedure

EBS00QZL

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-764, "Diagnostic Procedure" .



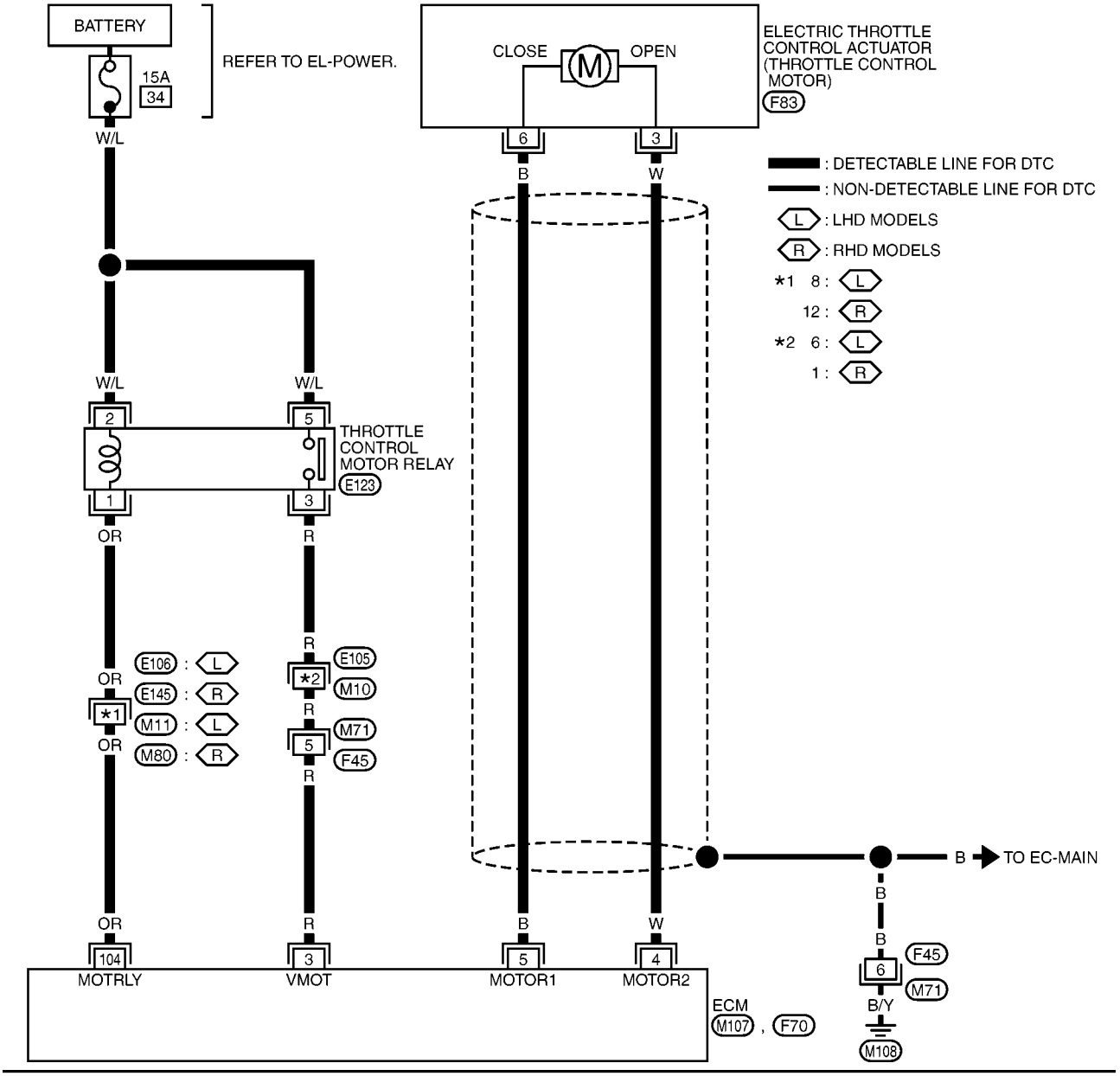
WITHOUT CONSULT-II

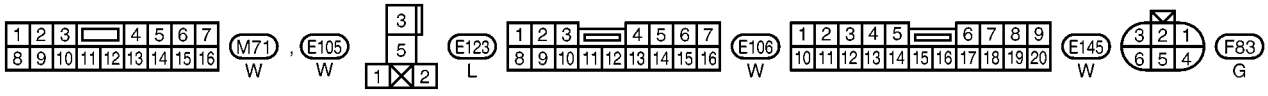
1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If DTC is detected, go to EC-764, "Diagnostic Procedure" .

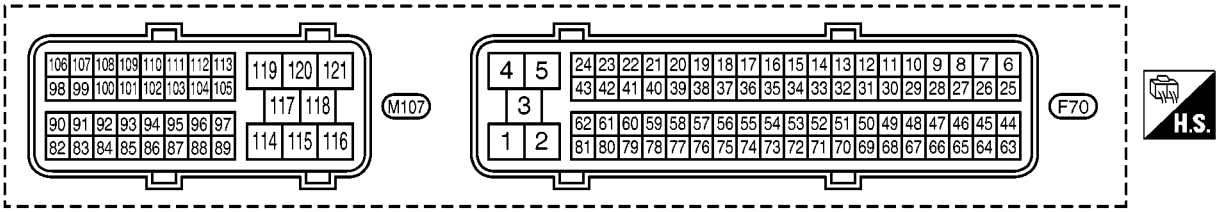
Wiring Diagram

EBS00QZM

EC-ETC1-01





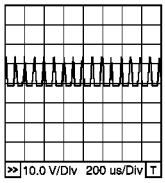
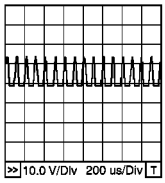


YEC463A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

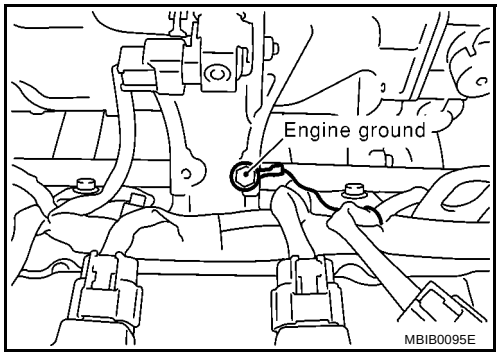
Diagnostic Procedure

EBS00QZN

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.

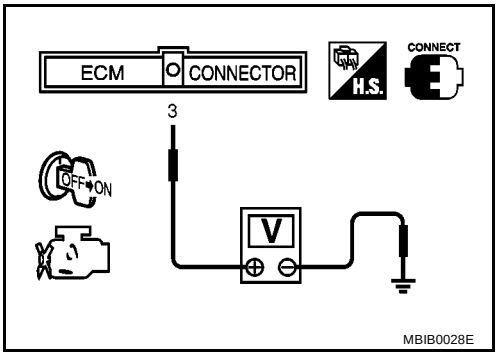


MBIB0095E

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

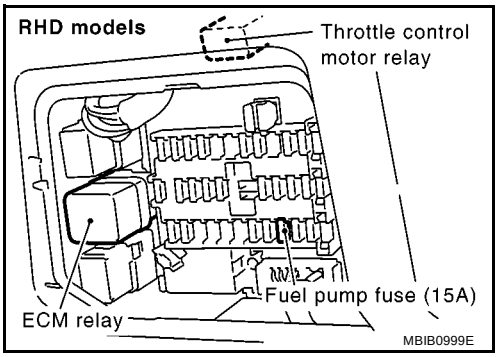


OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

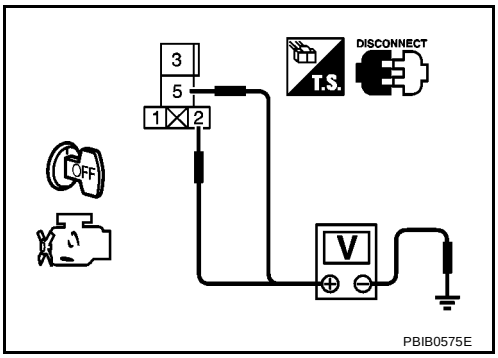
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

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

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors M71, F45
- Harness for open or short between ECM and throttle control motor relay

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

7. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between ECM and throttle control motor relay

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

9. CHECK THROTTLE CONTROL MOTOR RELAY

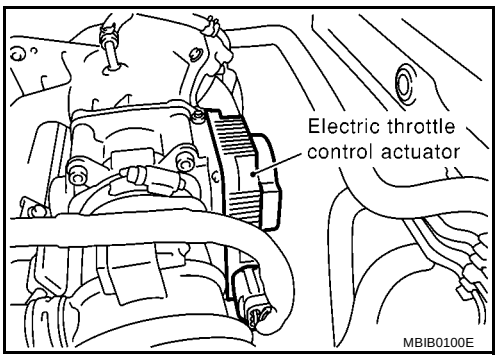
Refer to EC-768, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace throttle control motor relay.

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 harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

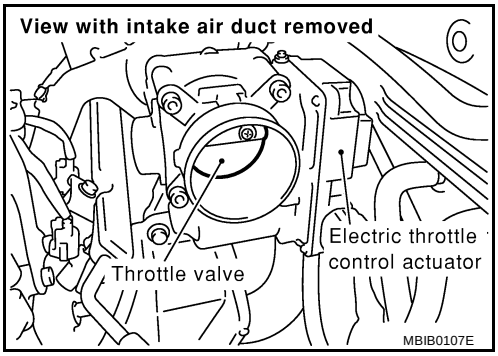
OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-768, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

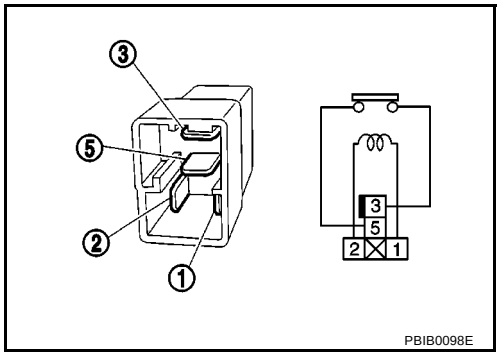
EBS00QZO

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



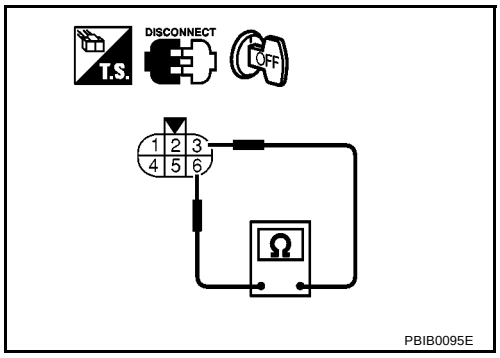
PBIB0098E

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-576, "Throttle Valve Closed Position Learning" .
5. Perform EC-576, "Idle Air Volume Learning" .



PBIB0095E

Remove and Installation

EBS00QZP

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

EBS00QZQ

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS00QZR

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

EBS00QZS

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	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 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low. **This self-diagnosis has the one trip detection logic.**	● Harness or connectors (Throttle control motor relay circuit is open.) ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

EBS00QZT

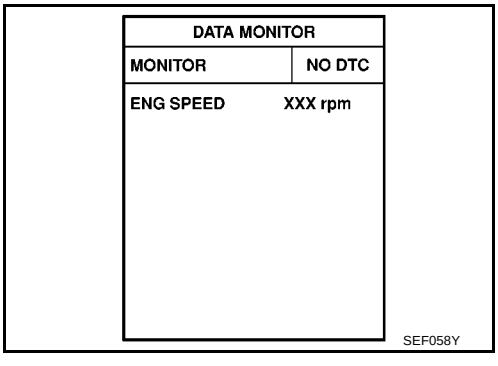
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-772, "Diagnostic Procedure" .



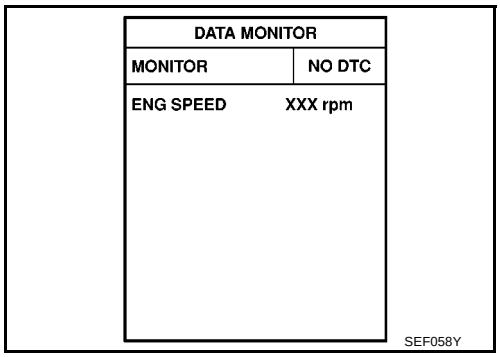
Without CONSULT-II

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. If DTC is detected, go to EC-772, "Diagnostic Procedure" .

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-772, "Diagnostic Procedure" .



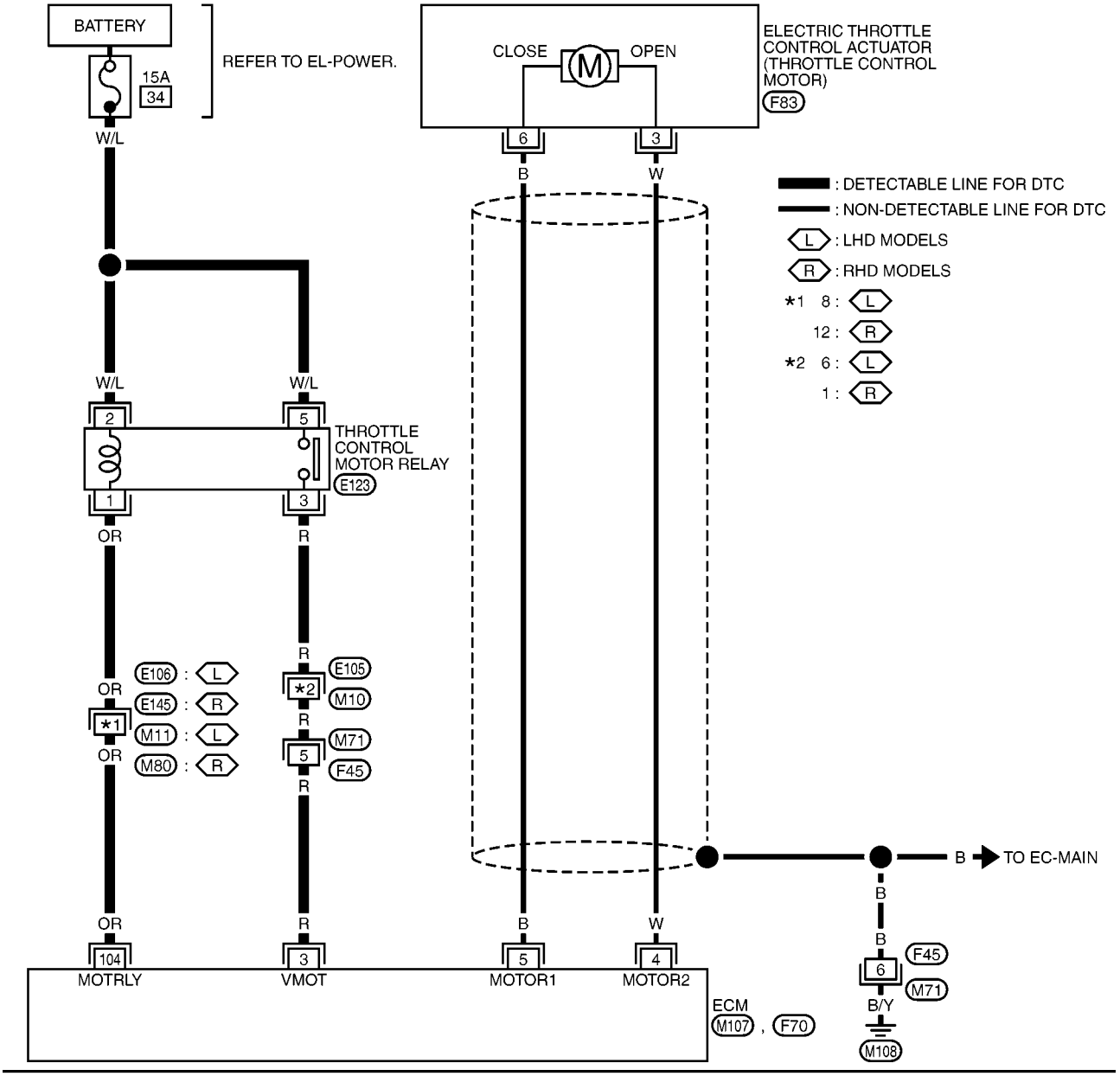
Without CONSULT-II

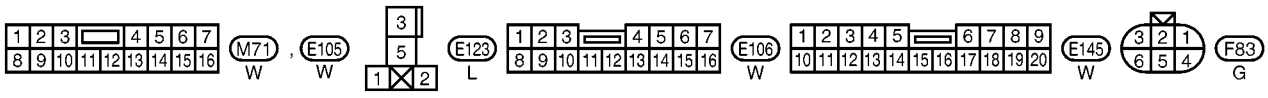
1. Turn ignition switch “ON” and wait at least 2 second.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If DTC is detected, go to EC-772, "Diagnostic Procedure" .

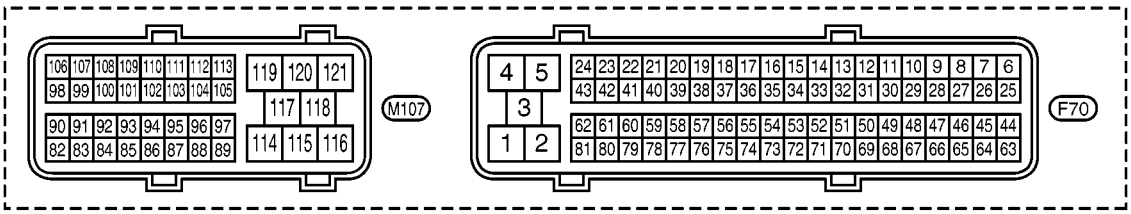
Wiring Diagram

EBS00QZU

EC-ETC2-01







YEC464A

Specification data are reference values and are measured between each terminal 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.

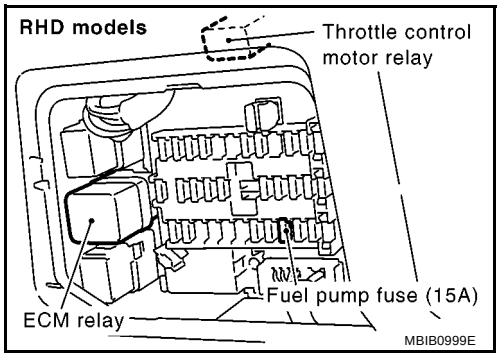
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
104	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
3	R	Throttle control motor power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00QZV

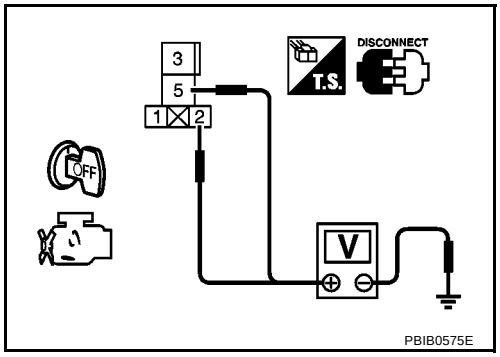
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

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

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- Harness connectors M71, F45
- Harness for open or short between ECM and throttle control motor relay

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

5. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between ECM and throttle control motor relay

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

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-774, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace throttle control motor relay.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

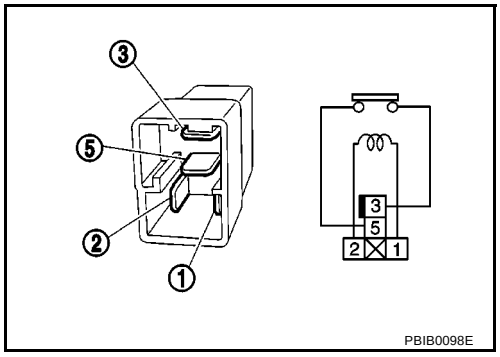
EBS00QZW

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

EBS00QZX

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.

On Board Diagnosis Logic

EBS00QZY

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

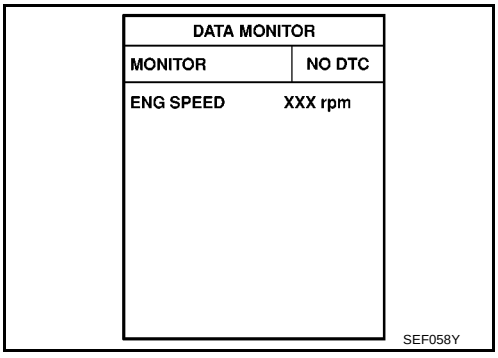
DTC Confirmation Procedure

EBS00QZZ

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch “ON” and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-777, "Diagnostic Procedure" .



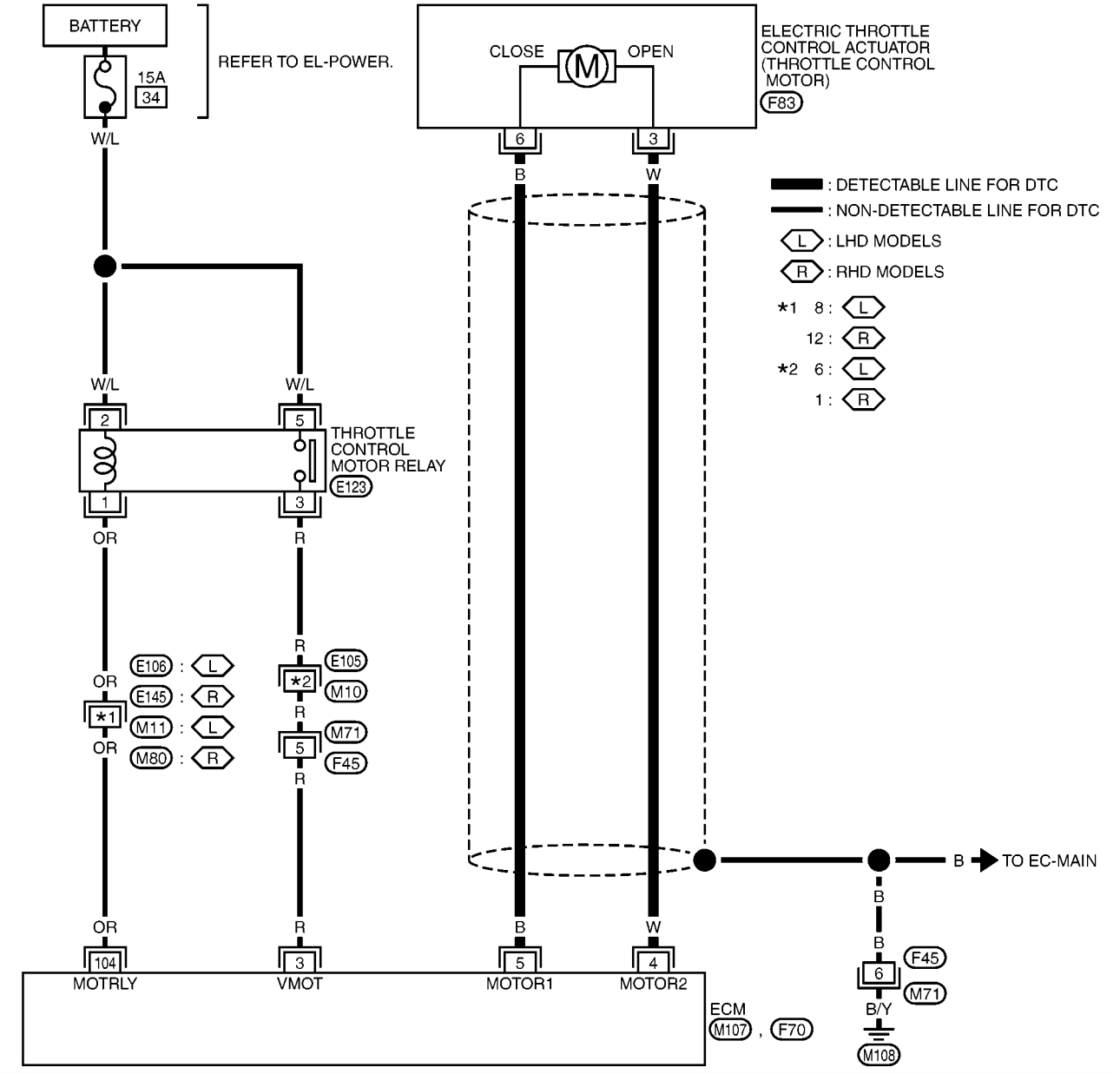
WITHOUT CONSULT-II

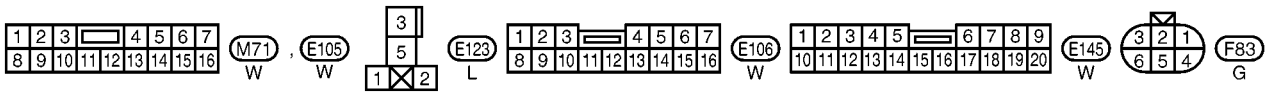
1. Turn ignition switch “ON” and wait at least 2 second.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If DTC is detected, go to EC-777, "Diagnostic Procedure" .

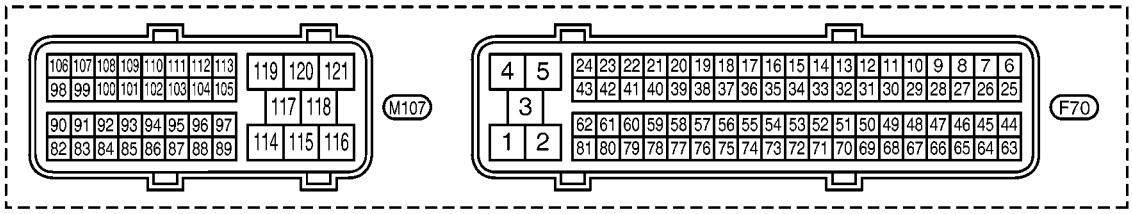
Wiring Diagram

EBS00R00

EC-ETC3-01





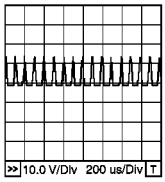
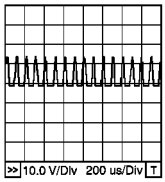


YEC465A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	B	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

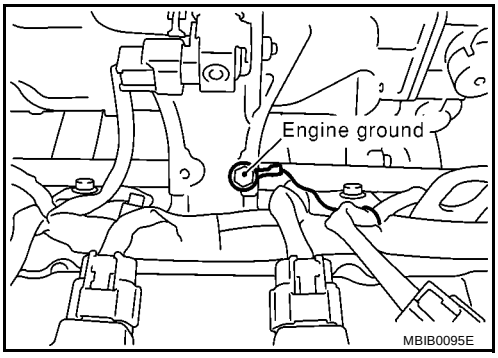
Diagnostic Procedure

EBS00R01

1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

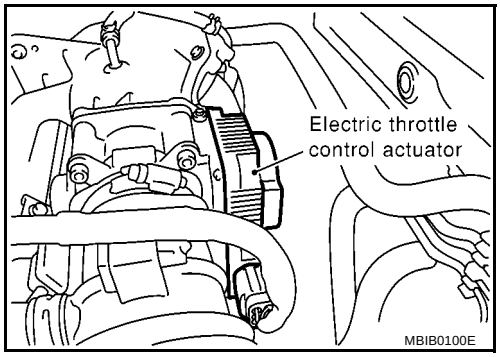
>> GO TO 2.



MBIB0095E

2. 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 harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-778, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

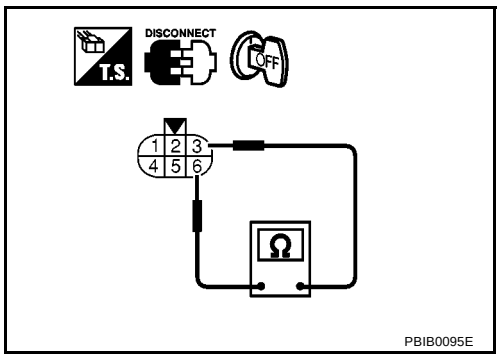
Component Inspection

EBS00R02

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-576, "Throttle Valve Closed Position Learning" .
5. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00R03

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

EBS00R04

NOTE:
If DTC P1217 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-651, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

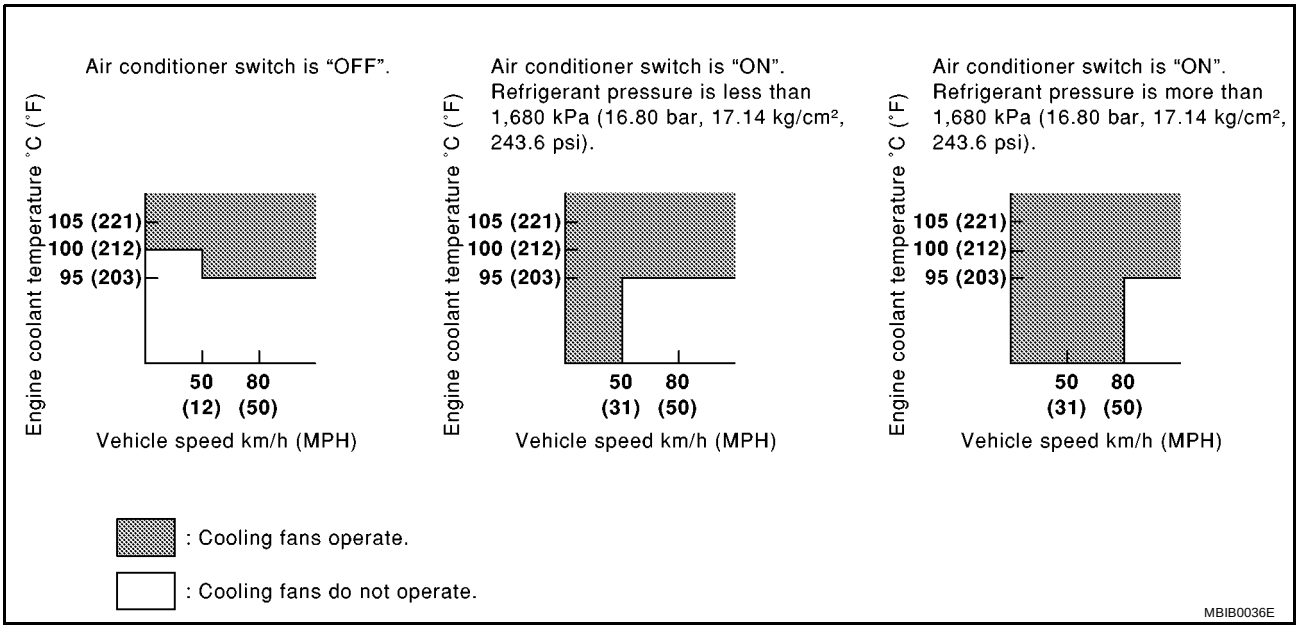
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	Cooling fan relay
Battery	Battery voltage*1		
Vehicle speed signal	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	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: These signals are sent to the ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 2-step control [ON/OFF].
The ECM sends a cooling fan control signal to the smart entrance control unit through CAN communication line, and the smart entrance control unit controls cooling fan relay.

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

EBS00R05

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 99°C (210°F) or less	OFF
		Engine coolant temperature is 100°C (212°F) or more	ON

On Board Diagnosis Logic

EBS00R06

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.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	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.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Harness or connectors (The CAN communication line is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-789, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to “Changing Engine Coolant”, LC-18. Also, replace the engine oil. Refer to “Changing Engine Oil”, LC-8.

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 “Engine Coolant Mixture Ratio”, MA-15.**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

EBS00R07

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

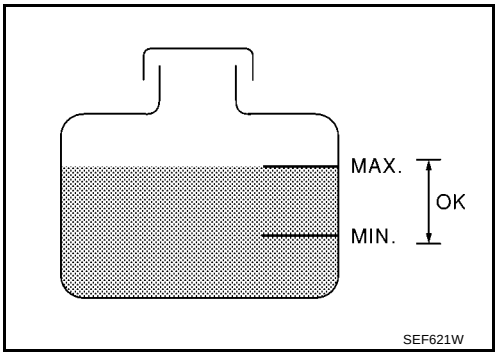
WARNING:

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.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-784, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-784, "Diagnostic Procedure" .
3. Turn ignition switch “ON”.



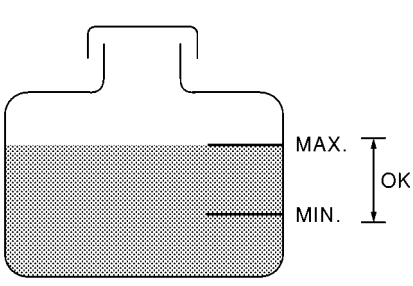
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-784, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	ON
MONITOR	
COOLAN TEMP/S	XXX °C

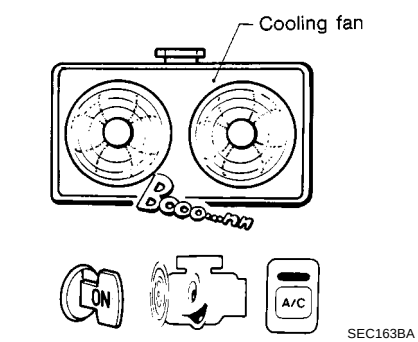
MBIB0037E

WITHOUT CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-784, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-784, "Diagnostic Procedure" .
3. Start engine and let it idle.
   Be careful not to overheat engine.
4. Turn air conditioner switch “ON”.
5. Turn blower fan switch “ON”.
6. Make sure that cooling fans operate.
   If NG, go to EC-784, "Diagnostic Procedure" .



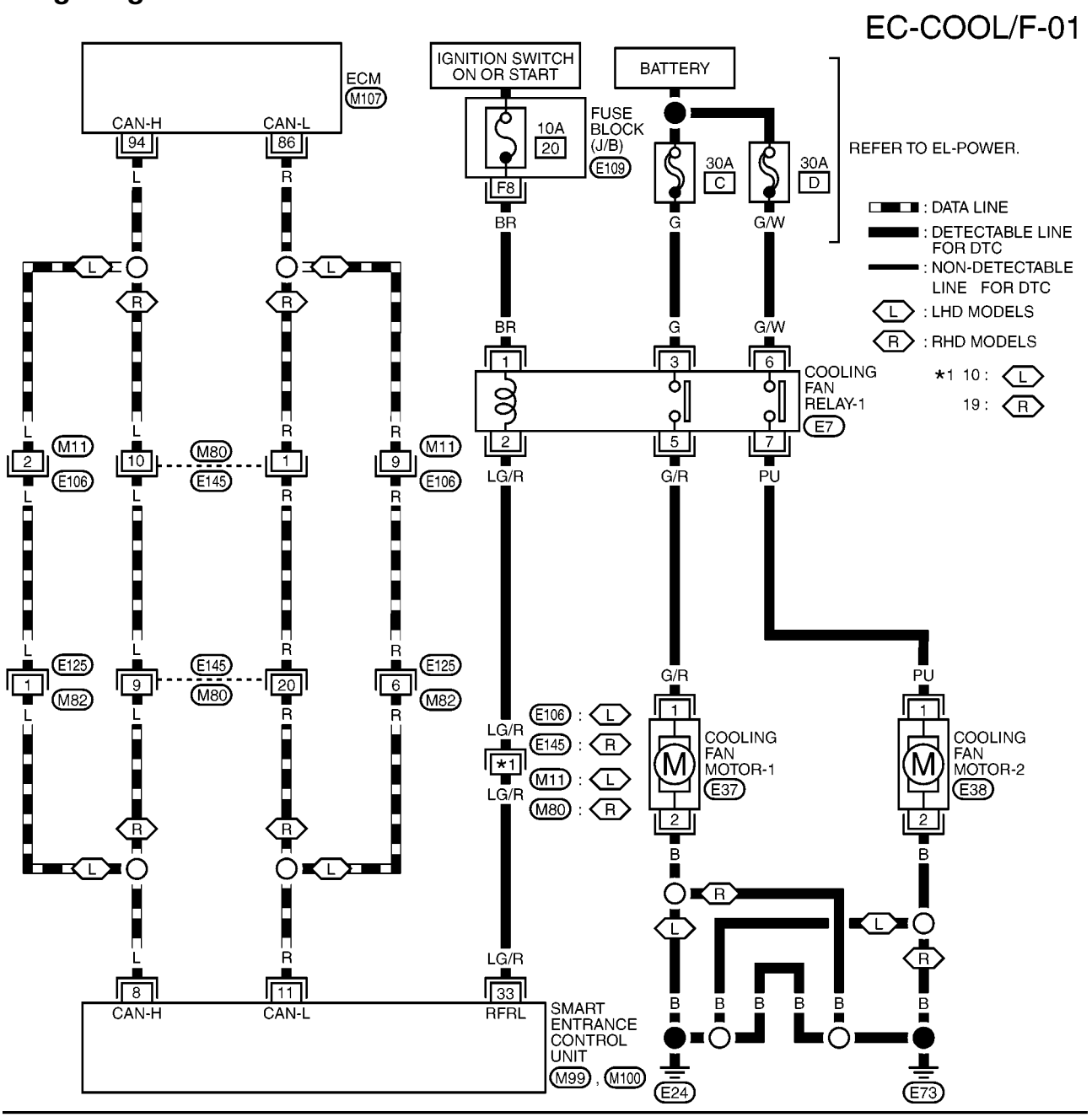
SEF621W



SEC163BA

Wiring Diagram

EBS00R08



YEC466A

Diagnostic Procedure

EBS00R09

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK COOLING FAN OPERATION

With CONSULT-II

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “ON” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-787, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	ON
MONITOR	
COOLAN TEMP/S	XXX °C

MBIB0037E

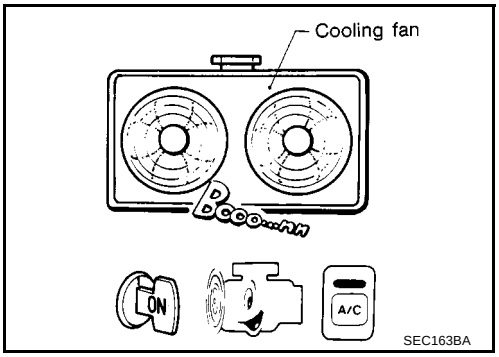
3. CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Start engine and let it idle.
2. Turn air conditioner switch “ON”.
3. Turn blower fan switch “ON”.
4. Make sure that cooling fans-1 and -2 operate.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to EC-787, "PROCEDURE A" .)

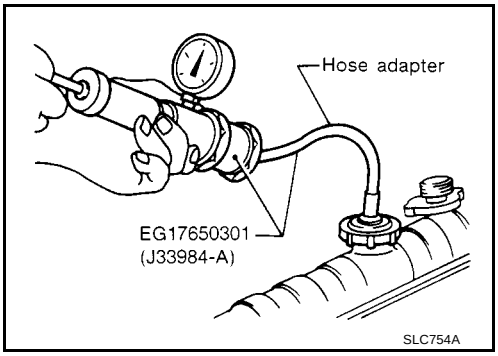


SEC163BA

4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar 1.6 kg/cm^2 , 23 psi)



CAUTION:
Higher than the specified pressure may cause radiator damage. Pressure should not drop.

OK or NG

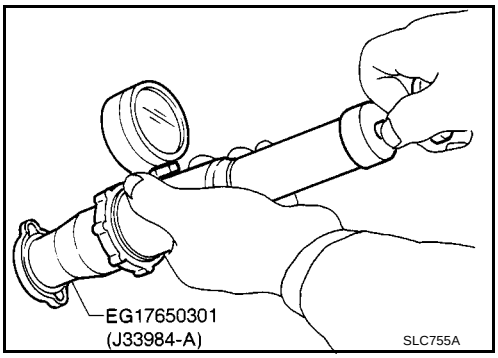
OK >> GO TO 5.
NG >> Check the following for leak

- Hose
- Radiator
- Water pump
  Refer to “Water Pump”, LC-14.

5. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

Radiator cap relief pressure: 59 - 98 kPa (0.59 - 0.98 bar 0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



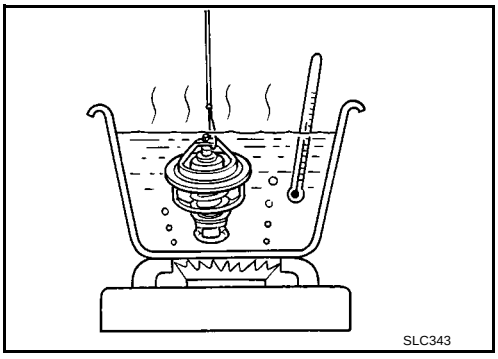
OK or NG

OK >> GO TO 6.
NG >> Replace radiator cap.

6. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature: 82°C (180°F) [standard]
Valve lift: More than 8 mm/95°C (0.31 in/203°F)



3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to “Thermostat”, LC-15.

OK or NG

OK >> GO TO 7.
NG >> Replace thermostat

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-664, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace engine coolant temperature sensor.

8. CHECK MAIN 12 CAUSES

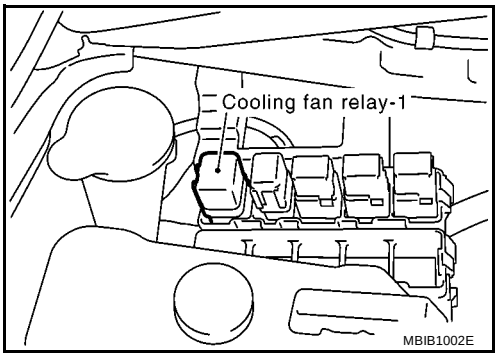
If the cause cannot be isolated, go to EC-789, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

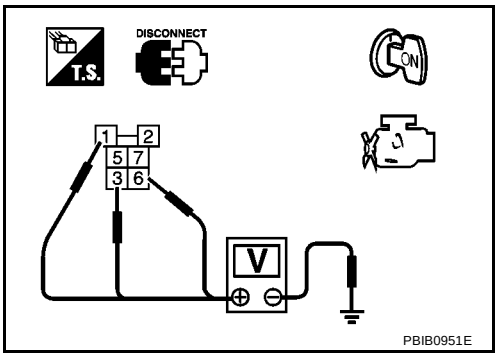
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch “ON”.



4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- 10A fuse
- 30A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

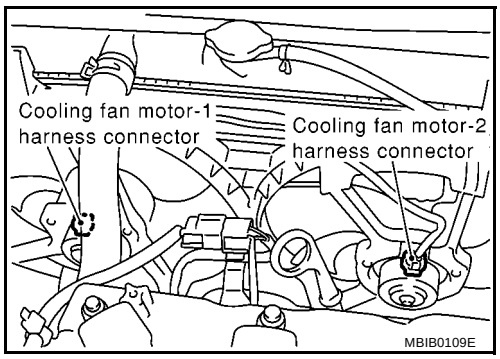
>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTORS CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 2 and ground.
   Refer to wiring diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 2 and ground.
   Refer to wiring diagram.

   Continuity should exist.
6. Also check harness for short to ground and short to power.



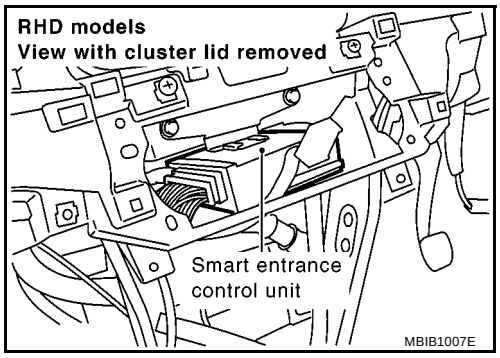
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect smart entrance control unit.
2. Check harness continuity between smart entrance control unit terminal 33 and cooling fan relay-1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.
3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between smart entrance control unit and cooling fan relay-1

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

6. CHECK COOLING FAN RELAY-1

Refer to EC-790, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS

Refer to EC-790, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK SMART ENTRANCE CONTROL UNIT

Refer to “SMART ENTRANCE CONTROL SYSTEM”, EL-341.

OK or NG

OK >> GO TO 9.
NG >> Replace cooling fan motors.

9. CHECK INTERMITTENT INCIDENT

Perform EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

EBS00R0A

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	See “Engine Coolant Mixture Ratio”, MA-15.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, LC-18.
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See “CHENGING RADIATOR CAP”, LC-13.
ON*2	5	● Coolant leaks	● Visual	No leaks	See “CHENGING COOLING SYSTEM FOR LEAKS”, LC-13.
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat”, LC-15, and “Radiator”, LC-16.
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-780).
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	See “Changing Engine Coolant”, LC-18.
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See “Changing Engine Coolant”, LC-18.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-60, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-74, "CYLINDER BLOCK" .

*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 “Overheating Cause Analysis”, LC-20.

Component Inspection

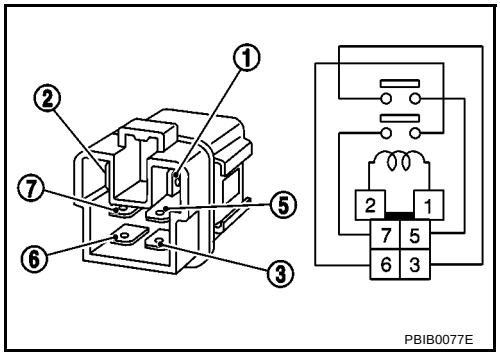
EBS00R0B

COOLING FAN RELAY-1

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace cooling fan relay.

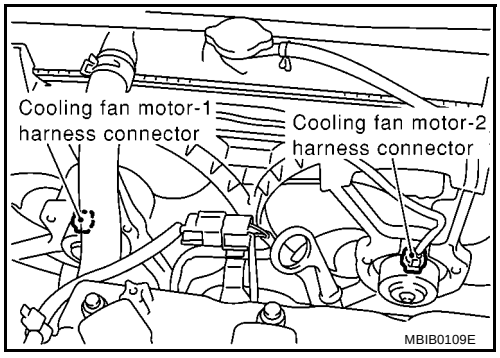


COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	1	2

Cooling fan motor should operate.
If NG, replace cooling fan motor.



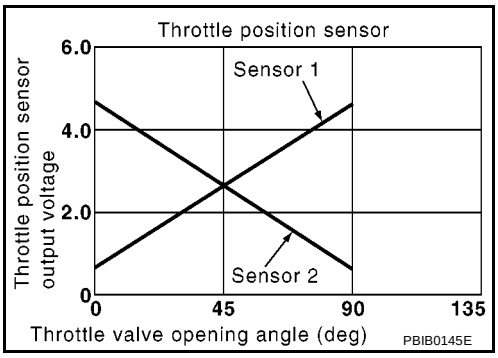
DTC P1223, P1224 TP SENSOR

PFP:16119

Component Description

EBS00R0C

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 the 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R0D

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T models) 1st (M/T models)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00R0E

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1223 1223	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) ● Electric throttle control actuator (TP sensor 2)
P1224 1224	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
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.

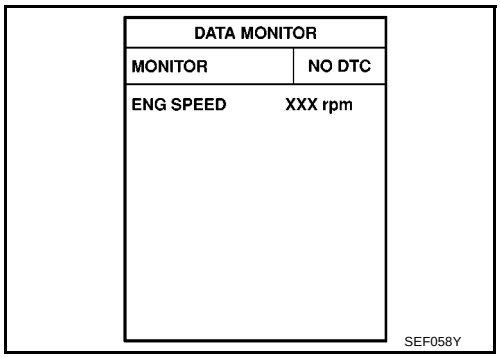
DTC Confirmation Procedure

EBS00R0F

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-794, "Diagnostic Procedure" .



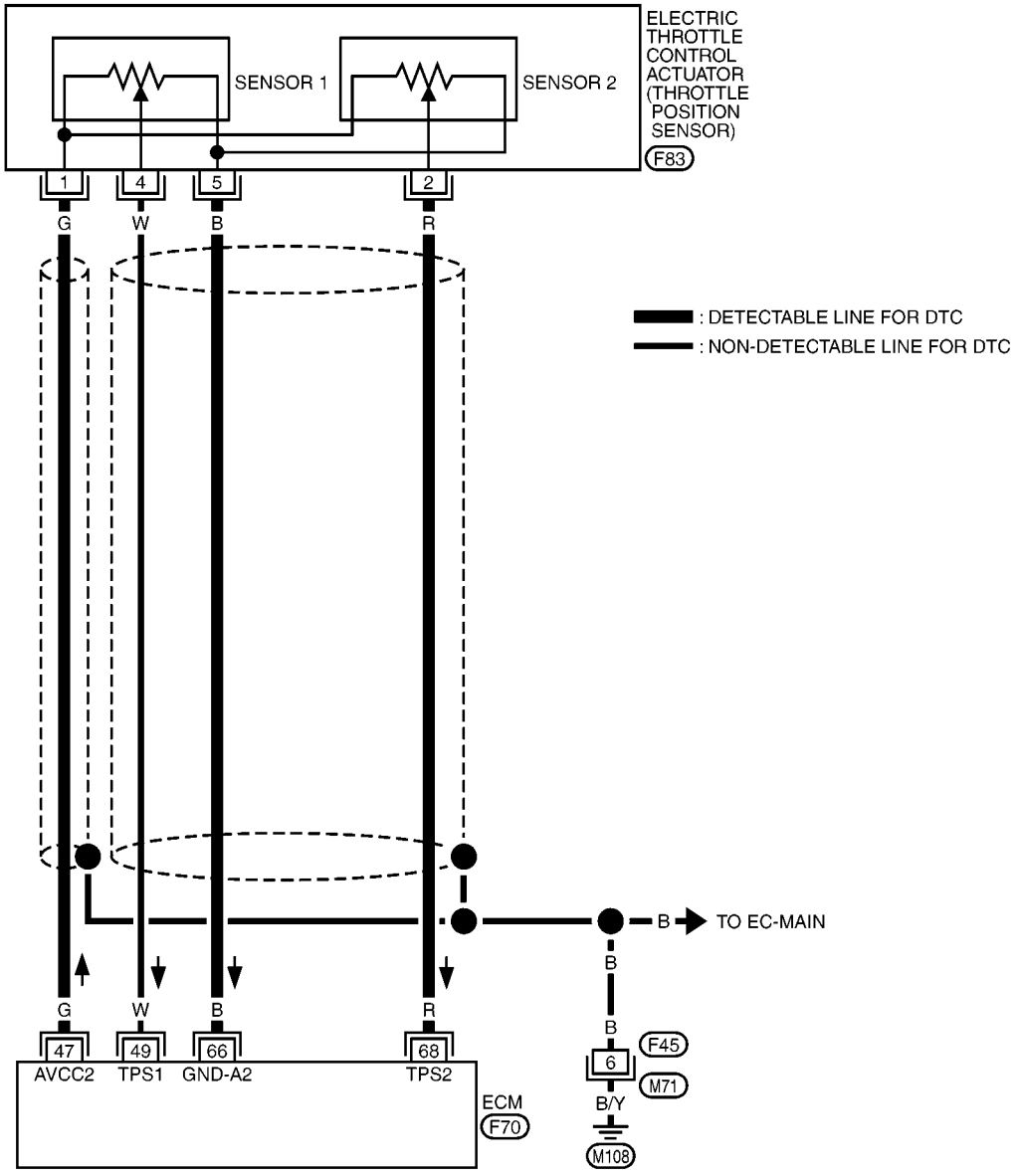
WITHOUT CONSULT-II

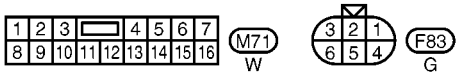
1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-796, "Component Inspection" .

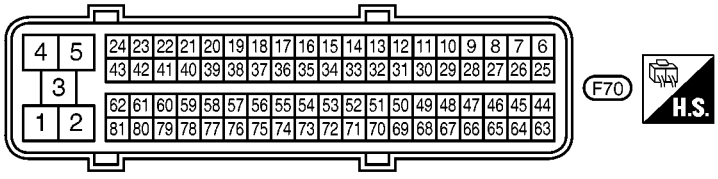
Wiring Diagram

EBS00R0G

EC-TPS2-01







YEC467A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Throttle position sensor power supply	**[Ignition switch "ON"]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	Less than 4.75V
66	B	Throttle position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" (A/T models) ● Shift lever position is "1st" (M/T models) ● Accelerator pedal fully depressed	More than 0.36V

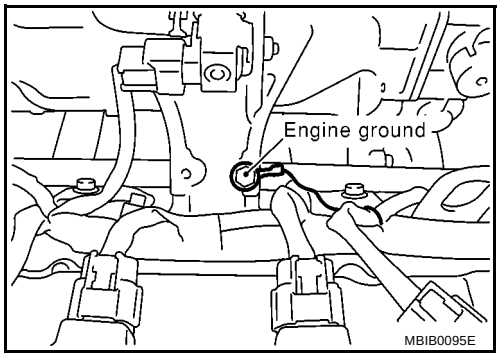
Diagnostic Procedure

EBS00R0H

1. RETIGHTEN GROUND SCREWS

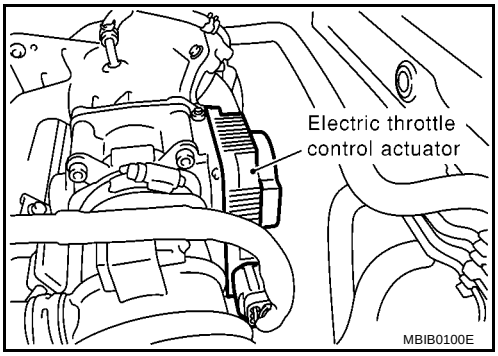
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



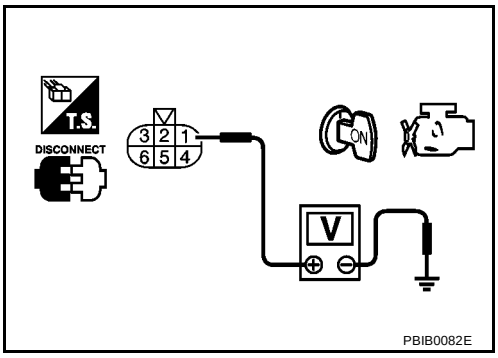
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 68 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-796, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

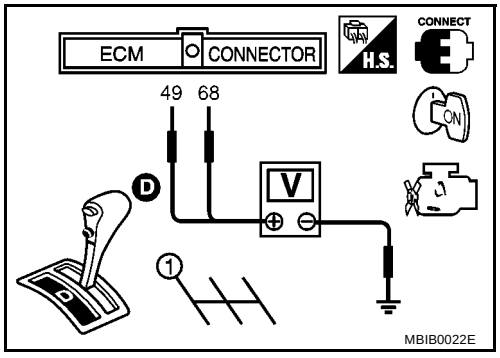
Component Inspection

EBS00R0I

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch “ON”.
4. Set selector lever to “D” position (A/T models) or “1st” position (M/T models).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-576, "Throttle Valve Closed Position Learning" .
8. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00R0J

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

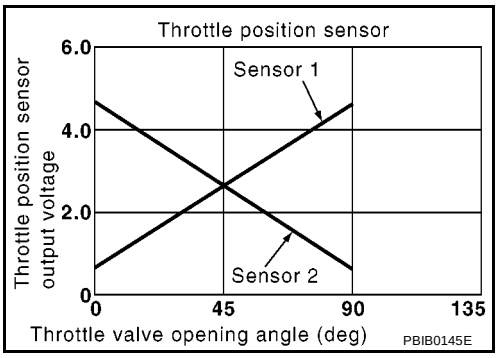
DTC P1225 TP SENSOR

PFP:16119

Component Description

EBS00R0K

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 the 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.



On Board Diagnosis Logic

EBS00R0L

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

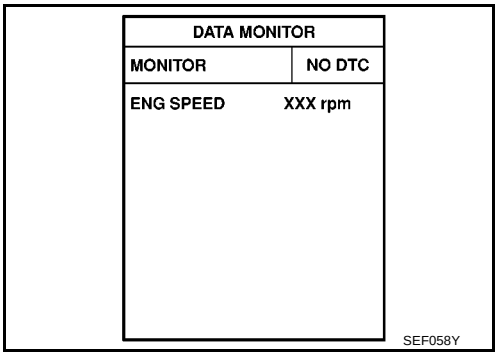
DTC Confirmation Procedure

EBS00R0M

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. If 1st trip DTC is detected, go to EC-798, "Diagnostic Procedure" .



WITHOUT CONSULT-II

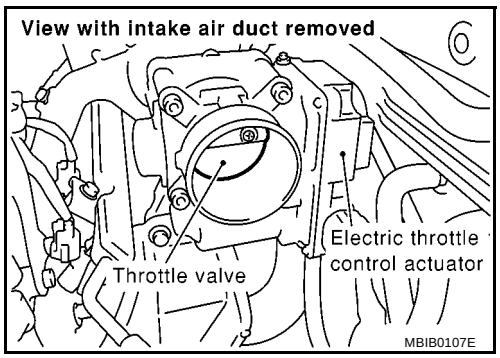
1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If 1st trip DTC is detected, go to EC-798, "Diagnostic Procedure" .

Diagnostic Procedure

EBS00R0N

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch “OFF”.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00R0O

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

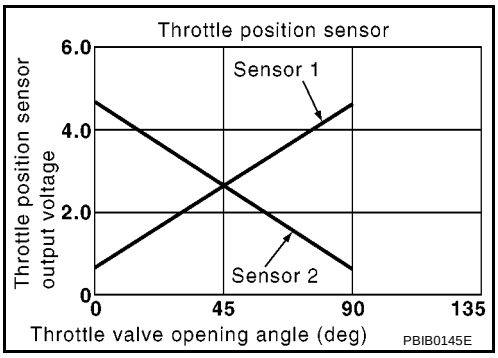
DTC P1226 TP SENSOR

PFP:16119

Component Description

EBS00R0P

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 the 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.



On Board Diagnosis Logic

EBS00R0Q

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

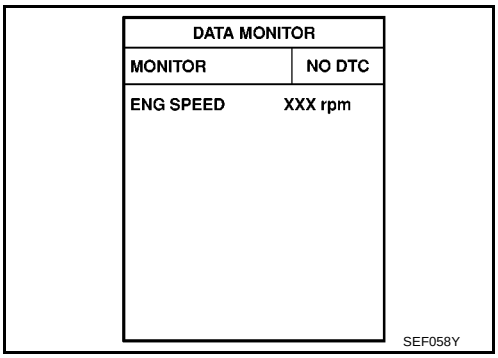
DTC Confirmation Procedure

EBS00R0R

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch “OFF”, wait at least 10 seconds.
4. Turn ignition switch “ON”.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-800, "Diagnostic Procedure" .



WITHOUT CONSULT-II

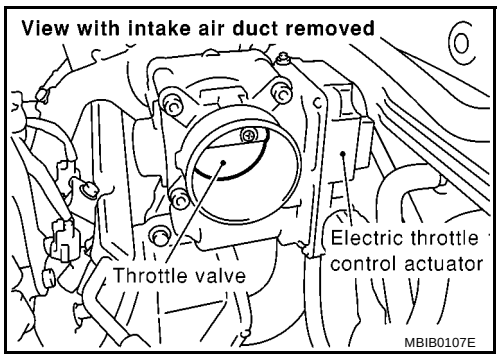
1. Turn ignition switch “ON”.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Repeat step 2 for 32 times.
4. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
5. If 1st trip DTC is detected, go to EC-800, "Diagnostic Procedure" .

Diagnostic Procedure

EBS00R0S

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch “OFF”.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

EBS00R0T

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

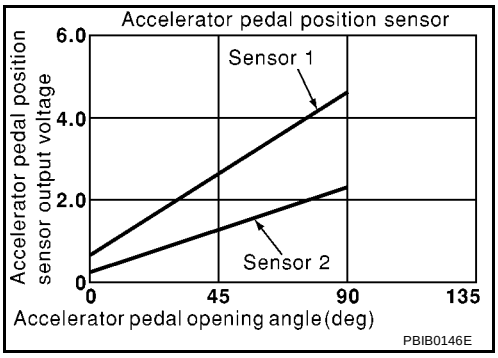
DTC P1227, P1228 APP SENSOR

PFP:18002

Component Description

EBS00R0U

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R0V

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.35 - 0.67V
		Accelerator pedal: Fully depressed	More than 3.9V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminal voltage signal.

On Board Diagnosis Logic

EBS00R0W

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P1228 1228	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
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 throttle valve to be slower than the normal condition. So, the acceleration will be poor.

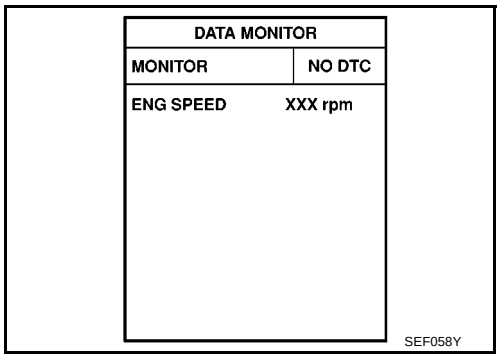
DTC Confirmation Procedure

EBS00R0X

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-804, "Diagnostic Procedure" .

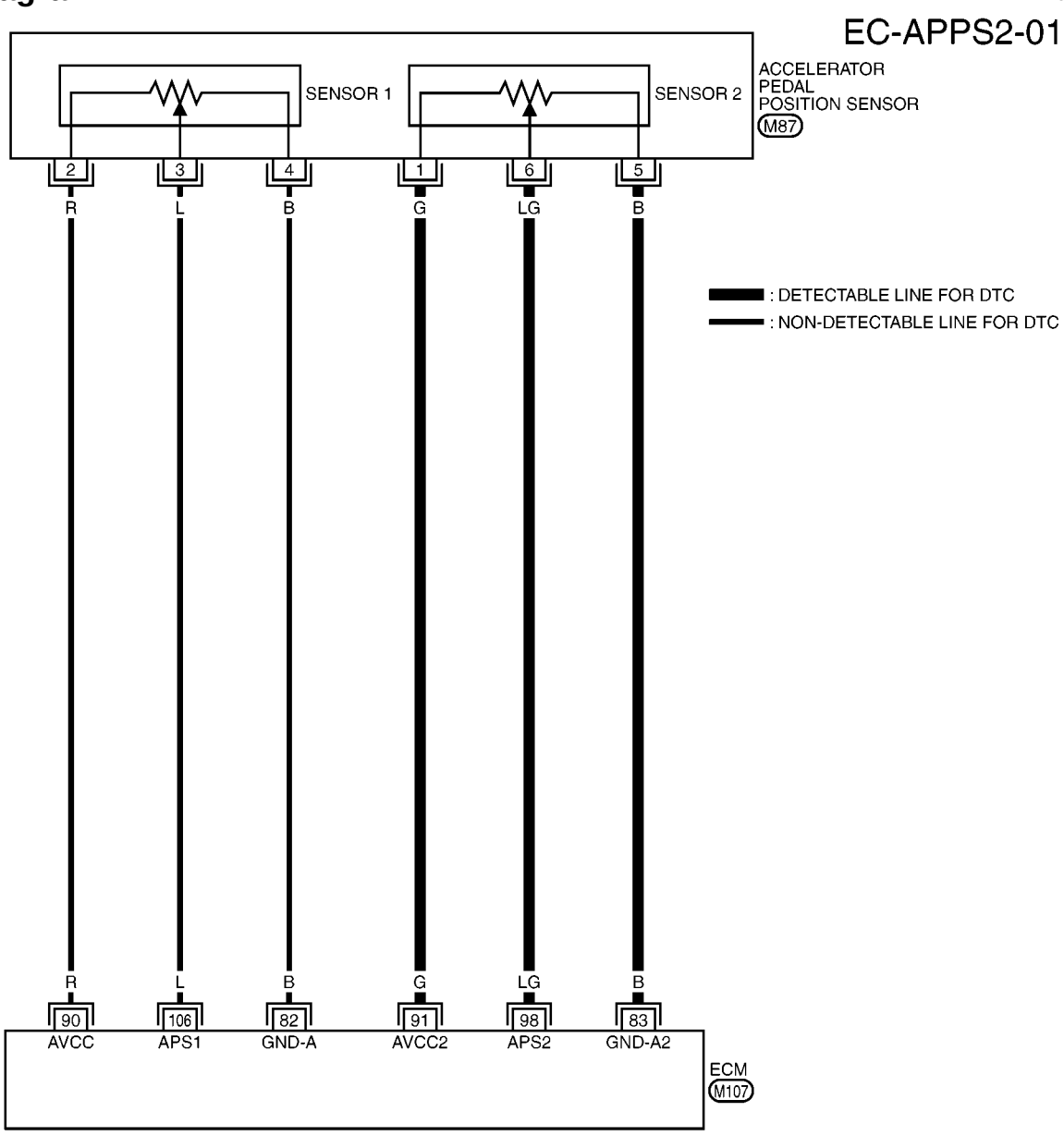


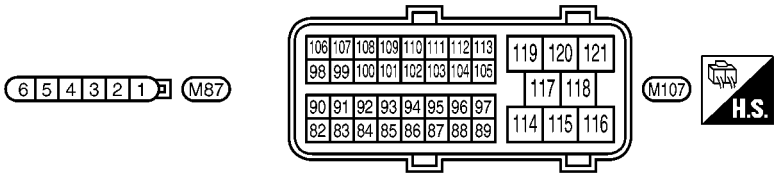
WITHOUT CONSULT-II

1. Start engine and let it idle for 1 second.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-804, "Diagnostic Procedure" .

Wiring Diagram

EBS00R0Y





YEC468A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	B	Sensor ground (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch "ON"]**	Approximately 5V
91	G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch "ON"]**	Approximately 5V
98	LG	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.17 - 0.34V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.95V
106	L	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal fully released	0.35 - 0.67V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.9V

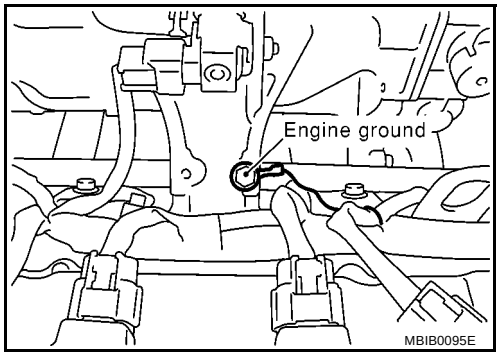
Diagnostic Procedure

EBS00R0Z

1. RETIGHTEN GROUND SCREWS

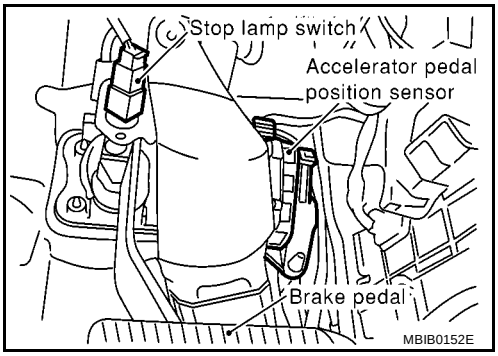
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



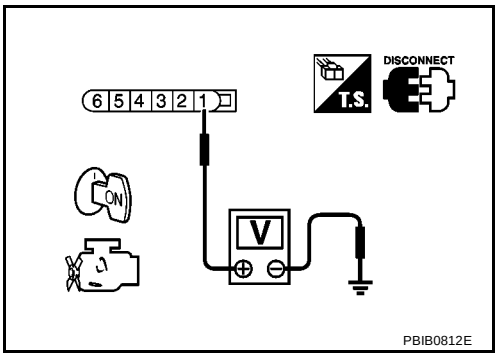
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch “ON”.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 83 and APP sensor terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-806, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE APP SENSOR

1. Replace the accelerator pedal position sensor.
2. Perform EC-576, "Accelerator Pedal Released Position Learning" .
3. Perform EC-576, "Throttle Valve Closed Position Learning" .
4. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

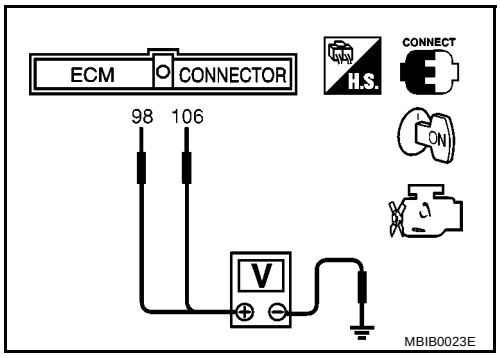
>> **INSPECTION END**

Component Inspection

EBS00R10

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and engine ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.35 - 0.67V
	Fully depressed	More than 3.9V
98 (Accelerator pedal position sensor 2)	Fully released	0.17 - 0.34V
	Fully depressed	More than 1.95V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-576, "Accelerator Pedal Released Position Learning" .
6. Perform EC-576, "Throttle Valve Closed Position Learning" .
7. Perform EC-576, "Idle Air Volume Learning" .

Remove and Installation

EBS00R11

ACCELERATOR PEDAL

Refer to “ACCELERATOR CONTROL SYSTEM”, FE-3.

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

EBS00R12

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (The TP sensor 1 and 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

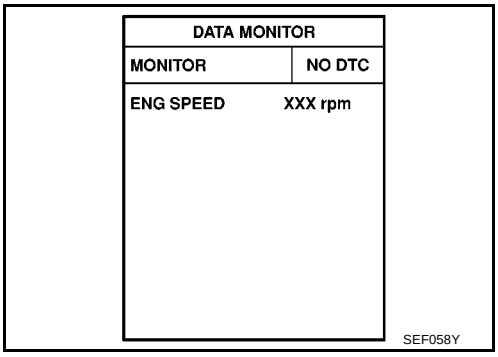
EBS00R13

NOTE:
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.

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-809, "Diagnostic Procedure" .



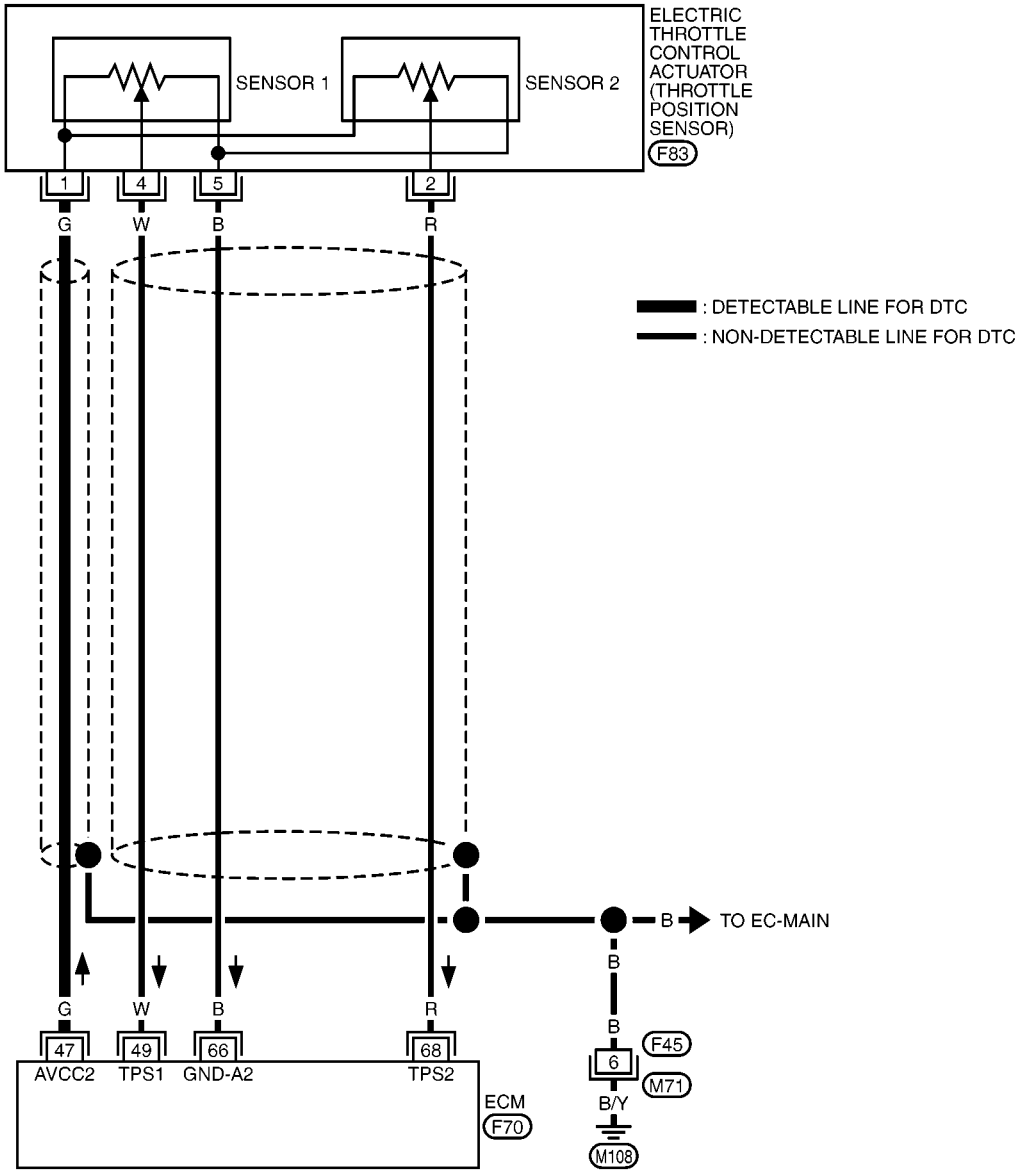
WITHOUT CONSULT-II

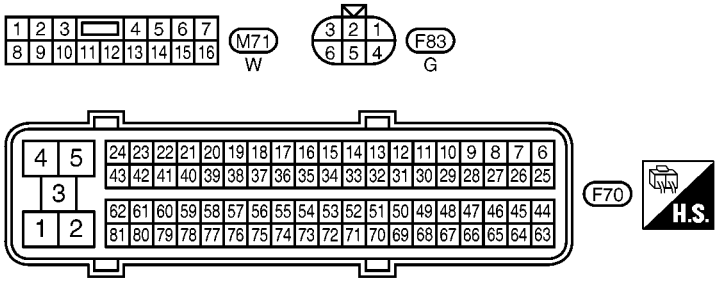
1. Start engine and let it idle for 1 seconds.
2. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
3. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4. If DTC is detected, go to EC-809, "Diagnostic Procedure" .

Wiring Diagram

EBS00R14

EC-SEN/PW-01





YEC469A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Throttle position sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

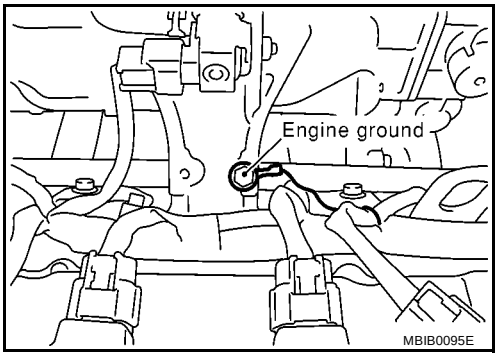
Diagnostic Procedure

EBS00R15

1. RETIGHTEN GROUND SCREWS

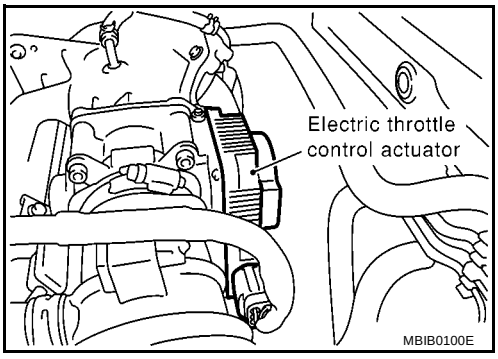
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".

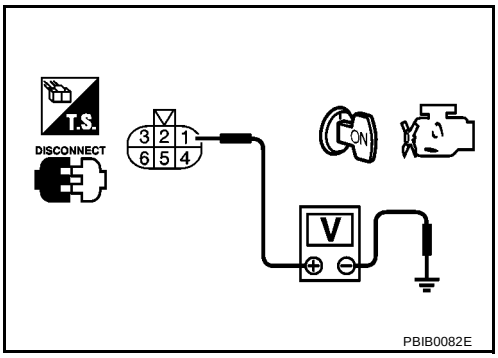


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

Check the following.

- Harness for short to power and short to ground between ECM terminal 47 and electric throttle control actuator terminal 1.
- ECM pin terminal.

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR

Refer to EC-715, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-576, "Throttle Valve Closed Position Learning" .
3. Perform EC-576, "Idle Air Volume Learning" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

EBS00R16

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS00R17

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

EBS00R18

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FALI-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

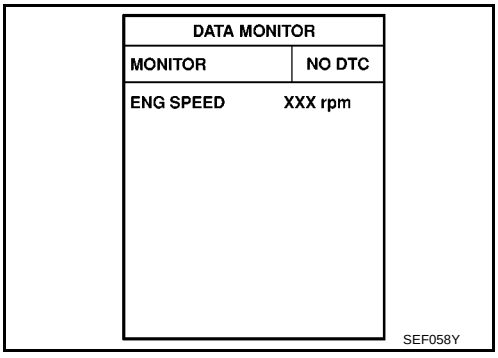
Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

EBS00R19

WITH CONSULT-II

1. Turn ignition switch “ON”.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-813, "Diagnostic Procedure" .



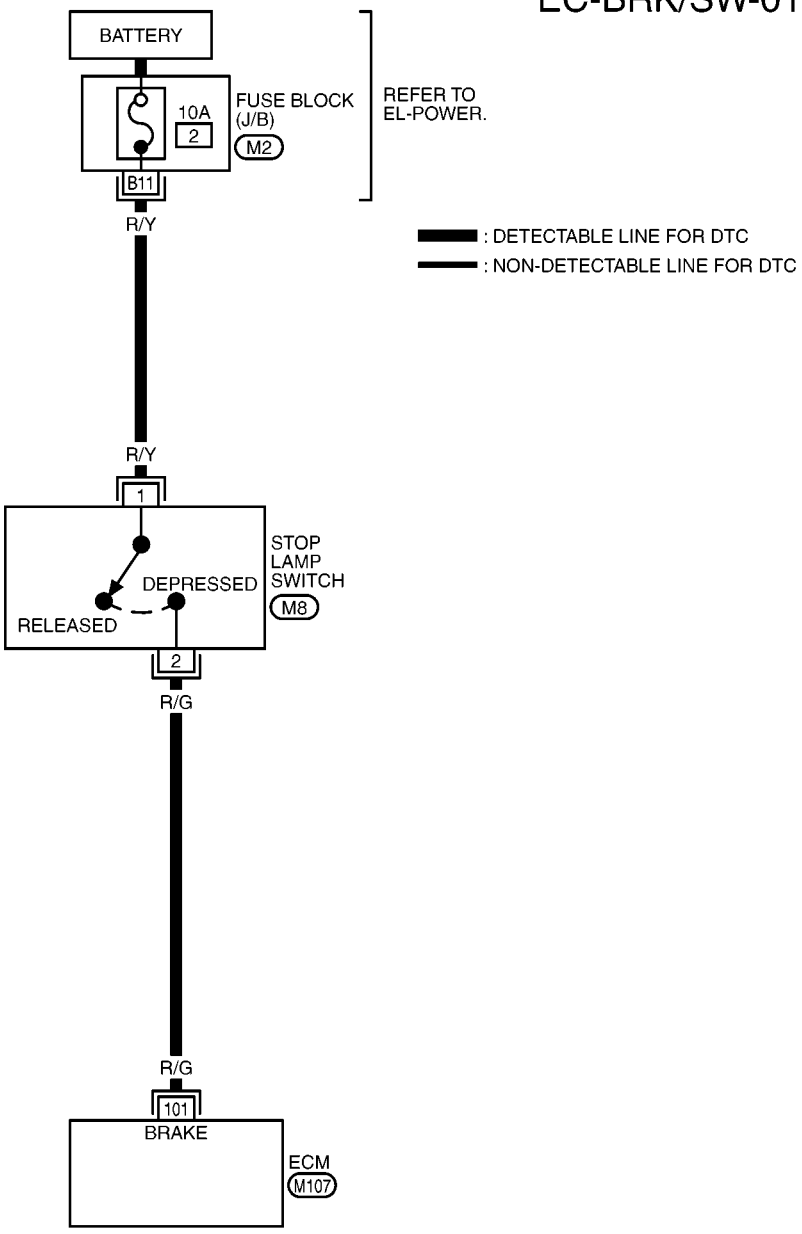
WITHOUT CONSULT-II

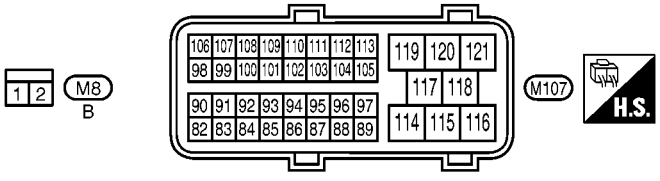
1. Turn ignition switch “ON”.
2. Fully depress the brake pedal at least 5 seconds.
3. Erase the “Diagnostic Test Mode II (Self-diagnostic results)” memory. Refer to EC-582 .
4. Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
5. Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6. If DTC is detected, go to EC-813, "Diagnostic Procedure" .

Wiring Diagram

EBS00R1A

EC-BRK/SW-01





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC471A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch "OFF"]** ● Brake pedal fully released	Approximately 0V
			[Ignition switch "OFF"] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00R1B

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch "OFF".
2. Check the stop lamp when depressing and releasing the brake pedal.

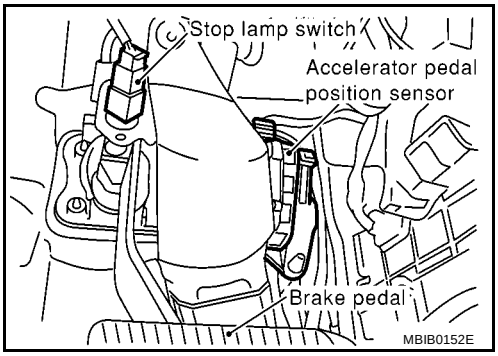
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.

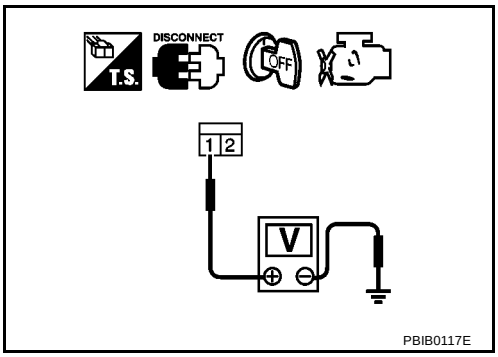


2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Fuse block (J/B) connector M2
- Harness for open and short between stop lamp switch and battery

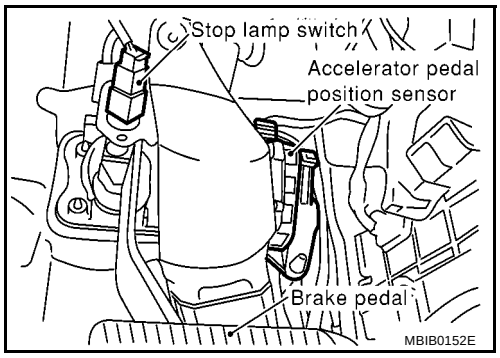
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> 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-814, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

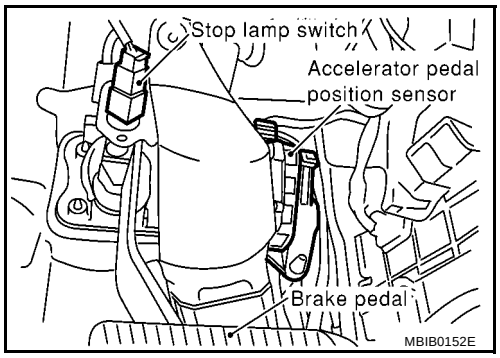
>> **INSPECTION END**

Component Inspection

EBS00R1C

STOP LAMP SWITCH

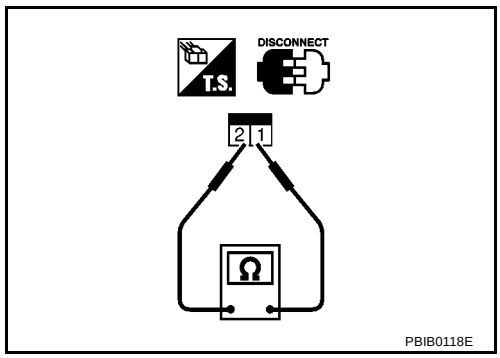
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to “BRAKE PEDAL AND BRACKET”, BR-14, and perform step 2 again.



HO2S1 HEATER (M/T MODELS)

PFP:22690

Description

EBS00R1D

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
Engine coolant temperature sensor	Engine coolant temperature		

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.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00R1E

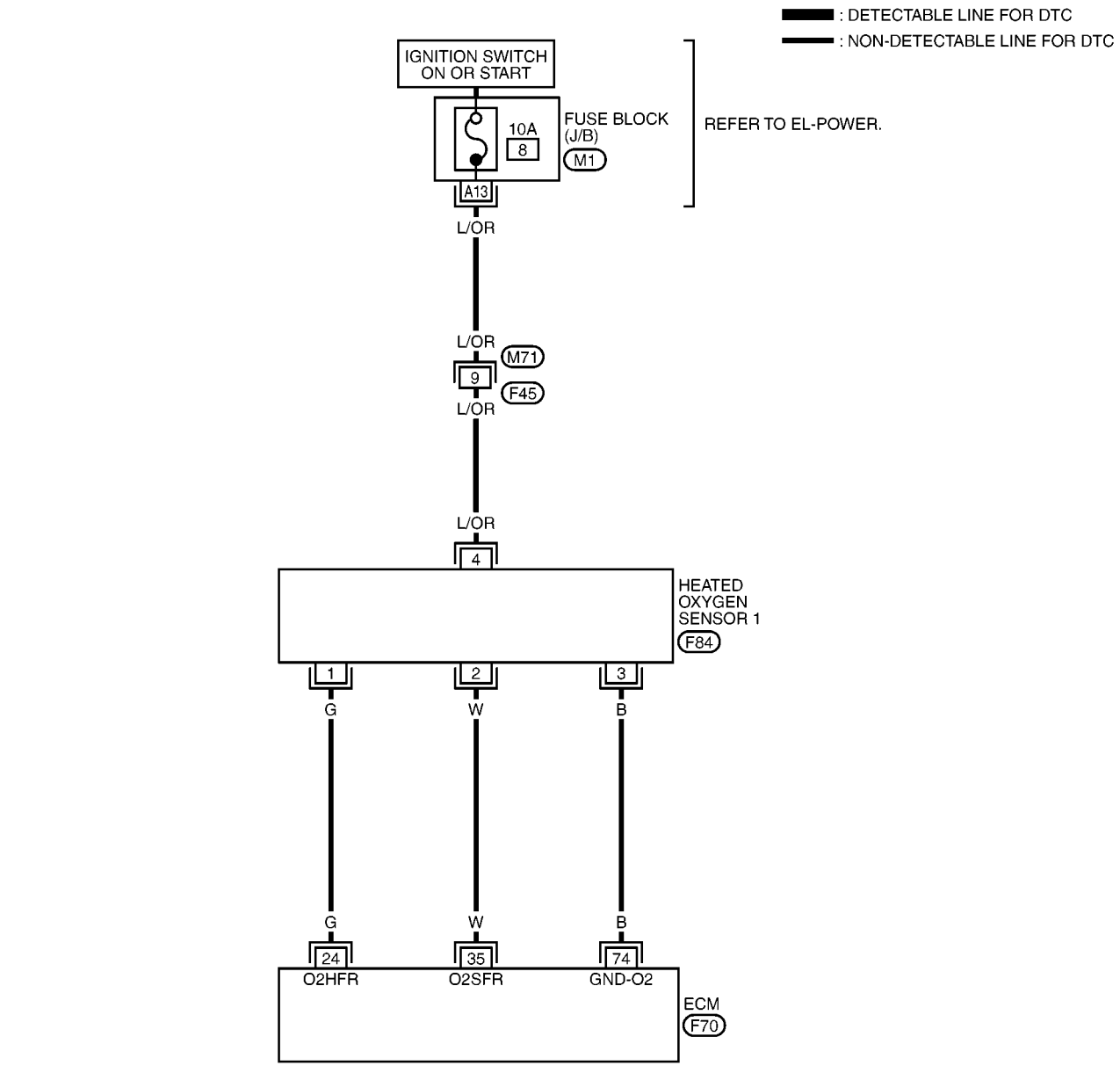
Specification data are reference values.

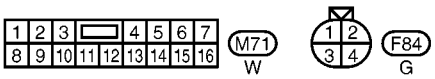
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

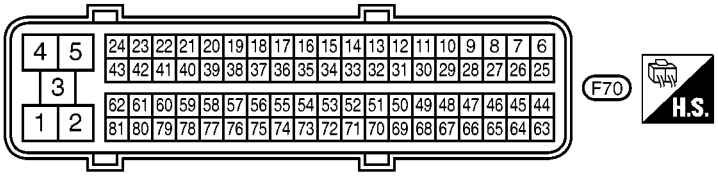
Wiring Diagram

EBS00R1F

EC-FRO2-01







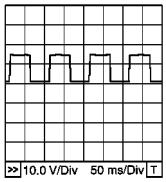
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC482A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

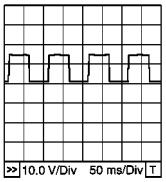
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

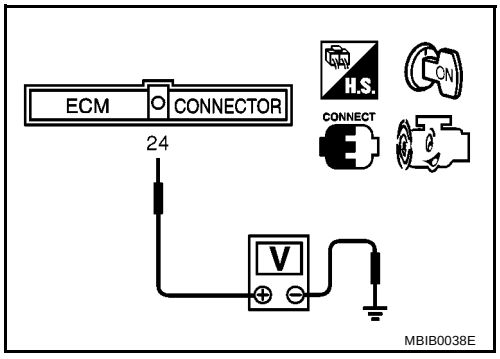
Diagnostic Procedure

EBS00R1G

1. CHECK OVERALL 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 the tester probe between ECM terminal 24 (HO2S1 heater signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.

Conditions	Voltage
At idle	Approximately 7.0V★  PBIB0519E
Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)



MBIB0038E

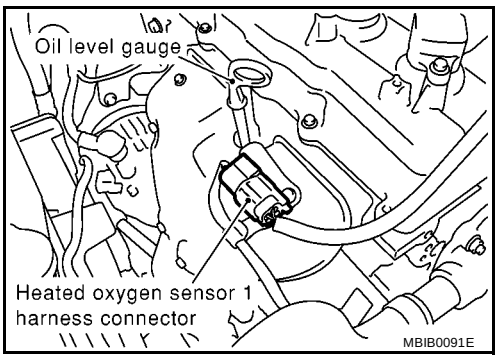
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 2.

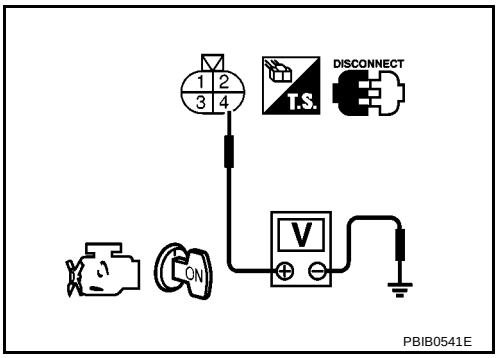
2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair open circuit or short to ground or short to power in 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 harness continuity between ECM terminal 24 and HO2S1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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-820, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

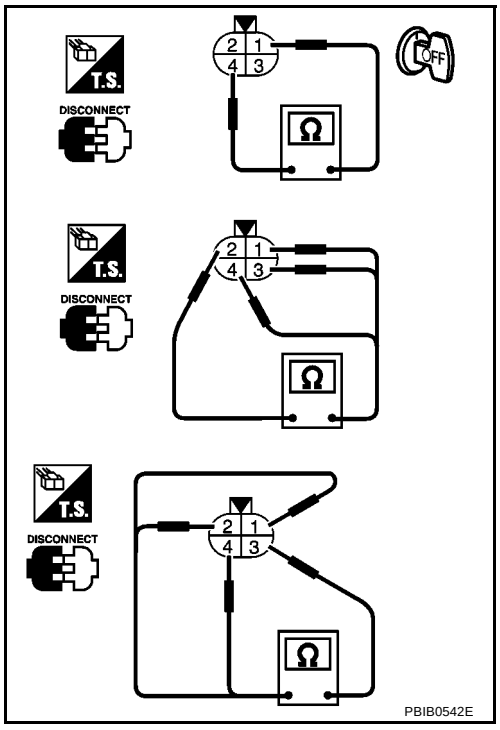
Component Inspection

EBS00R1H

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	8 - 10 Ω at 25°C (77°F)
2 and 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R1I

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

HO2S1 HEATER (A/T MODELS)

PFP:22690

Description

EBS00R1J

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
Engine coolant temperature sensor	Engine coolant temperature		

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.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,200	OFF
Below 3,200 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00R1K

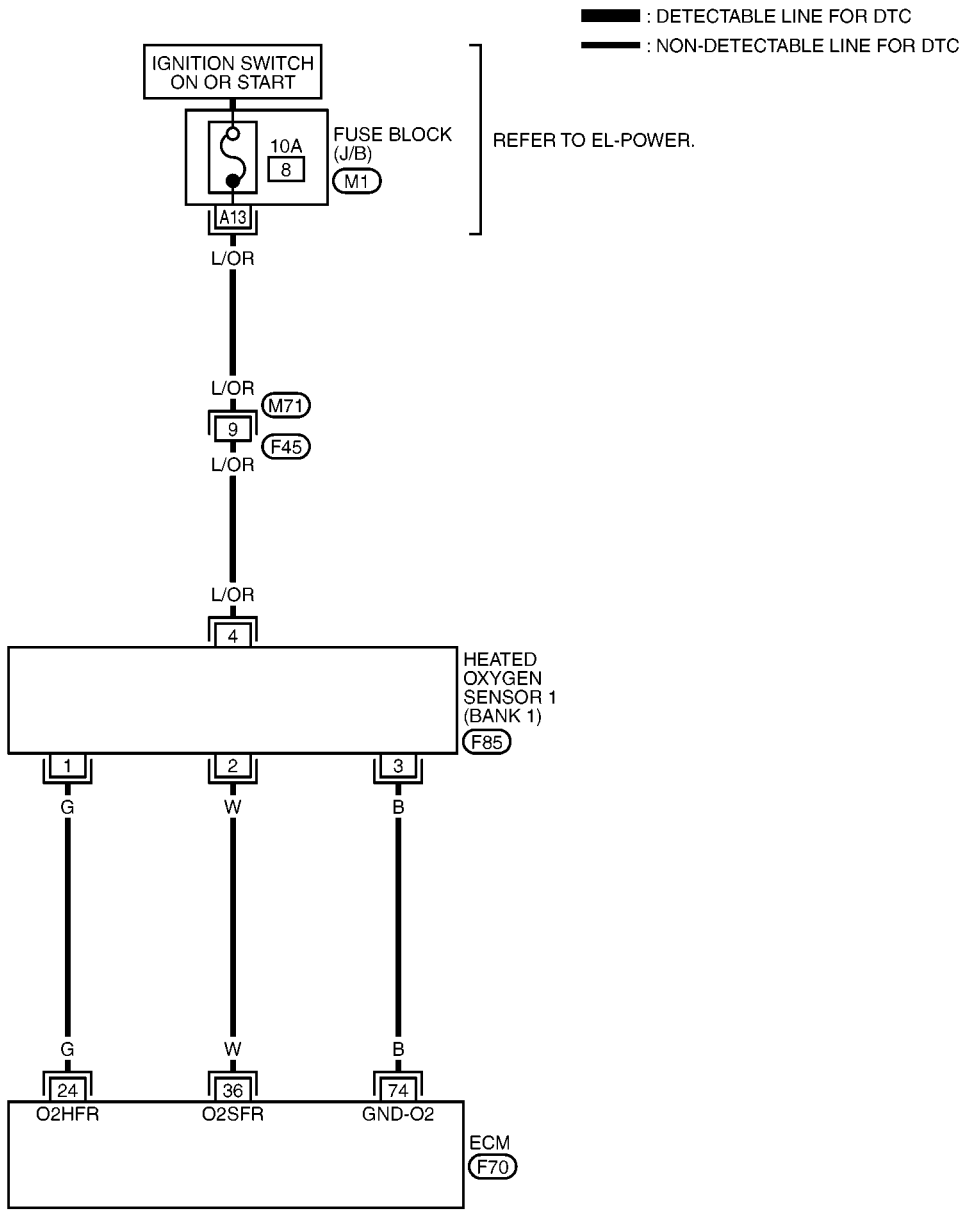
Specification data are reference values.

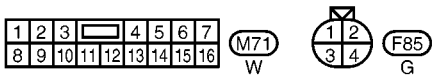
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 3,200 rpm	ON
	● Engine speed: Above 3,200 rpm	OFF

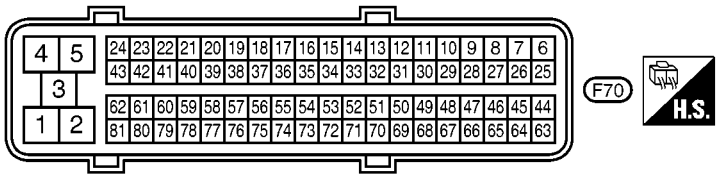
Wiring Diagram
BANK 1

EBS00R1L

EC-FRO2B1-01







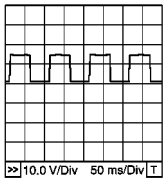
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC483A

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

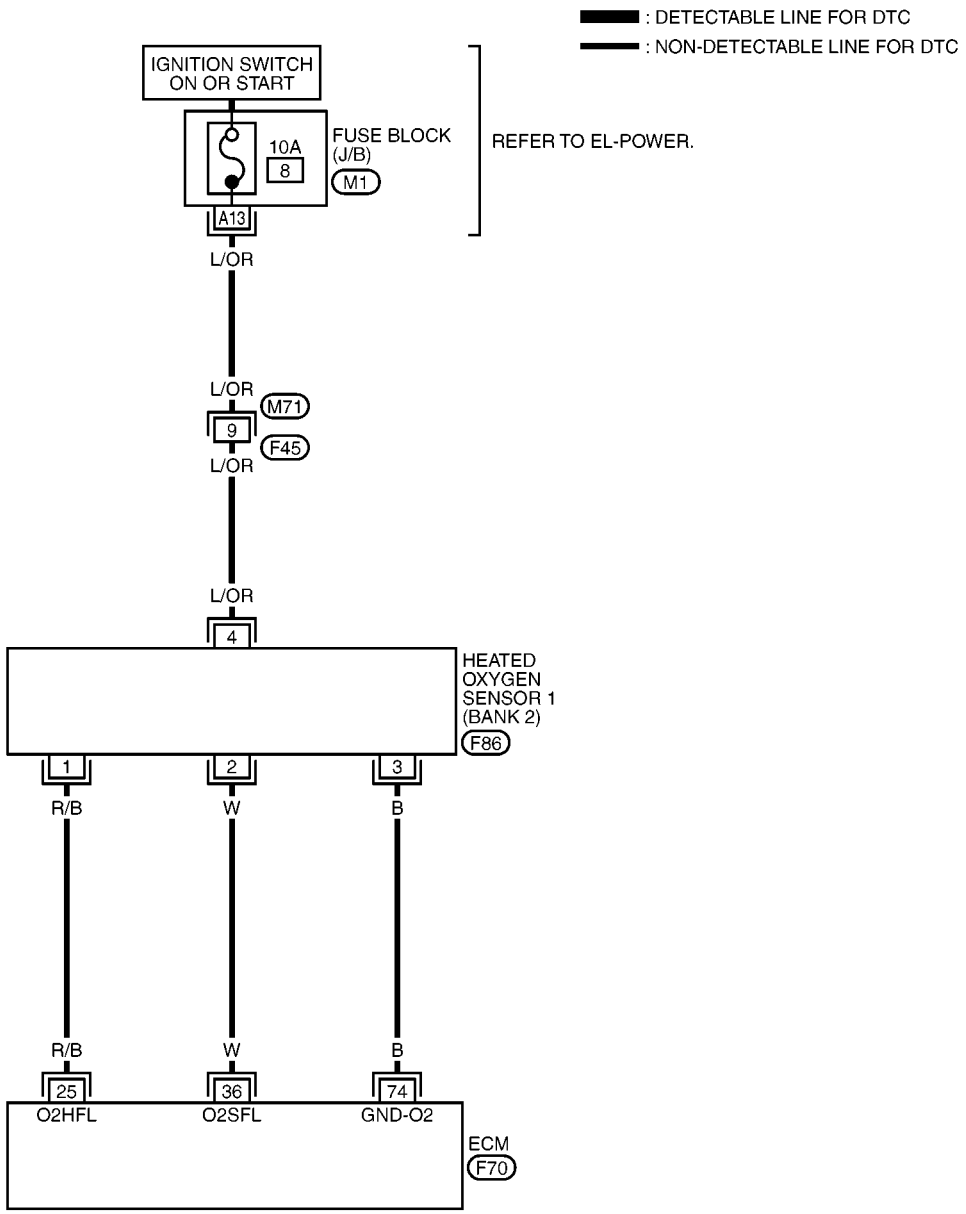
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

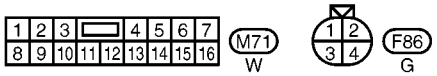
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,200 rpm	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

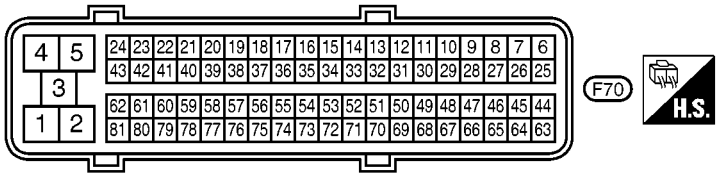
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2

EC-FRO2B2-01







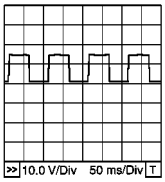
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC484A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	R/B	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,200 rpm.	Approximately 7.0V★  PBIB0519E
			[Ignition switch "ON"] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

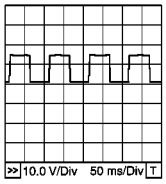
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

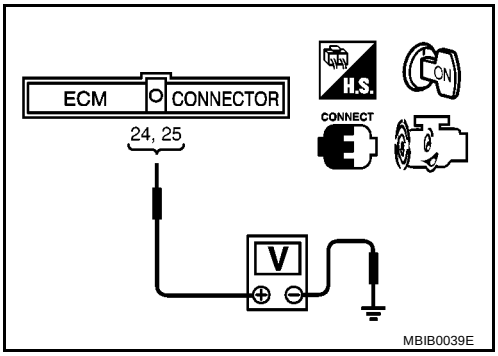
Diagnostic Procedure

EBS00R1M

1. CHECK OVERALL 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 the tester probe between ECM terminal 24 [HO2S1 (B1) heater signal] or 25 [HO2S1 (B2) heater signal] and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.

Conditions	Voltage
At idle	Approximately 7.0V★  PBIB0519E
Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)



MBIB0039E

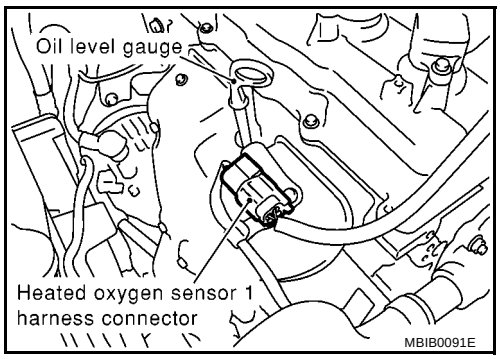
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 2.

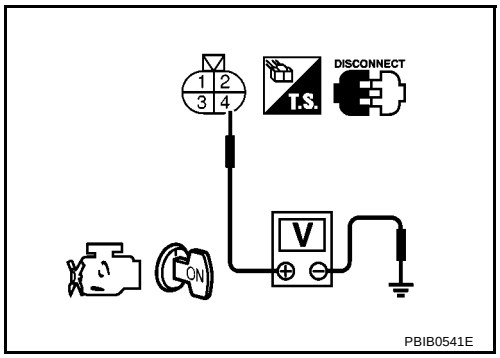
2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair open circuit or short to ground or short to power in 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 harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
24	1	1
25	1	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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-827, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

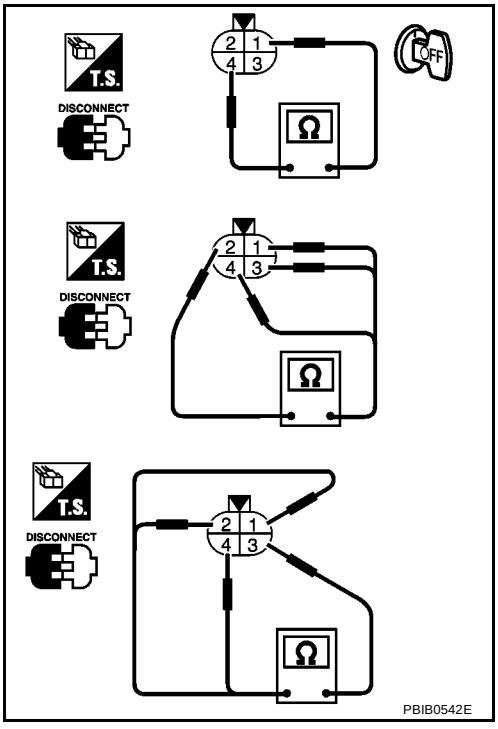
Component Inspection

EBS00R1N

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	8 - 10 Ω at 25°C (77°F)
2 and 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R1O

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

HO2S2 HEATER (M/T MODELS)

PFP:226A0

Description

EBS00R1P

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 3,800	OFF
● Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00R1Q

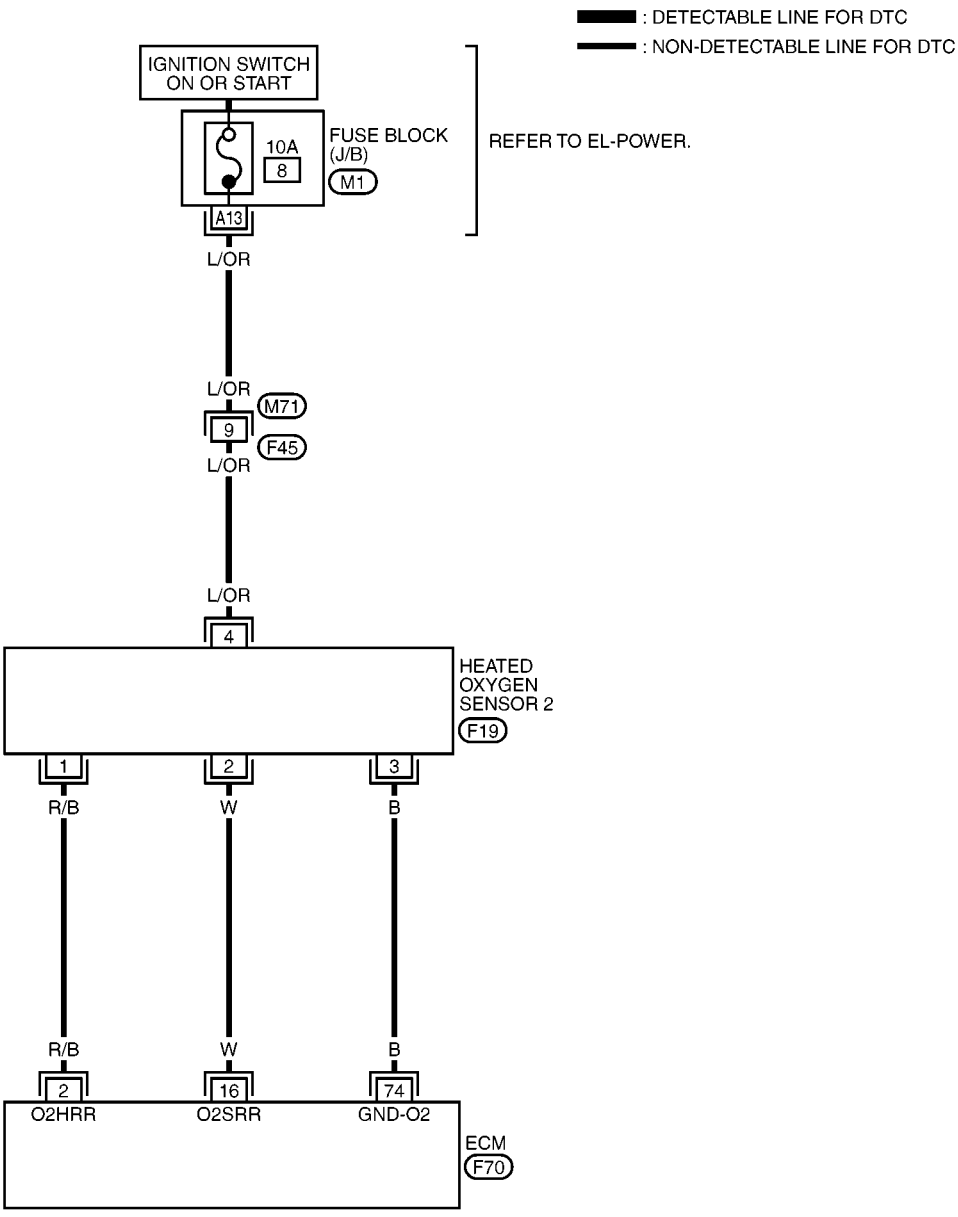
Specification data are reference values.

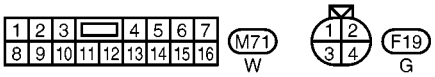
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON
	● Engine speed: Above 3,800 rpm	OFF

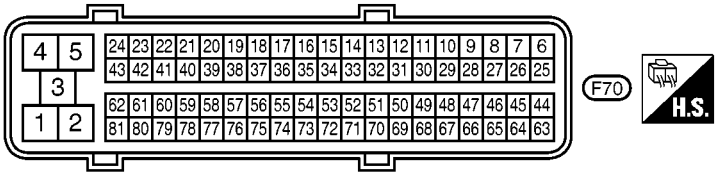
Wiring Diagram

EBS00R1R

EC-RRO2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC485A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed: Below 3,800 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,800 rpm.	BATTERY VOLTAGE (11 - 14V)

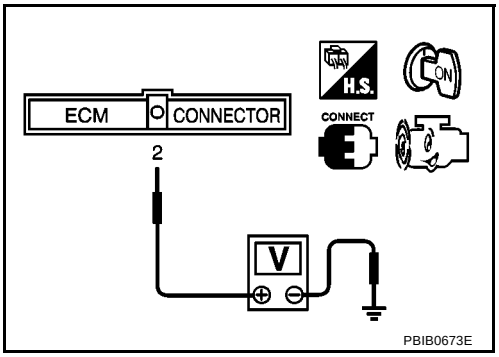
Diagnostic Procedure

EBS00R1S

1. CHECK OVERALL FUNCTION CHECK

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 one minute under no load.
4. Let engine idle for one minute.
5. Set the voltmeter probe between ECM terminal 2 (HO2S2 heater signal) and ground.
6. Check the voltage under the following conditions.

Conditions	Voltage
At idle	0 - 1V
Engine speed is above 3,800 rpm	Battery voltage

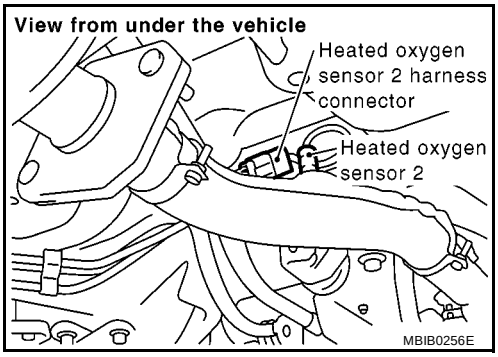


OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 2.

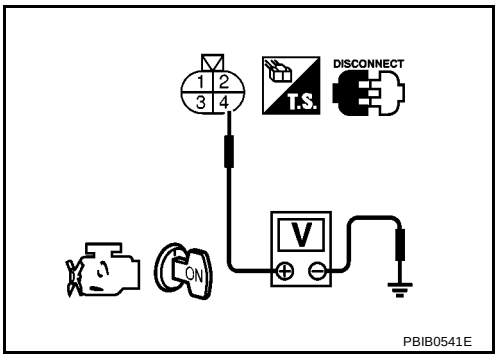
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- 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 harness continuity between ECM terminal 2 and HO2S2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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-832, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

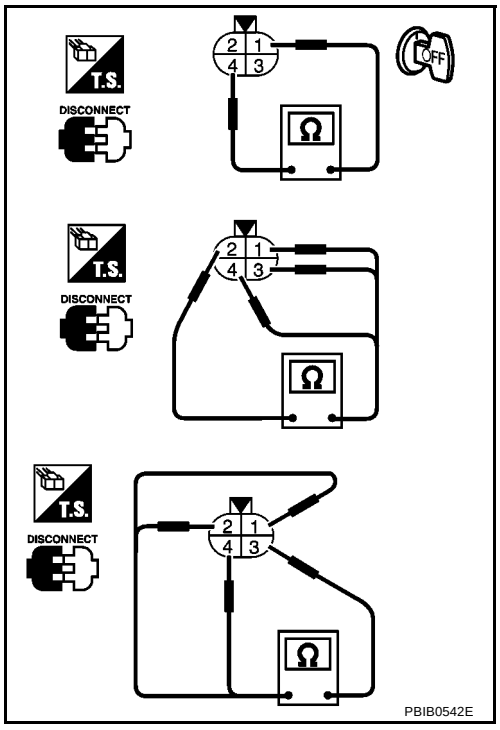
Component Inspection

EBS00R1T

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	5.0 - 7.0 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R1U

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

HO2S2 HEATER (A/T MODELS)

PFP:226A0

Description

EBS00R1V

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 heaters
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 heaters corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heaters
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 one minute and at idle for one minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

EBS00R1W

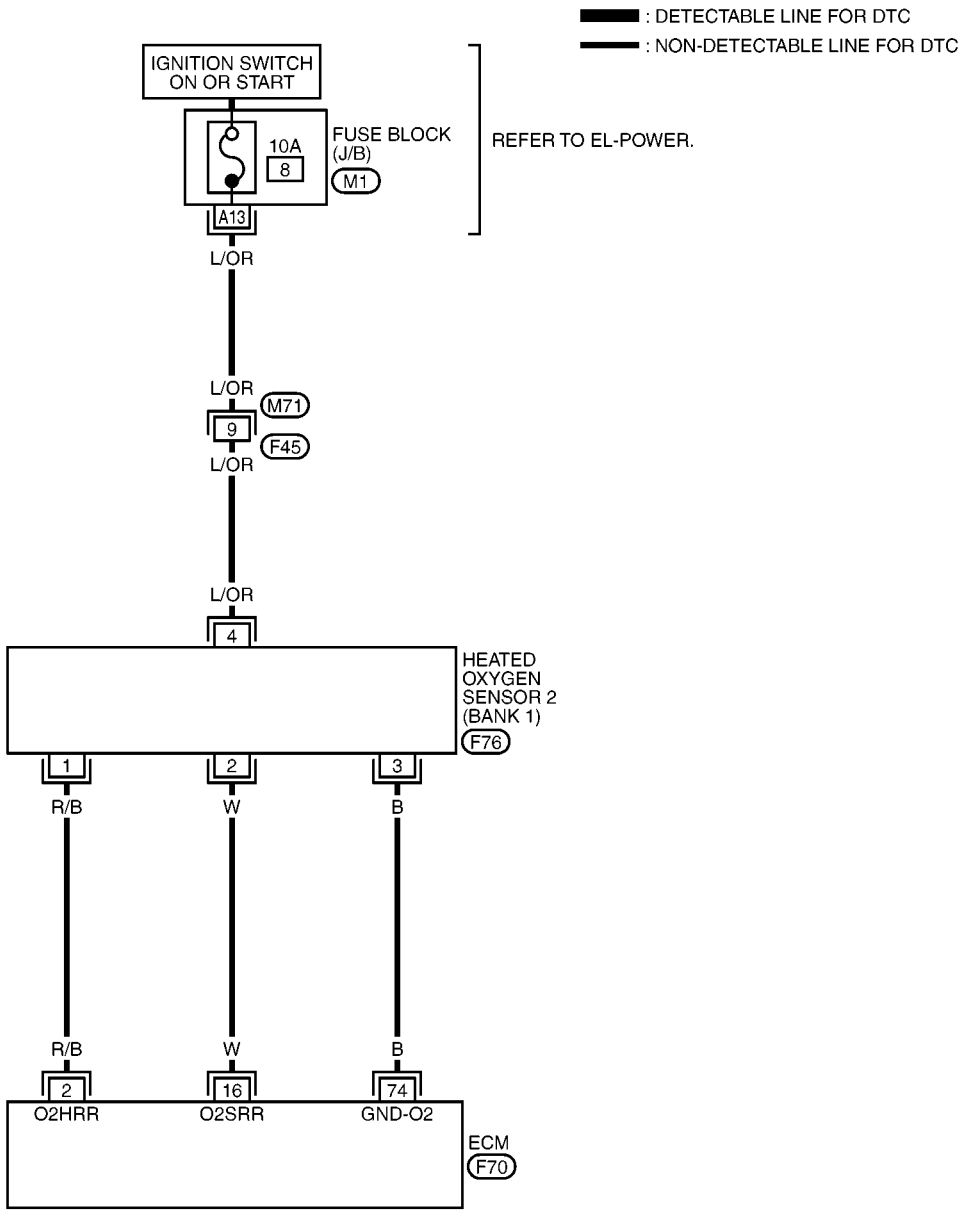
Specification data are reference values.

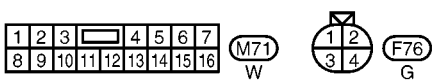
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,600 rpm.	OFF
	● Engine speed: Below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	ON

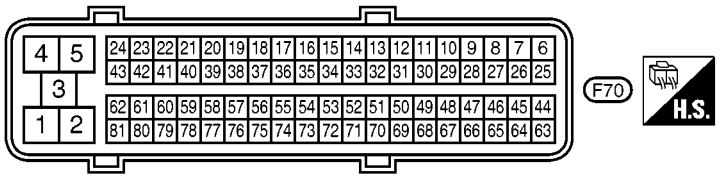
Wiring Diagram
BANK 1

EBS00R1X

EC-RRO2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC486A

Specification data are reference values and are measured between each terminal and ground.

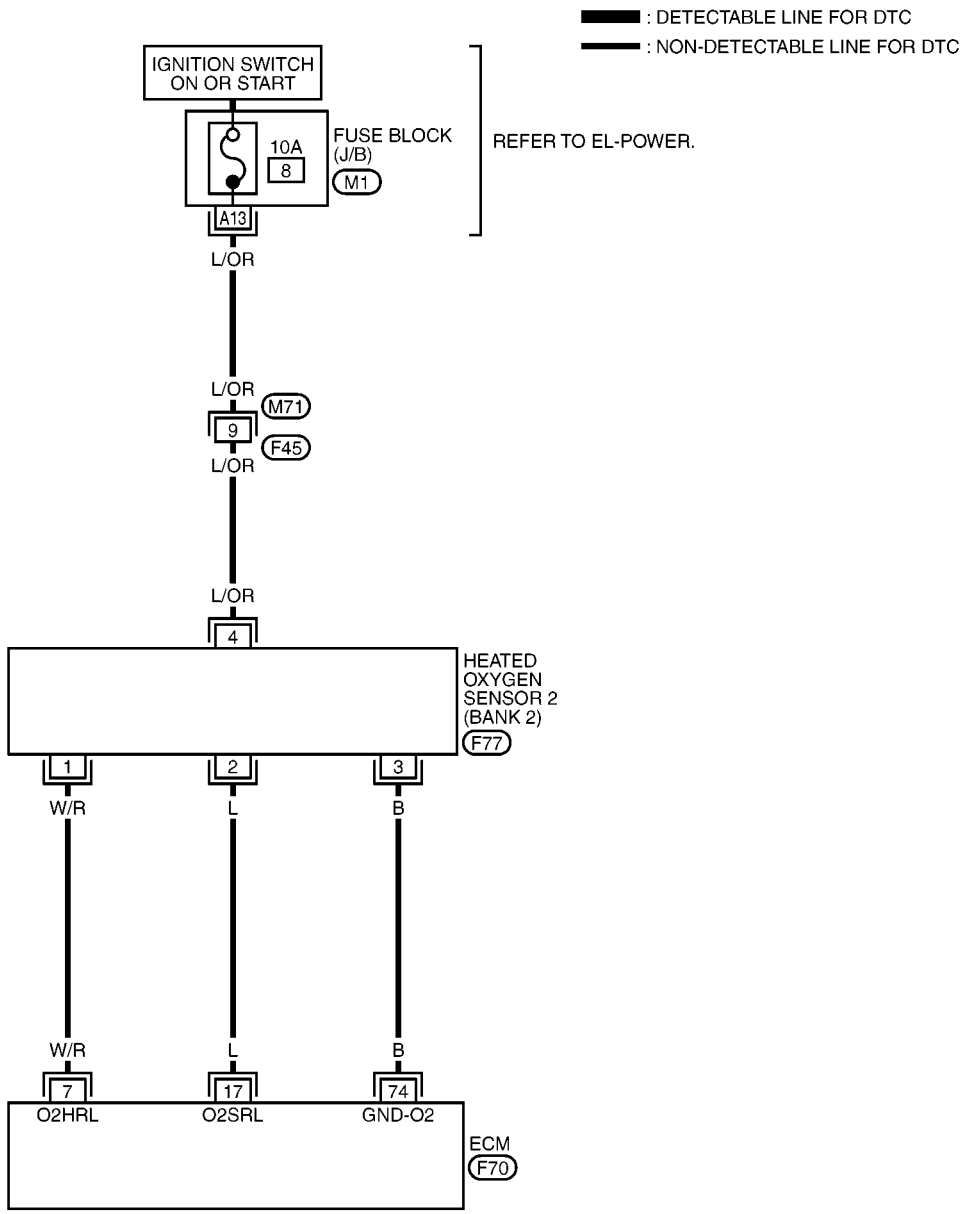
CAUTION:

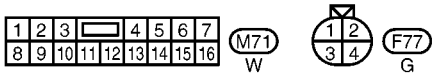
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

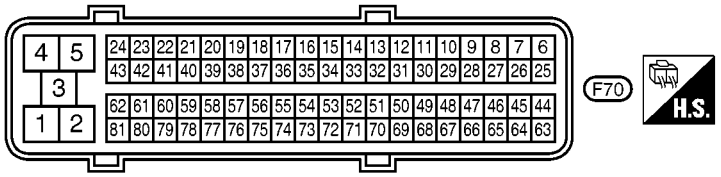
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed: Below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-RRO2B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC487A

Specification data are reference values and are measured between each terminal and body 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	W/R	Heated oxygen sensor 2 heater (bank 2)	**[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 one minute and at idle for one minute under no load	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

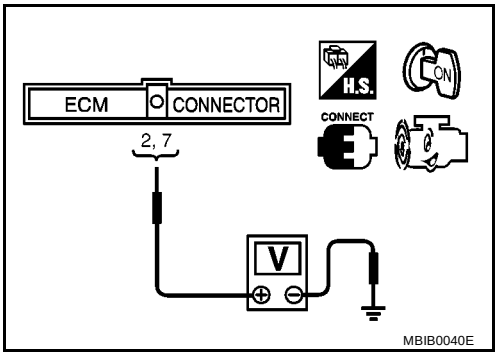
Diagnostic Procedure

EBS00R1Y

1. CHECK OVERALL 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 keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 2 [HO2S2(B1) heater signal] or 7 [HO2S2(B2) heater signal] and ground.
6. Check the voltage under the following conditions.

Conditions	voltage
At idle	0 - 1V
Engine speed is above 3,600 rpm.	Battery voltage

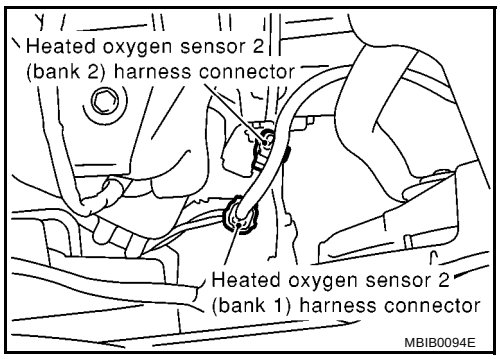


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

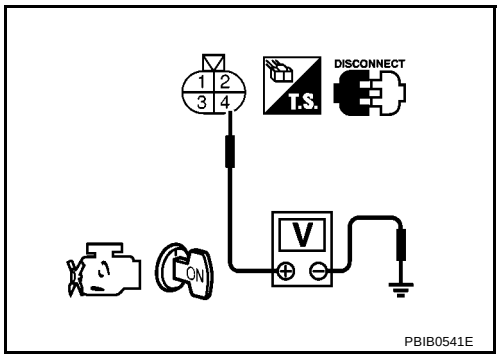
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- 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 harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
7	1	1
2	1	2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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-839, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00R1Z

HEATED OXYGEN SENSOR 2 HEATER

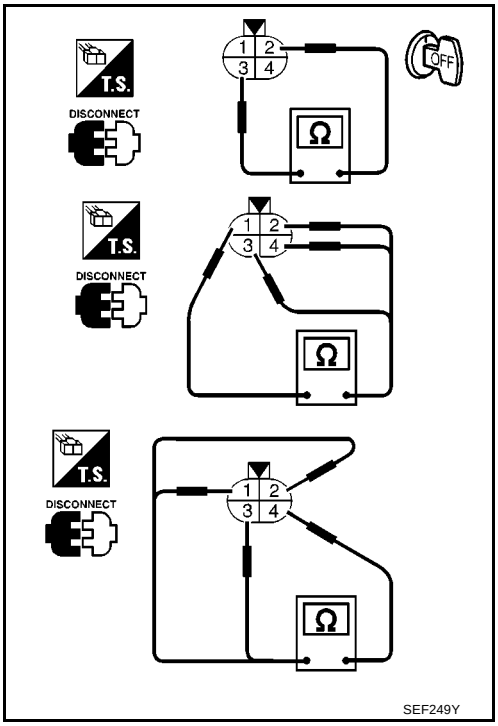
1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	5.0 - 7.0 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	

2. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

EBS00R20

HATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

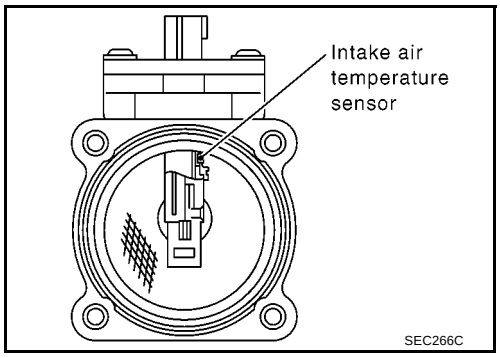
IAT SENSOR

PFP:22630

Component Description

EBS00R21

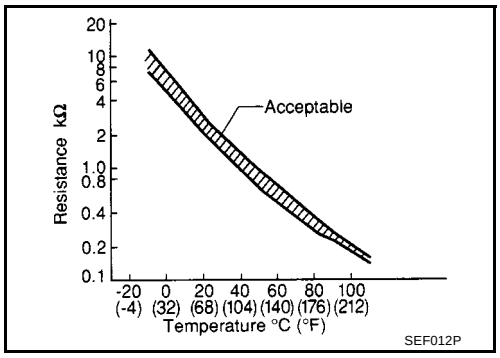
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 34 (Intake air temperature sensor) and body ground.



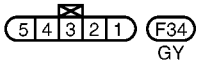
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

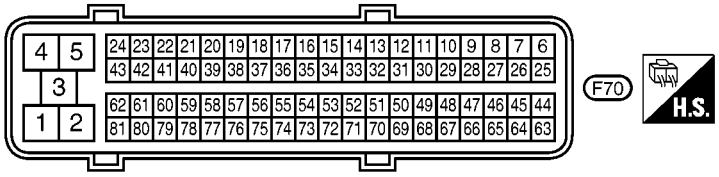
Wiring Diagram

EBS00R22

EC-IATSEN-01







YEC488A

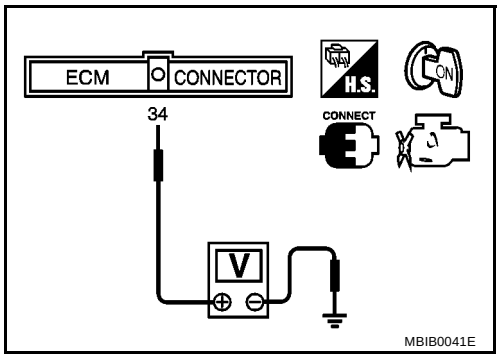
Diagnostic Procedure

EBS00R23

1. CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 34 and ground with CONSULT-II or tester.

Voltage: Approximately 0 - 4.8V

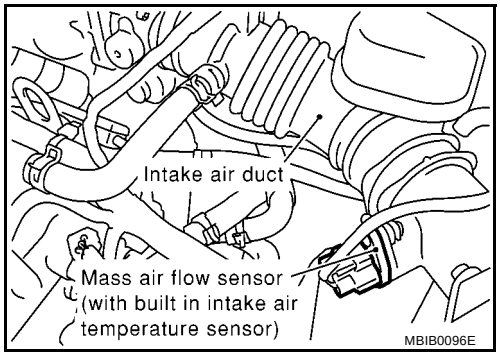


OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 2.

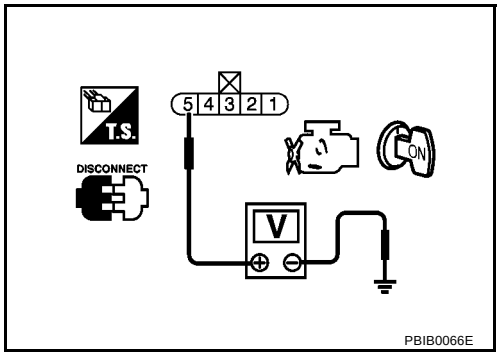
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between mass air flow sensor terminal 5 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 67 and mass air flow sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-843, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

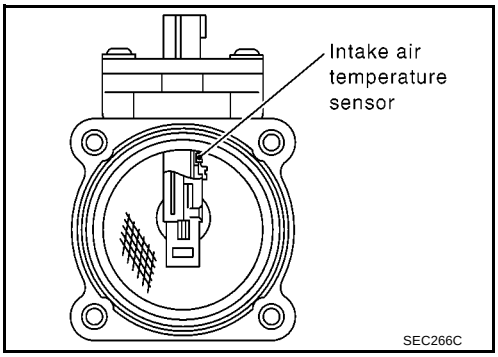
EBS00R24

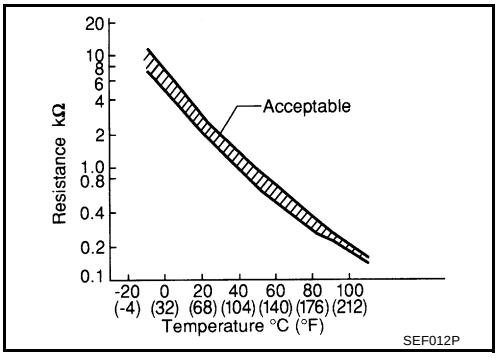
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 3 and 5 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

EBS00R25

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

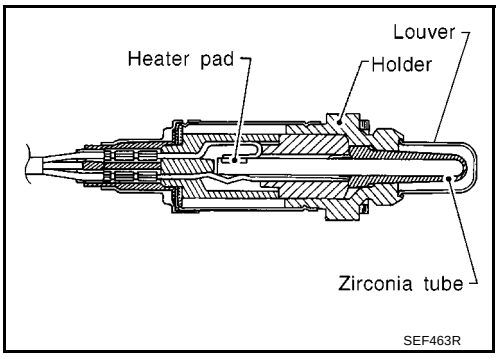
HO2S1 (M/T MODELS)

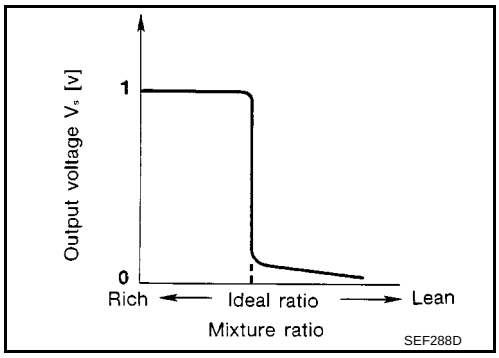
PFP:22690

Component Description

EBS00R26

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00R27

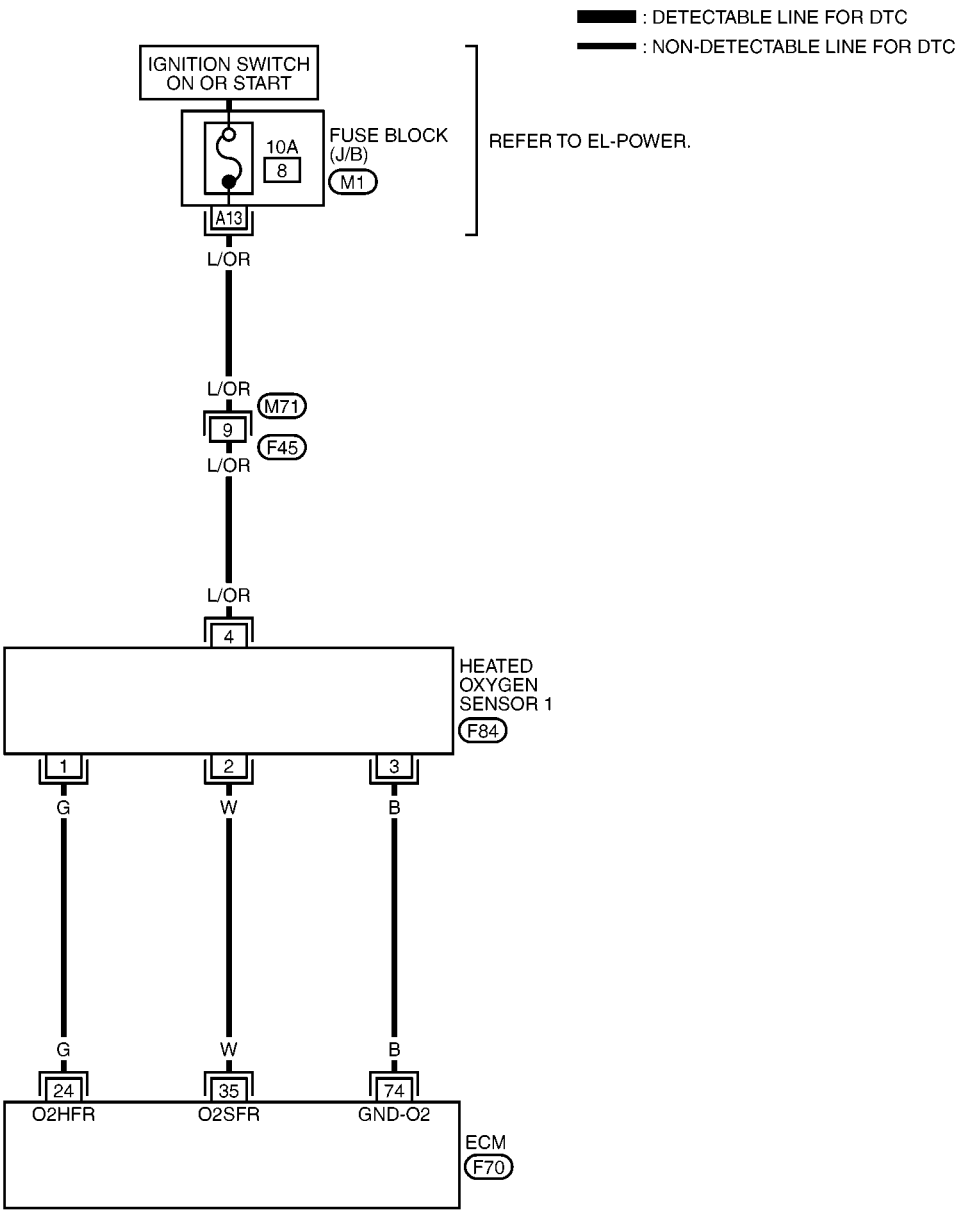
Specification data are reference values.

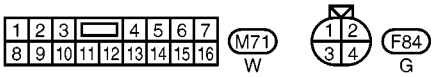
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

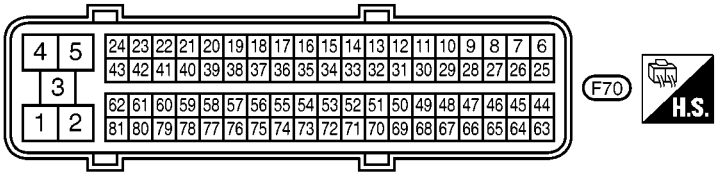
Wiring Diagram

EBS00R28

EC-FRO2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC482A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00R29

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

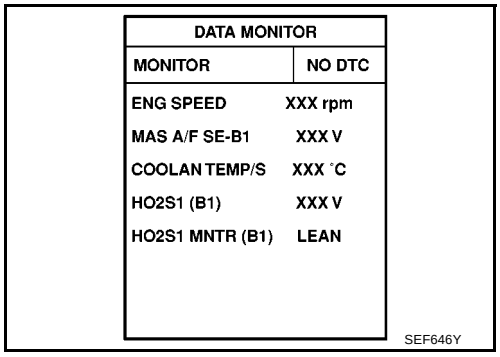
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNTR (B1)” in “DATA MONITOR” mode with CONSULT-II.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuate between LEAN and RICH more than five times in 10 seconds.

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



OK or NG

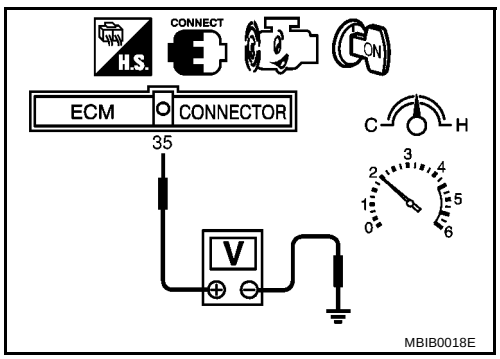
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times in 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



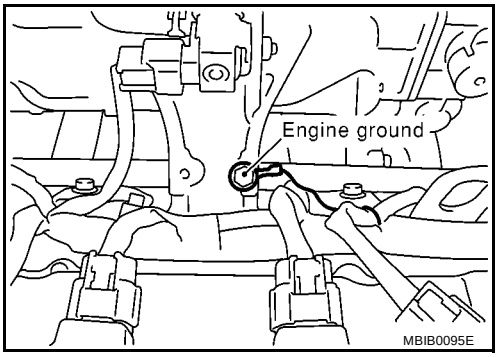
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 5.

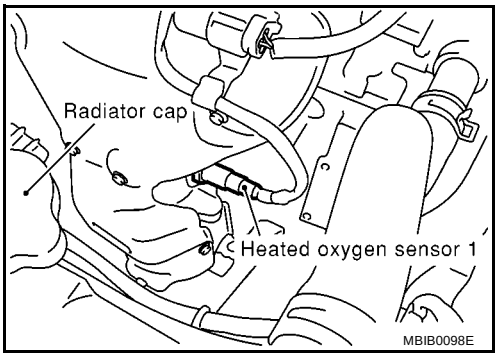


5. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

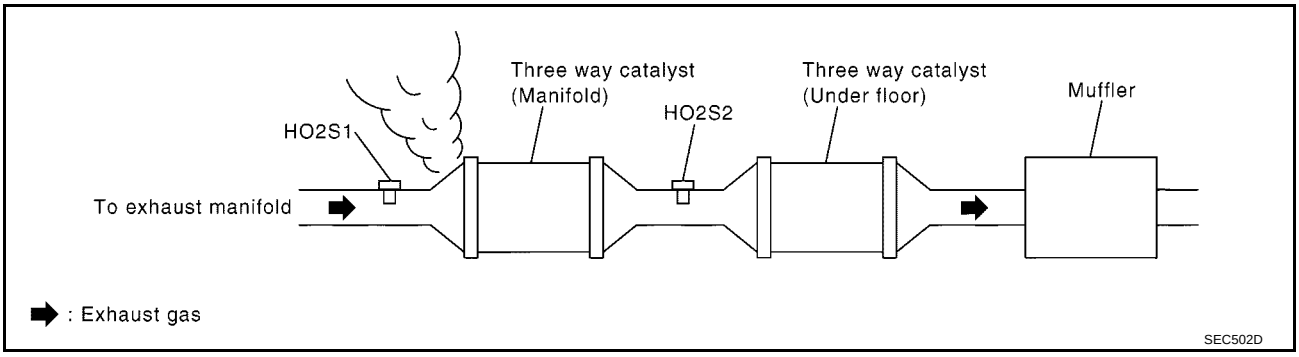
Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 6.



6. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

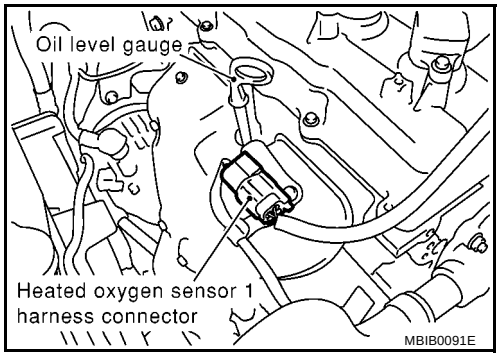
1. Turn ignition switch “OFF”.
2. Disconnect HO2S1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



9. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-820, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-659, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK PCV VALVE

Refer to EC-934, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace PCV valve.

13. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-849, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00R2A

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

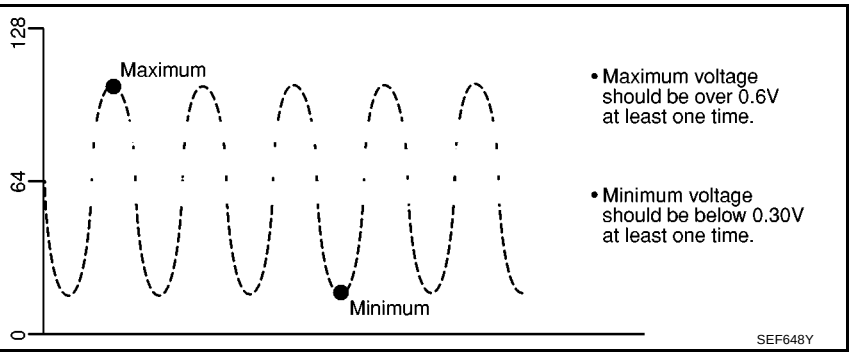
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least 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 means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



CAUTION:

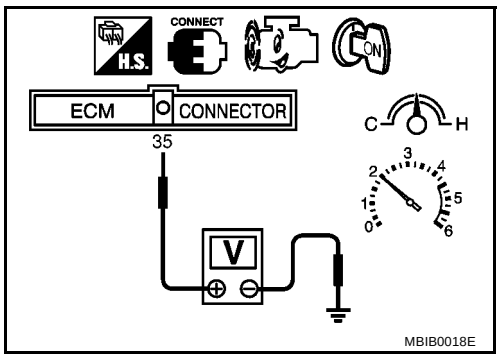
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and engine ground.

3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R2B

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

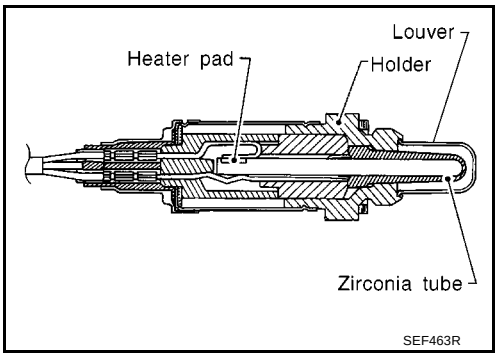
HO2S1 (A/T MODELS)

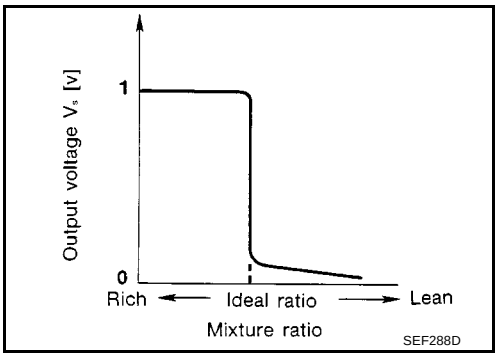
PFP:22690

Component Description

EBS00R2C

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS00R2D

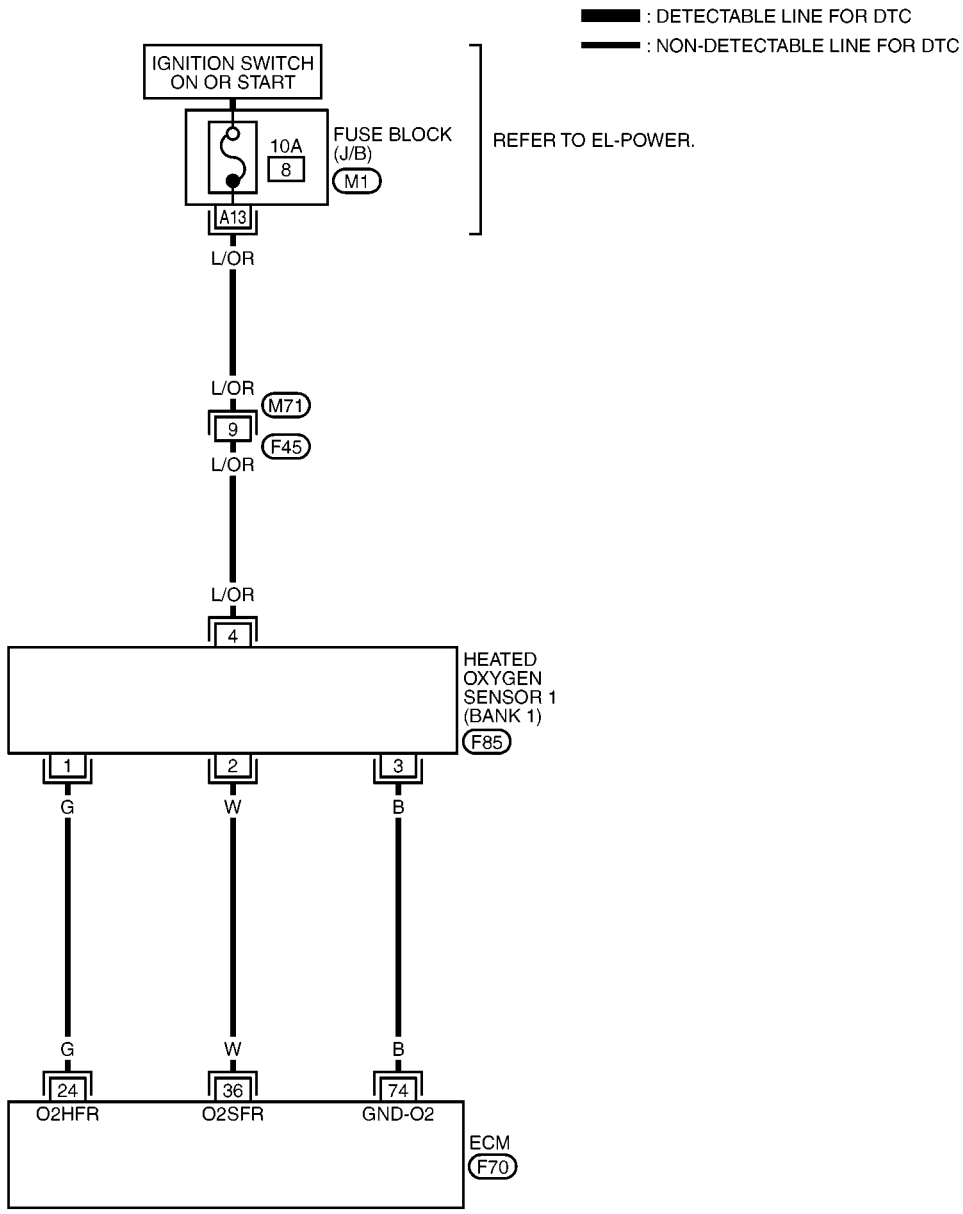
Specification data are reference values.

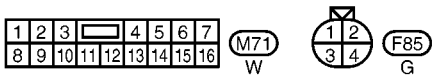
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

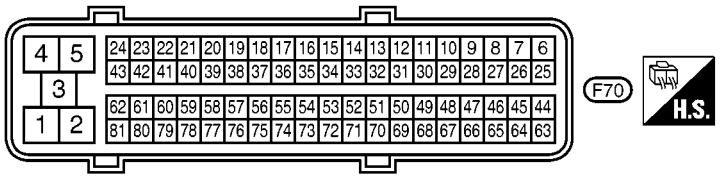
Wiring Diagram
BANK 1

EBS00R2E

EC-FRO2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC483A

Specification data are reference values and are measured between each terminal and ground.

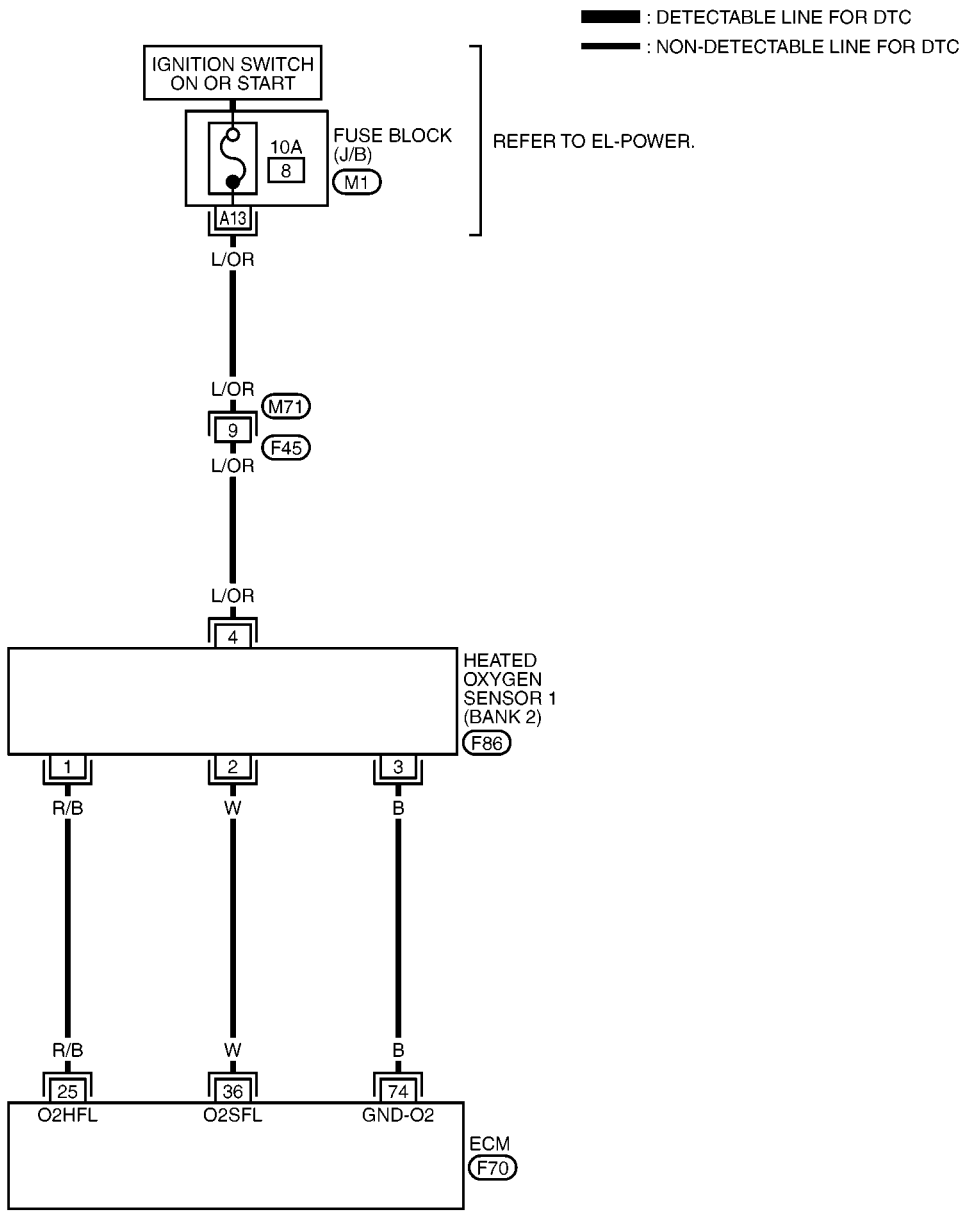
CAUTION:

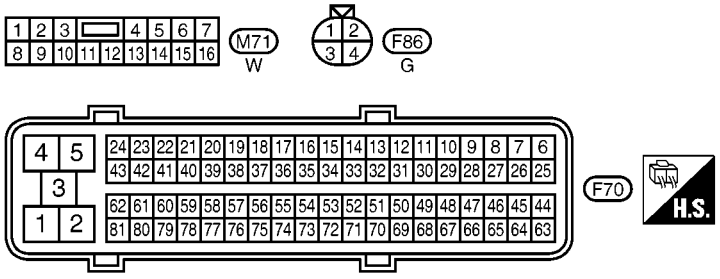
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-FRO2B2-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC484A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

EBS00R2F

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

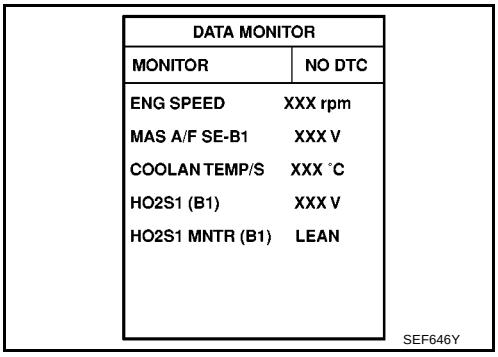
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNTR (B1)” and“HO2S1 MNTR (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuate between LEAN and RICH more than five times in 10 seconds.

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



OK or NG

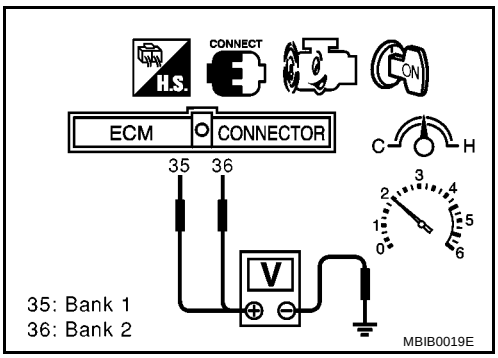
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1(B1) signal] or 36 [HO2S1(B2) signal] and engine ground.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times in 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



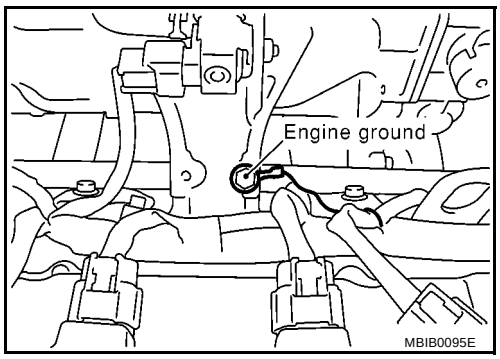
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 5.

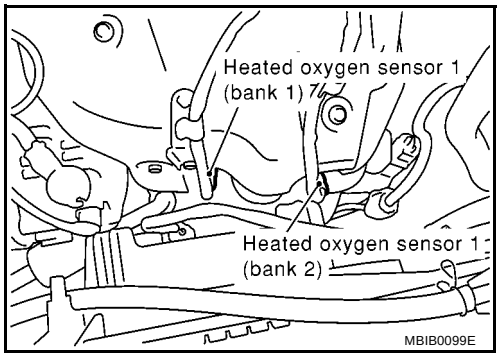


5. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

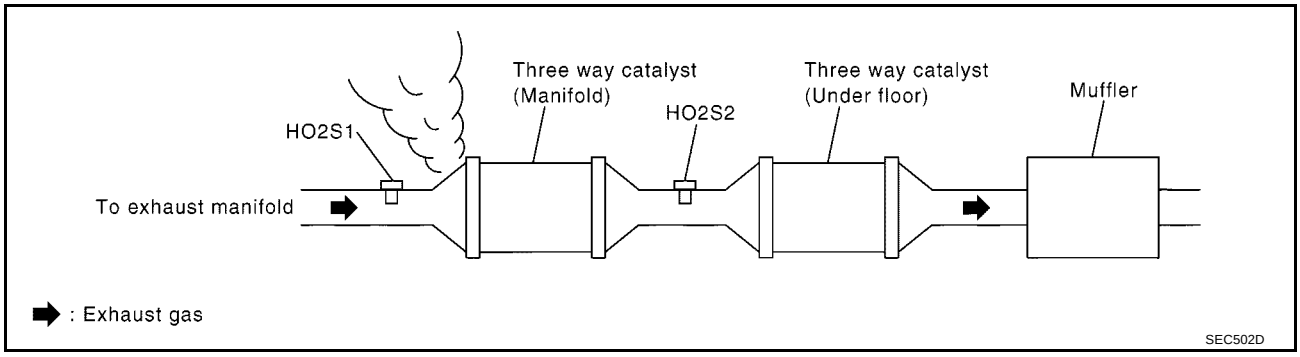
Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 6.



6. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

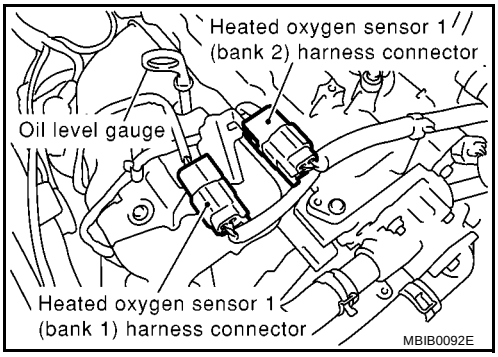
1. Turn ignition switch “OFF”.
2. Disconnect HO2S1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



9. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
35	2	1
36	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
35	2	1
36	2	2

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-827, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-659, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK PCV VALVE

Refer to EC-934, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace PCV valve.

13. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-858, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

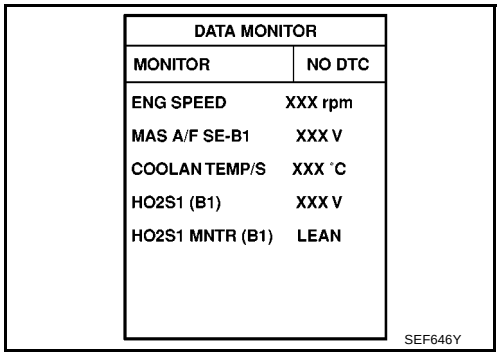
Component Inspection

EBS00R2G

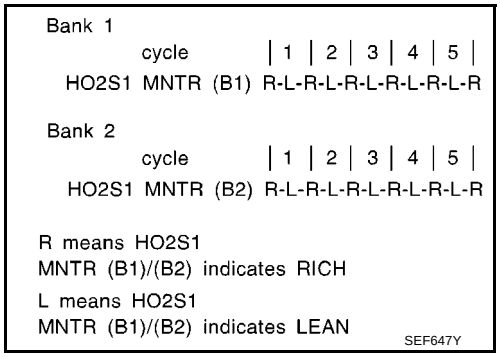
HEATED OXYGEN SENSOR 1

With CONSULT-II

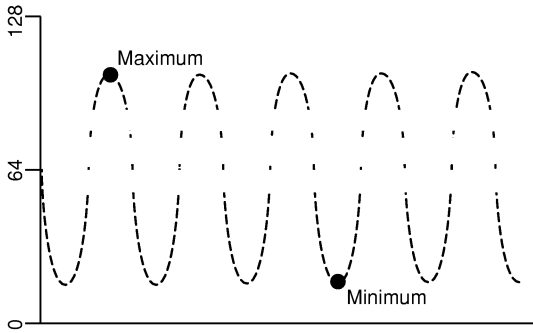
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)/(B2)” 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 at right.
   - “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

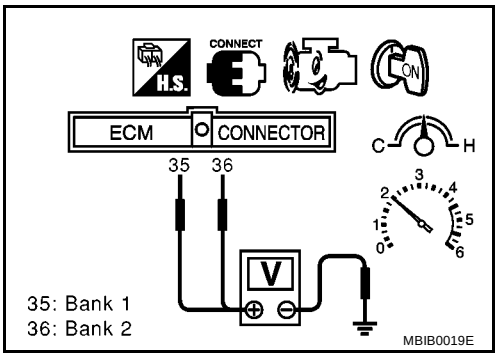
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] or 36 [HO2S1 (B2) signal] and engine ground.
3. Check the following with 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 one time.
   - The minimum voltage is below 0.3V at least one 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



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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R2H

HEATED OXYGEN SENSOR 1

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

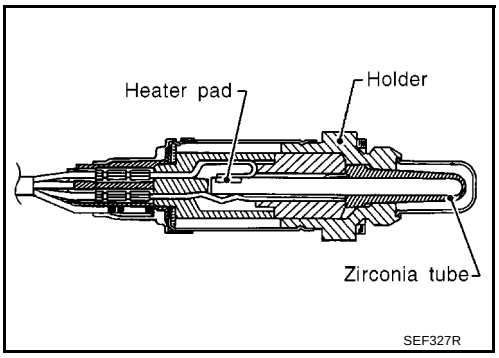
HO2S2 (M/T MODELS)

PFP:226A0

Component Description

EBS00R2I

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R2J

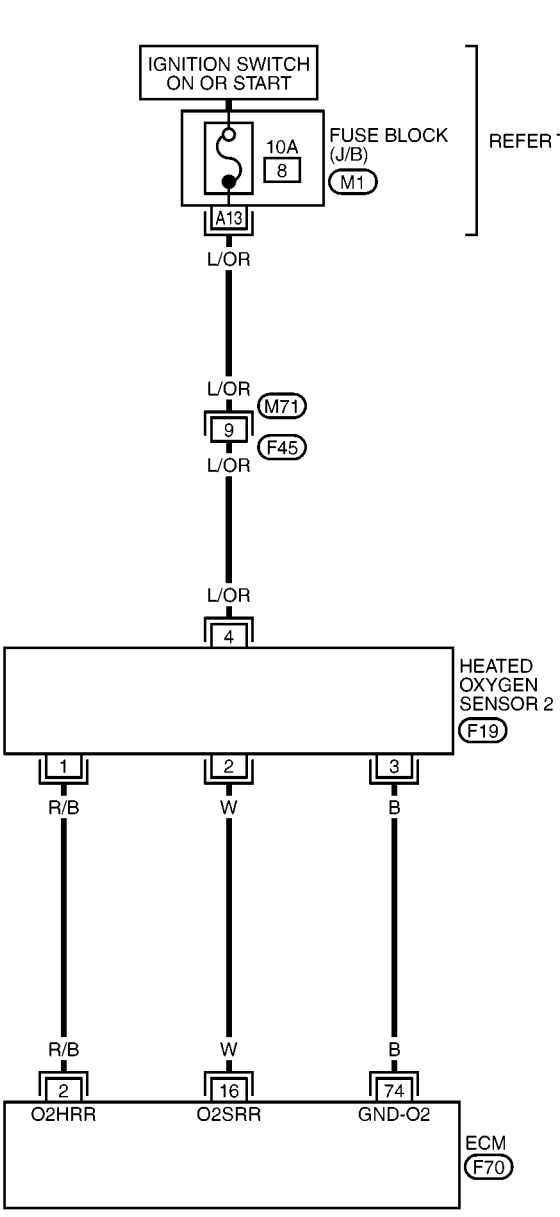
Specification data are reference values.

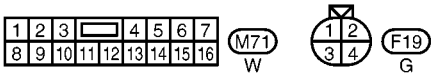
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load		LEAN ←→ RICH

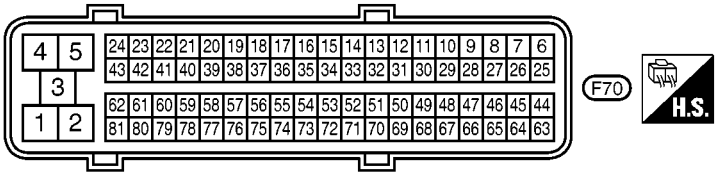
Wiring Diagram

EBS00R2K

EC-RRO2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC485A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

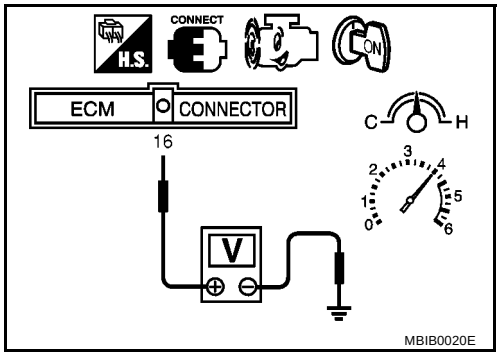
Diagnostic Procedure

EBS00R2L

1. CHECK OVERALL FUNCTION-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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage while revving up to 4,000 rpm under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)

The voltage does not remain in the range of 0.2 to 0.4V



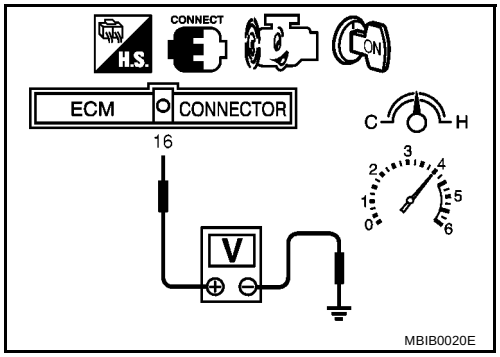
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK OVERALL FUNCTION-II

Keep engine at idle for 10 minutes, then check the voltage between ECM terminal 16 and ground, or check voltage when coasting 80 km/h (50 MPH) in 3rd gear position.

The voltage does not remain in the range of 0.2 to 0.4V



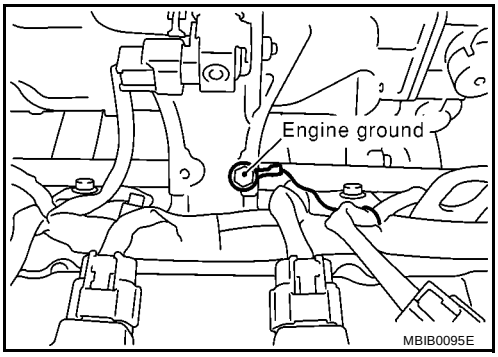
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

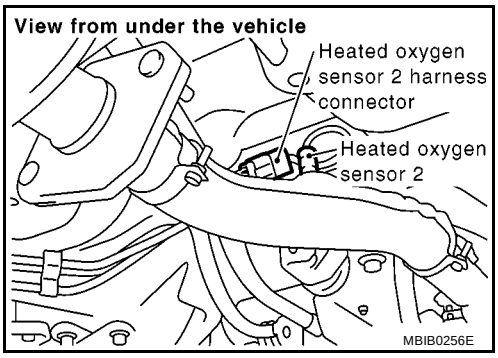
1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal 16 and HO2S2 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-864, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00R2M

HEATED OXYGEN SENSOR 2

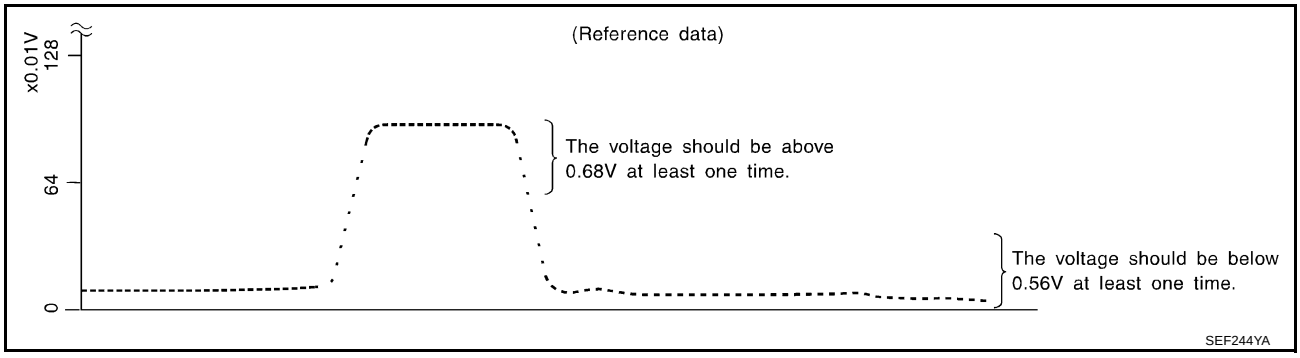
With CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



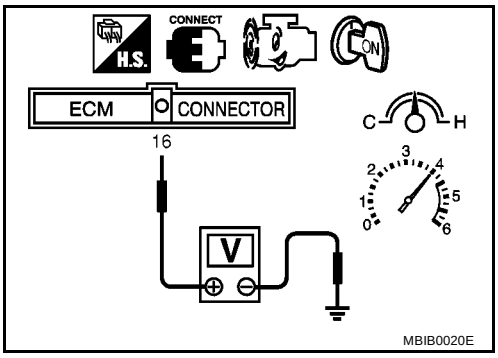
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.56V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R2N

HEATED OXYGEN SENSOR 2

Refer to “EXHAUST SYSTEM”, FE-11.

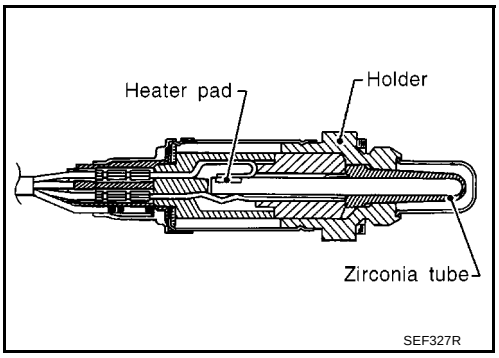
HO2S2 (A/T MODELS)

PFP:226A0

Component Description

EBS00R2O

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R2P

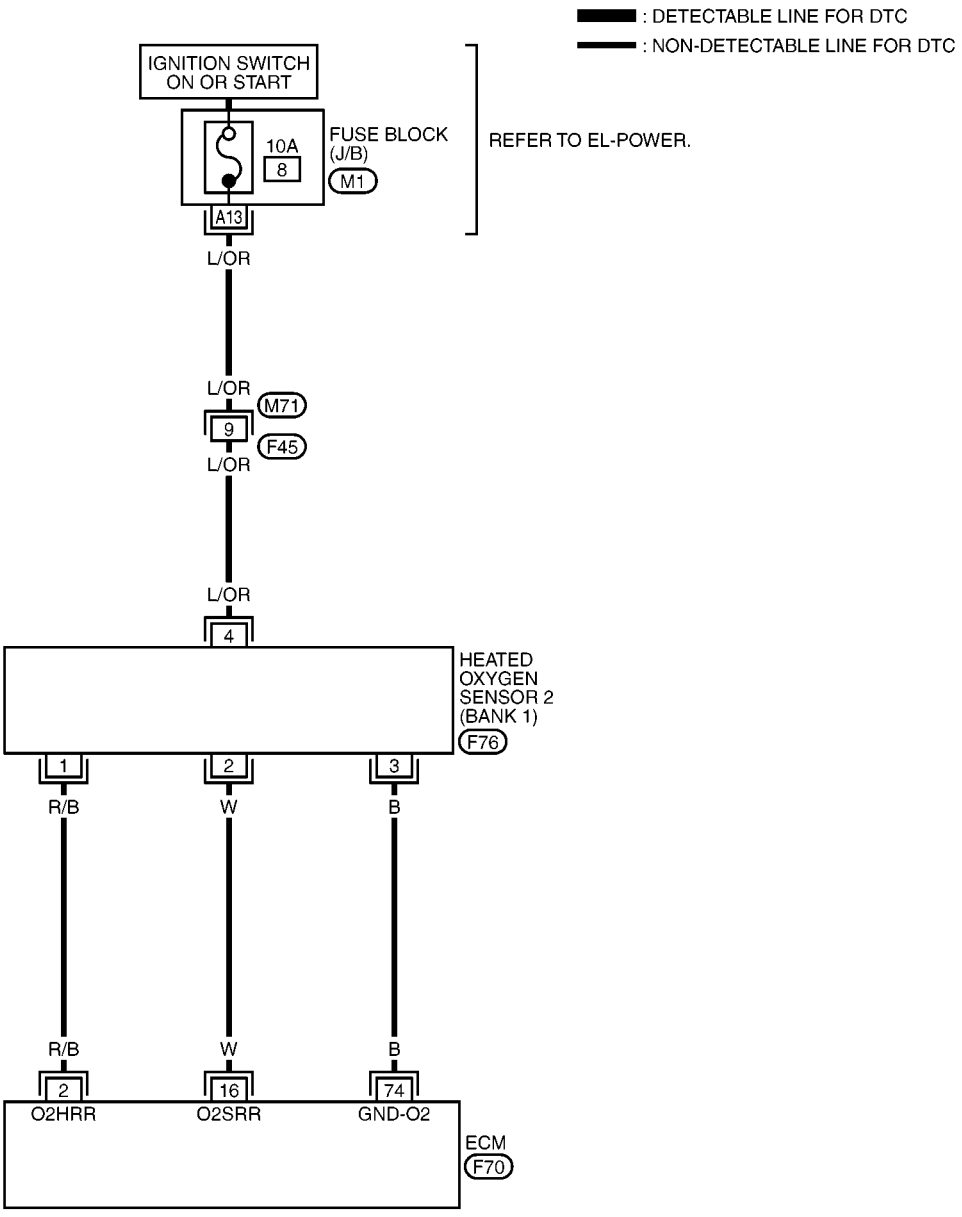
Specification data are reference values.

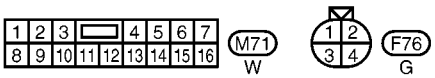
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up ● Keeping the engine speed at between 3,500 to 4,000 rpm for one minute and at idle for one minute under no load	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

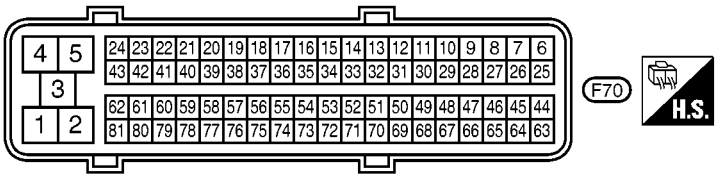
Wiring Diagram
BANK 1

EBS00R2Q

EC-RRO2B1-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC486A

Specification data are reference values and are measured between each terminal and body ground.

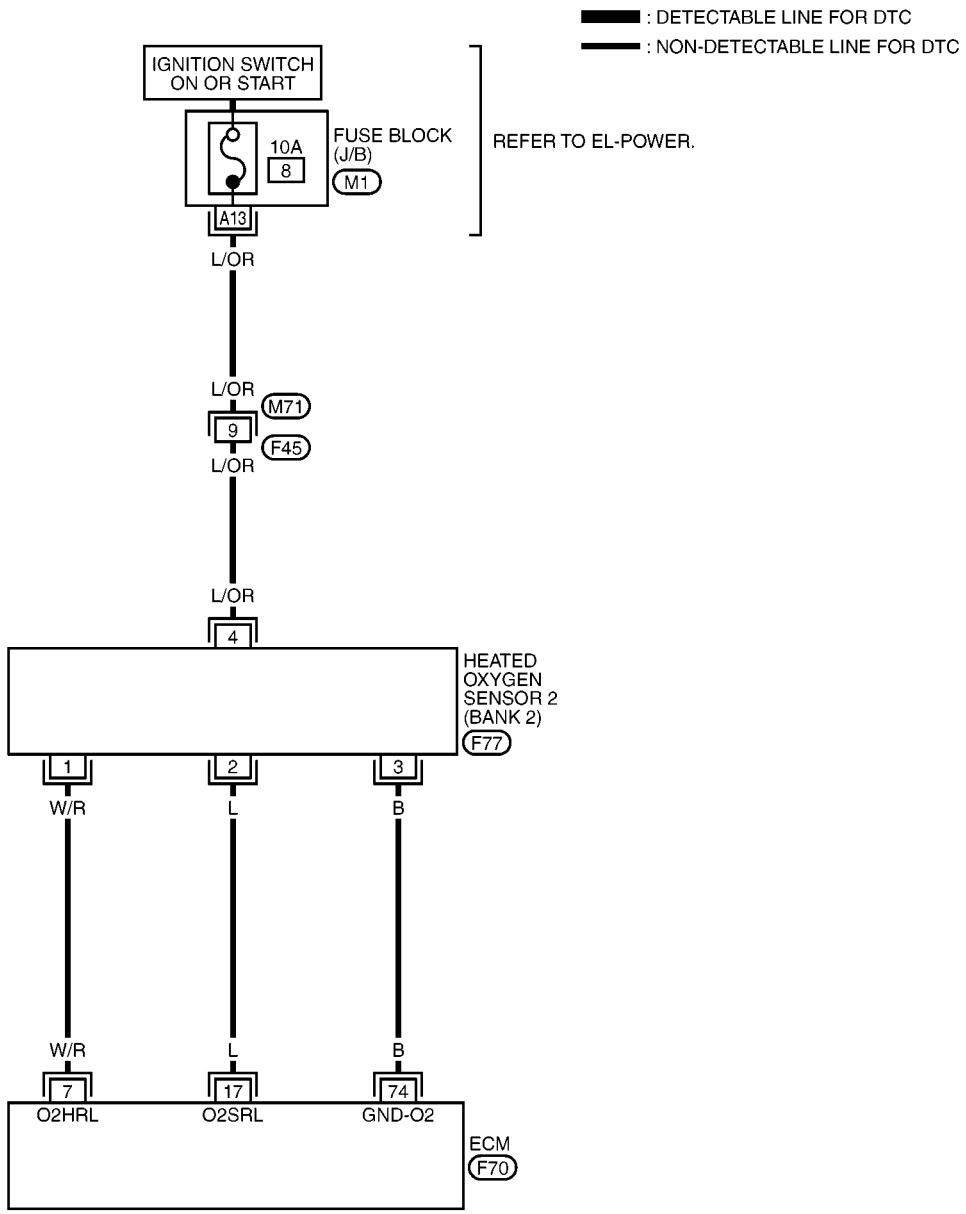
CAUTION:

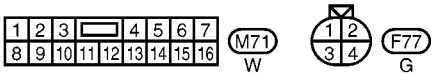
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

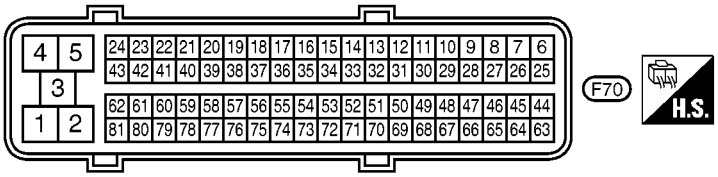
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

BANK 2

EC-RRO2B2-01







REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC487A

Specification data are reference values and are measured between each terminal and body 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.	0 - Approximately 1.0V
74	B	Sensors' ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

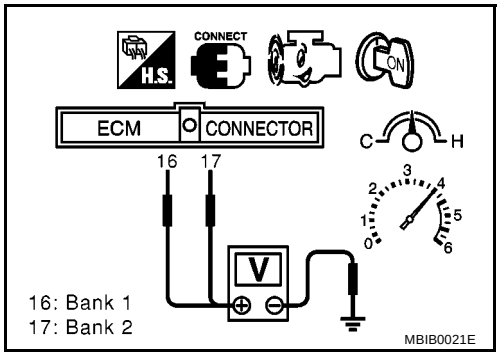
Diagnostic Procedure

EBS00R2R

1. CHECK OVERALL FUNCTION - 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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and ground.
6. Check the voltage while revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release the accelerator pedal as quickly as possible.)

The voltage does not remain in the range of 0.2 to 0.4V



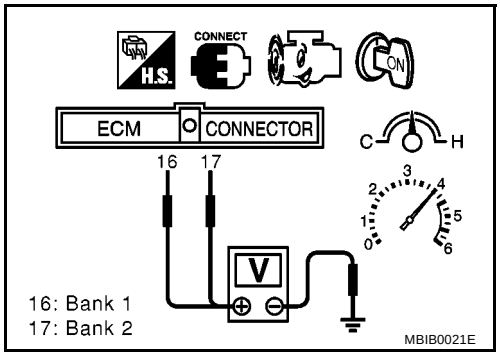
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK OVERALL FUNCTION - II

Keep engine at idle for 10 minutes, then check the voltage between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and ground, or check the voltage when coasting at 80 km/h (50 MPH) in “D” position with OD “OFF”.

The voltage does not remain in the range of 0.2 to 0.4V



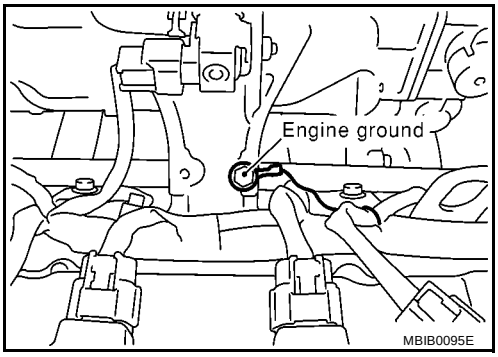
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. RETIGHTEN GROUND SCREWS

1. Stop vehicle and turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

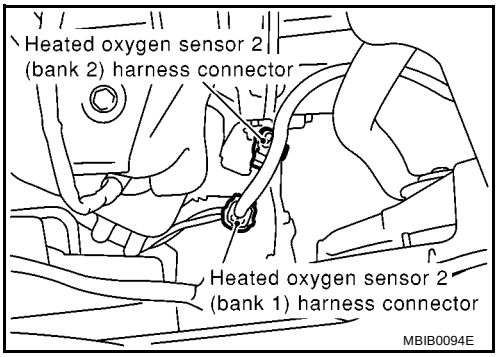
1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
16	2	1
17	2	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
16	2	1
17	2	2

Continuity should not exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-872, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS00R2S

HEATED OXYGEN SENSOR 2

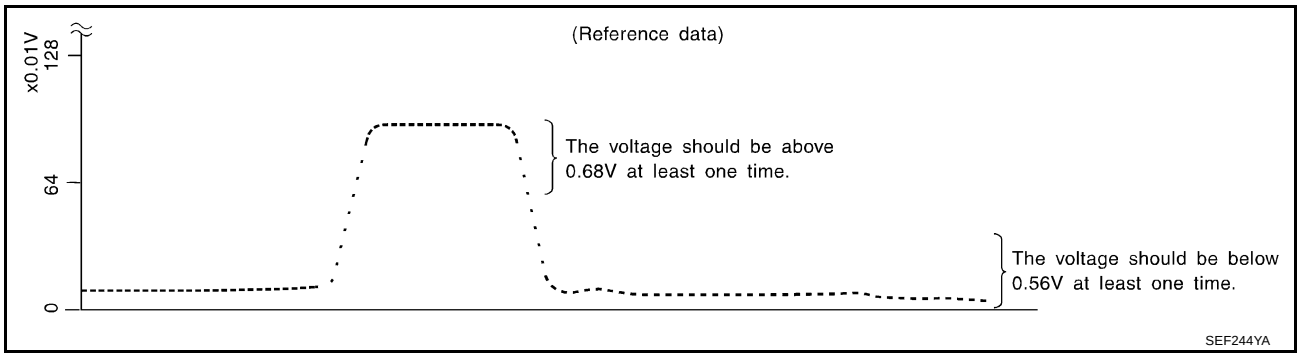
With CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.56V at least once when the “FUEL INJECTION” is –25%.

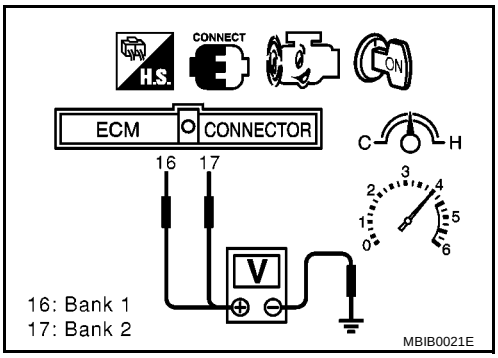
CAUTION:

- **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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

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 one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminal 16 [HO2S2 (B1) signal] or 17 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.
   The voltage should be below 0.56V at least once during this procedure.
8. If NG, 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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

EBS00R2T

HEATED OXYGEN SENSOR 2

Refer to EM-21, "EXHAUST MANIFOLD AND CATALYTIC CONVERTER" .

IGNITION SIGNAL

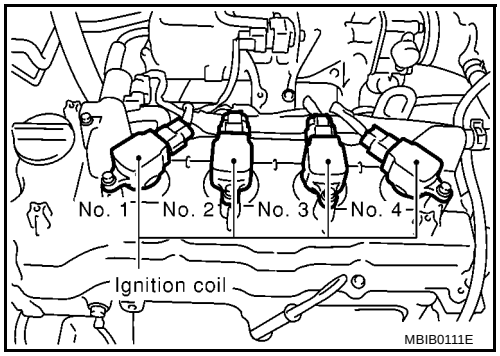
PFP:22448

Component Description

EBS00R2U

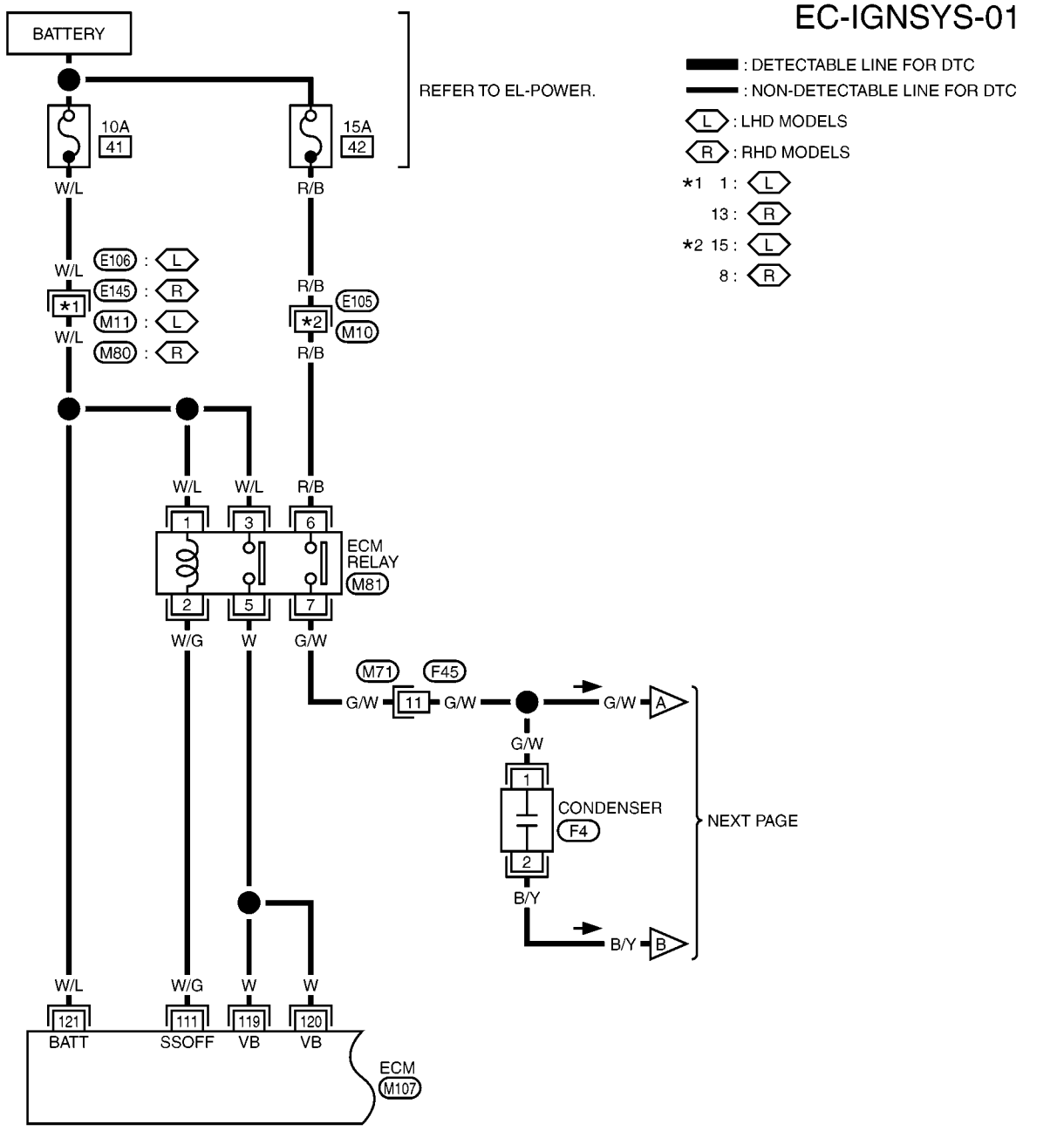
IGNITION COIL & POWER TRANSISTOR

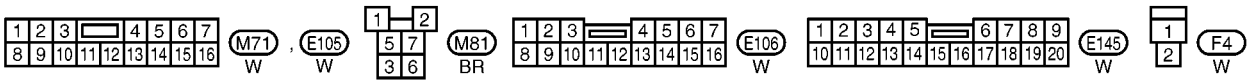
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

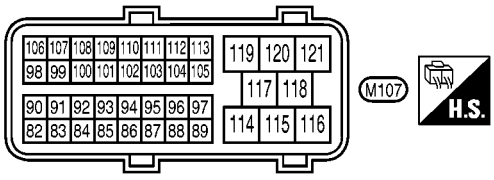


Wiring Diagram

EBS00R2V







YEC472A

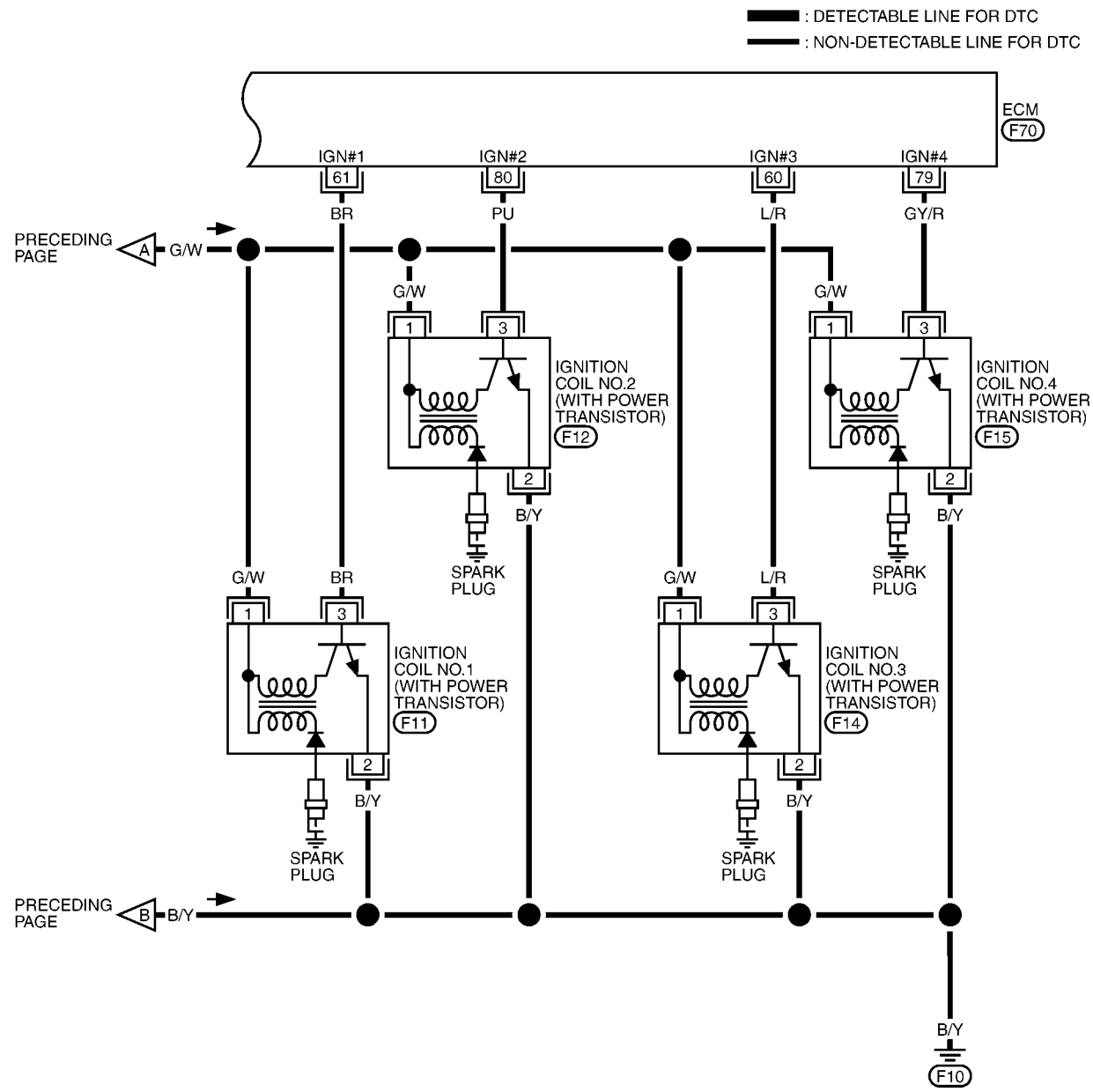
Specification data are reference values and are measured between each terminal and ground.

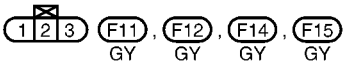
CAUTION:

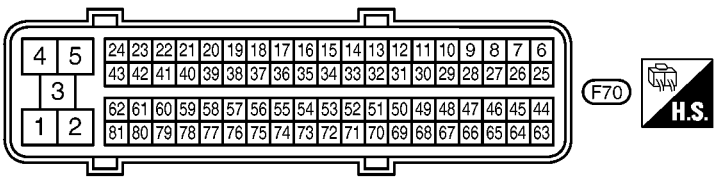
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.0V
			[Ignition switch "OFF"] ● More than a few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
119 120	W W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02





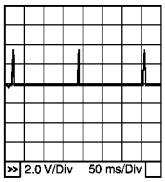
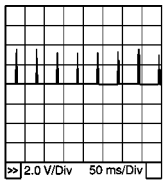


YEC473A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00R2W

1. CHECK ENGINE START

Turn ignition switch “OFF”, and restart engine.

Is engine running?

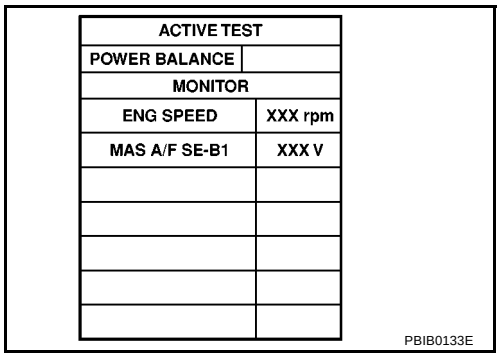
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.



PBIB0133E

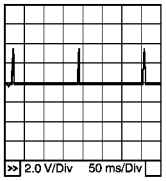
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

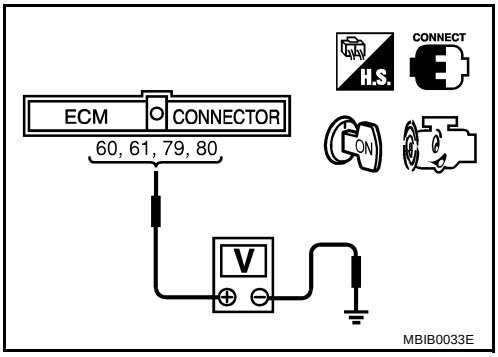
3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.



PBIB0521E



MBIB0033E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

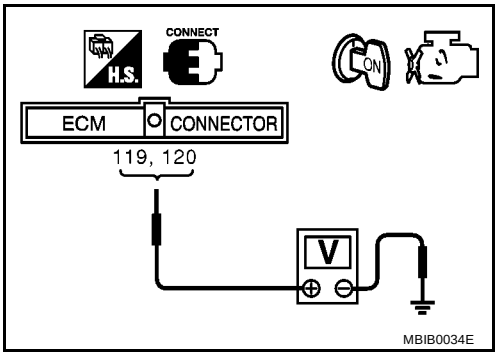
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> Go to EC-645, "POWER SUPPLY CIRCUIT FOR ECM"
.



MBIB0034E

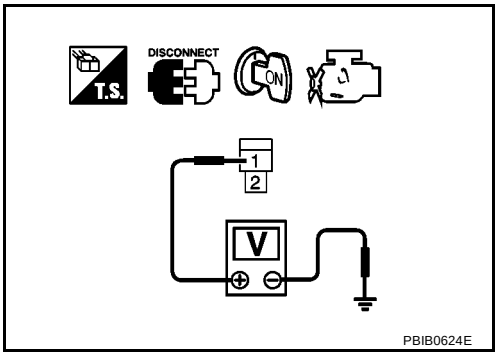
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.



PBIB0624E

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

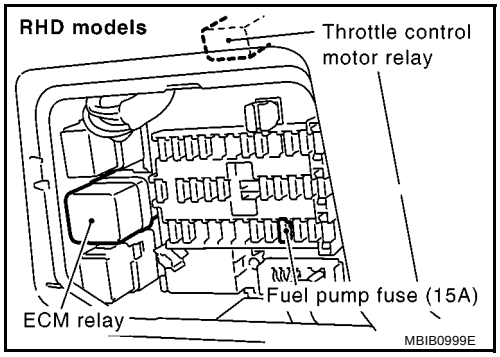
1. Turn ignition switch “OFF”.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between condenser and ECM relay

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

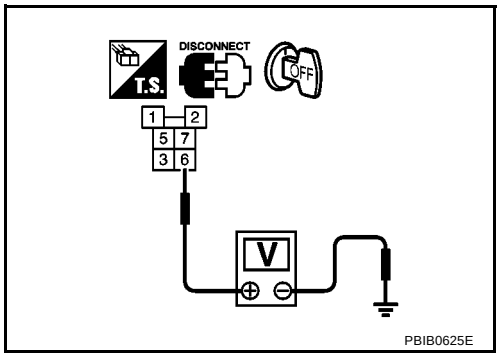
8. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- 15A fuse
- Harness for open or short between ECM relay and battery

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

10. CHECK ECM RELAY

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

11. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to power in harness or connector.

12. CHECK CONDENSER

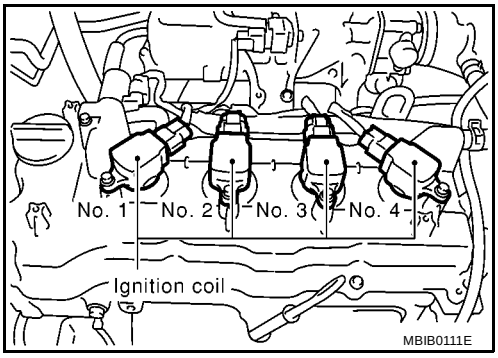
Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace condenser.

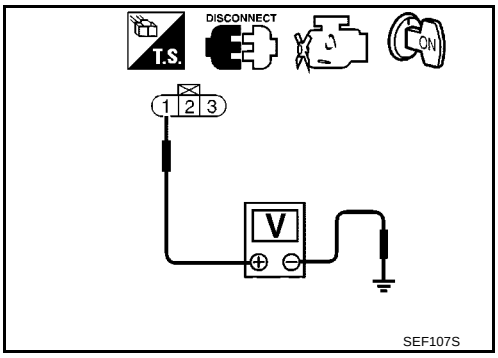
13. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch “OFF”.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between ignition coil and ECM relay

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

15. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ignition coil terminal 2 and engine ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to power in harness or connectors.

16. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-882, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ignition coil with power transistor.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

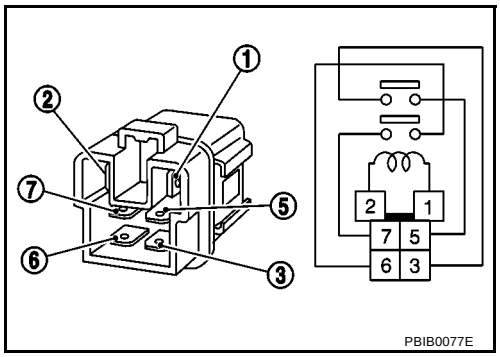
EBS00R2X

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

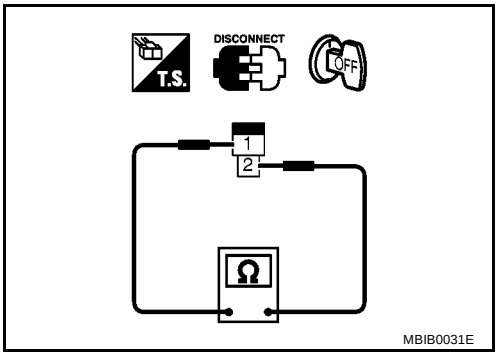
3. If NG, replace ECM relay.



CONDENSER

1. Turn ignition switch “OFF”.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

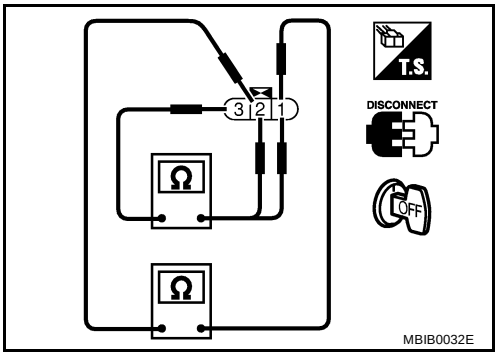
Resistance: Above 1 MΩ at 25°C (77°F)



IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
3 and 1	Except 0 or ∞
3 and 2	Except 0
1 and 2	



EBS00R2Y

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-27, "IGNITION COIL" .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

EBS00R2Z

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2	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*2		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed signal*1	Vehicle speed		

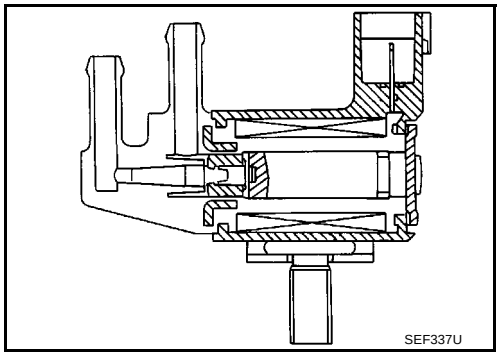
*: This signal is sent to the ECM through CAN communication line.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

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.



CONSULT-II Reference Value in Data Monitor Mode

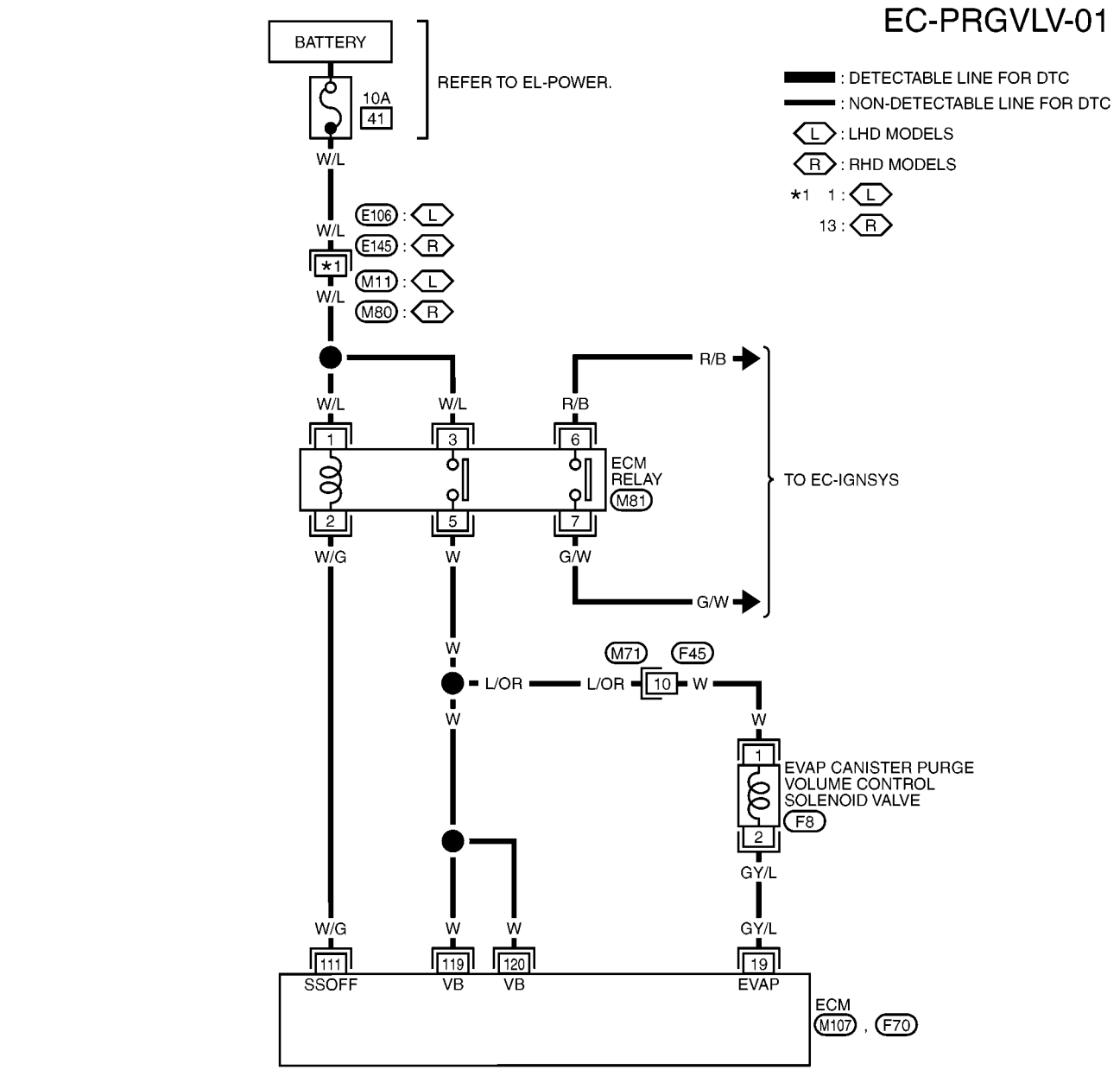
EBS00R30

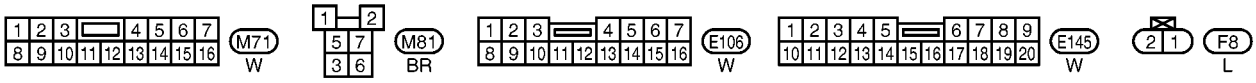
Specification data are reference values.

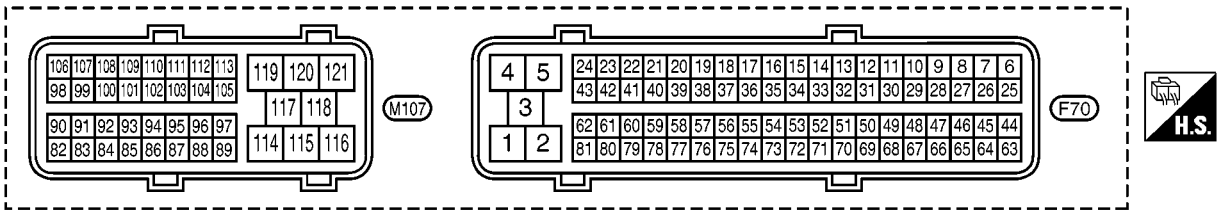
MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm	15 - 30%

Wiring Diagram

EBS00R31





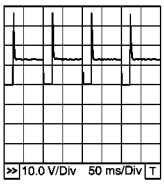


YEC489A

Specification data are reference values and are measured between each terminal and body 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is about 2,000 rpm	Approximately 10V★  PBIB0520E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00R32

1. CHECK OVERALL FUNCTION

With CONSULT-II

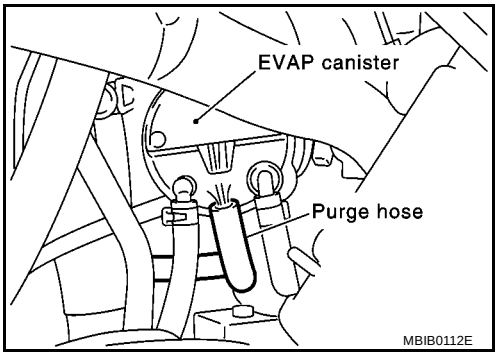
1. Turn ignition switch “OFF”.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Turn ignition switch “ON”.
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
5. Start engine and let it idle.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0569E

6. Change the valve opening percentage with touching “Qu” or “Qd” on CONSULT-II screen, and check for vacuum existence at the EVAP purge hose under the following conditions.

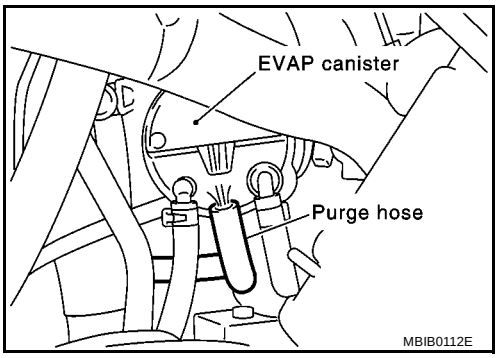
Conditions (PURG VOL CONT/V valve)	Vacuum
0%	Should not exist.
100%	Should exist.



Without CONSULT-II

1. Turn ignition switch “OFF”.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Start engine and let it idle for at least 80 seconds.
4. Check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions	Vacuum
At idle	Should not exist.
Engine speed is about 2,000 rpm.	Should exist.



OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK EVAP CANISTER

Refer to EC-933, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace EVAP canister.

3. CHECK EVAP PURGE LINE

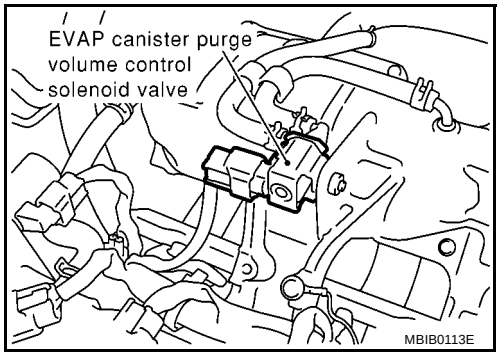
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-932, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 4.
NG >> Repair or reconnect the hose.

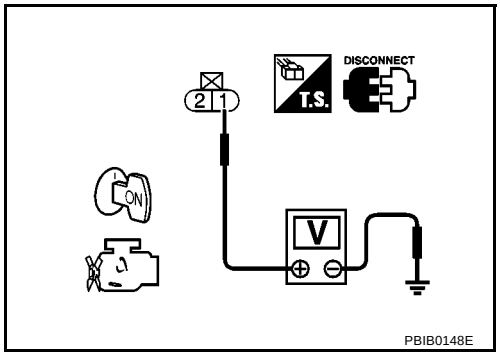
4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay

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

6. 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 harness continuity between ECM terminal 19 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

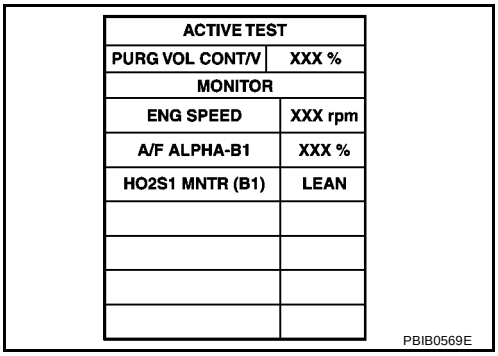
OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-890, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

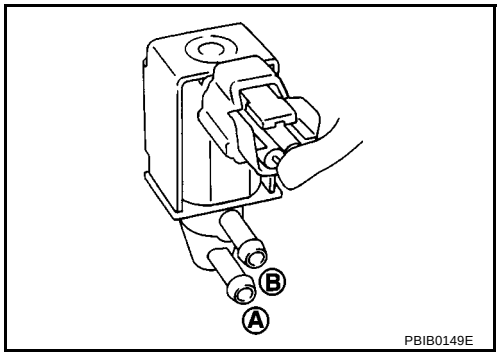
EBS00R33

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

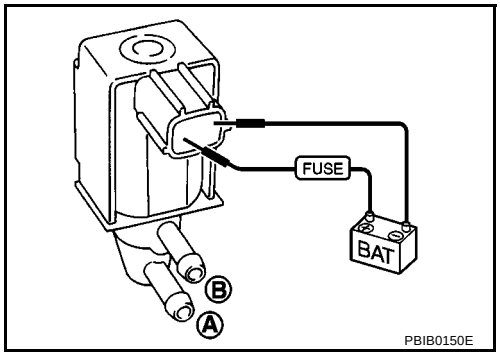
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

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	Yes
No supply	No



Removal and Installation

EBS00R34

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

VSS

PFP:32702

Description

EBS00R35

NOTE:
If DTC U1000 or U1001 is displayed, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-651, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

The vehicle speed signal is sent to the combination meter from ABS actuator and electric unit (control unit) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

Diagnostic Procedure

EBS00R36

1. CHECK VEHICLE SPEED SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Lift up the vehicle.
2. Start engine.
3. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II.
4. Make sure that “VHCL SPEED SE” indication exceeds 10 km/h (6 MPH) when rotating wheels with suitable gear position.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

Without CONSULT-II

1. Lift up the vehicle.
2. Start engine.
3. Read vehicle speed with combination meter.
   Make sure that vehicle speed indication exceeds 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit), Refer to “TROUBLEDIAGNOSIS-BASIC INSPECTION”, BR-70.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to “METERS AND GAUGES”, EL-100.

>> **INSPECTION END**

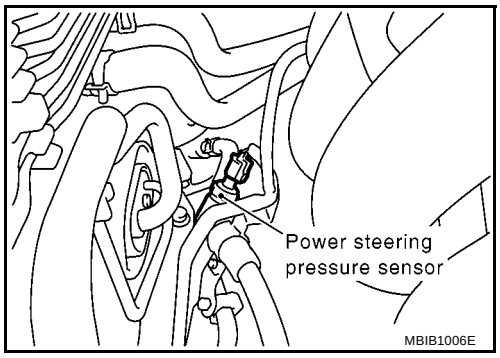
POWER STEERING PRESSURE SENSOR

PFP:49763

Component Description

EBS00R37

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R38

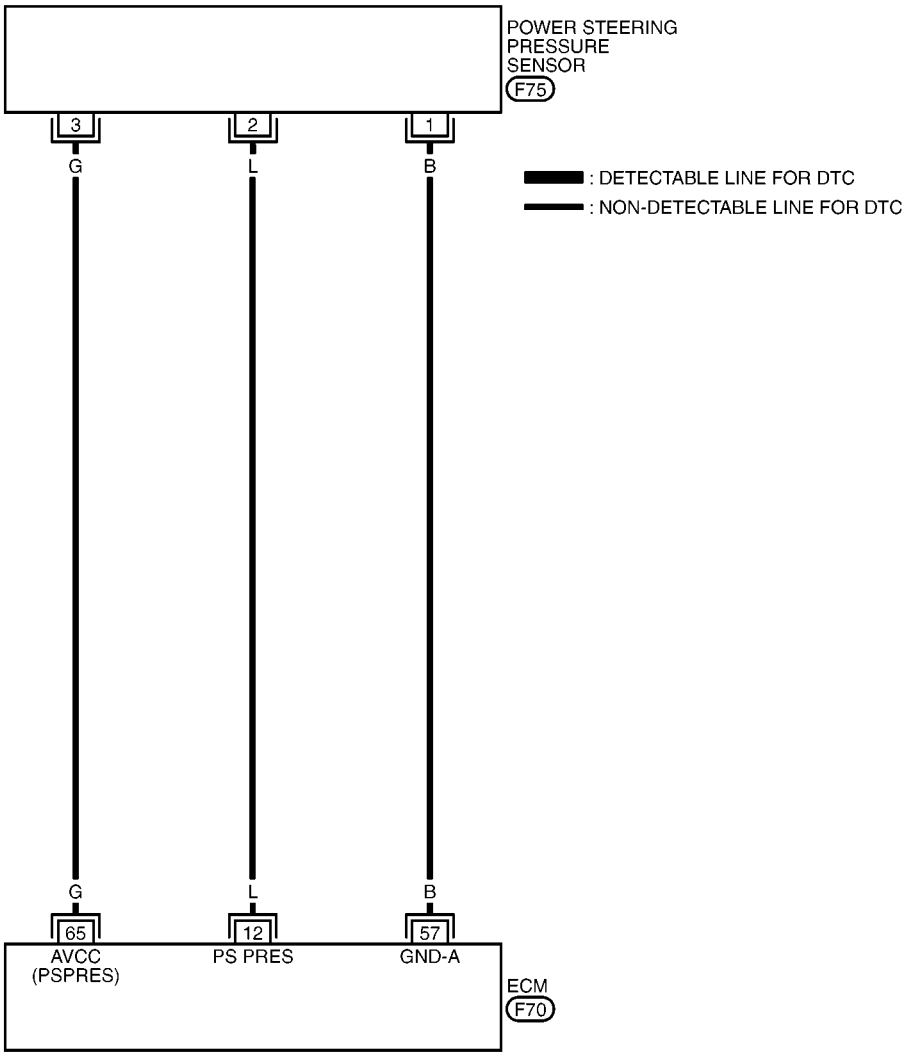
Specification data are reference values.

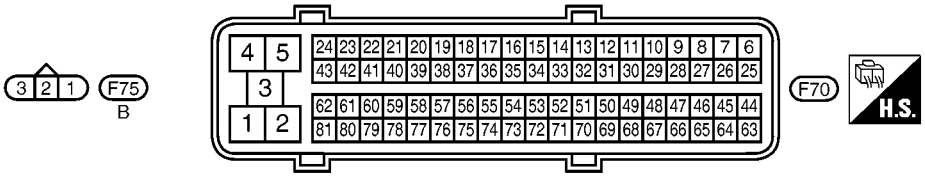
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

Wiring Diagram

EBS00R39

EC-PS/SEN-01





YEC628A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	L	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
57	B	Sensors' ground (Power steering pressure sensor/ Refrigerant pressure sensor)	**[Engine is running]** ● Idle speed	Approximately 0V
65	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

EBS00R3A

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

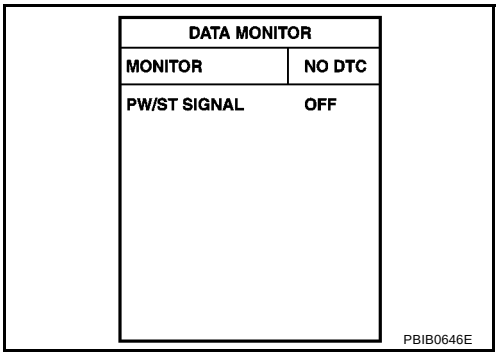
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK POWER STEERING PRESSURE SENSOR OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

Steering in neutral position	OFF
Steering is turned	ON



OK or NG

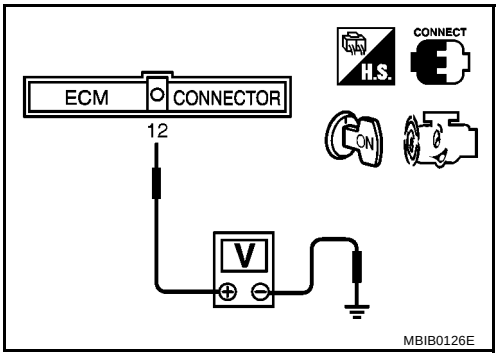
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK POWER STEERING PRESSURE SENSOR OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned.	0.5 - 4.0V
Steering wheel is not being turned.	0.4 - 0.8V



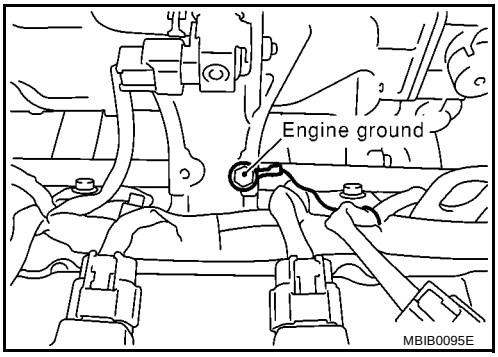
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. RETIGHTEN GROUND SCREWS

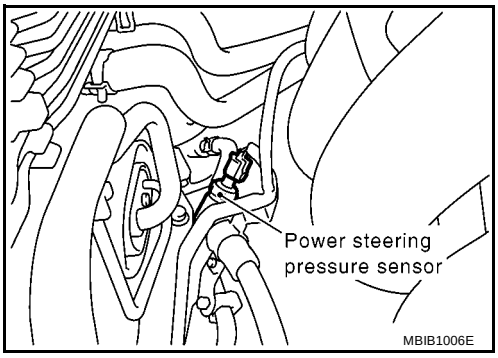
1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



5. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch “ON”.

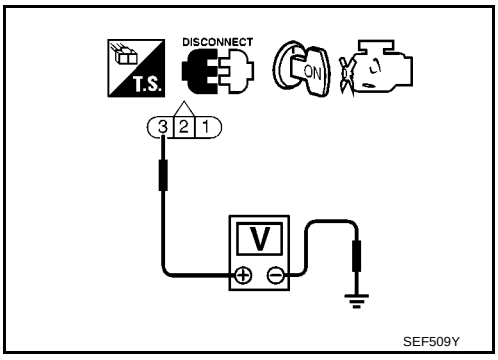


3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



6. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 57 and PSP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK PSP SENSOR

Refer to EC-896, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace PSP sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

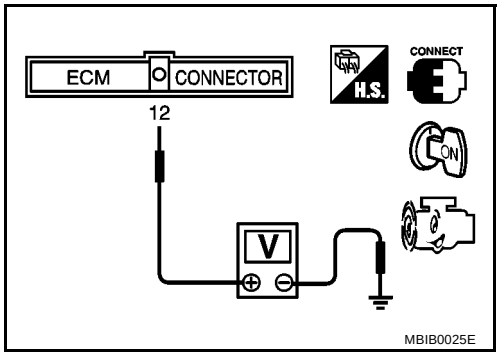
Component Inspection

EBS00R3B

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned fully.	0.5 - 4.0V
Steering wheel is not being turned.	0.4 - 0.8V



IVT CONTROL SOLENOID VALVE

PFP:23796

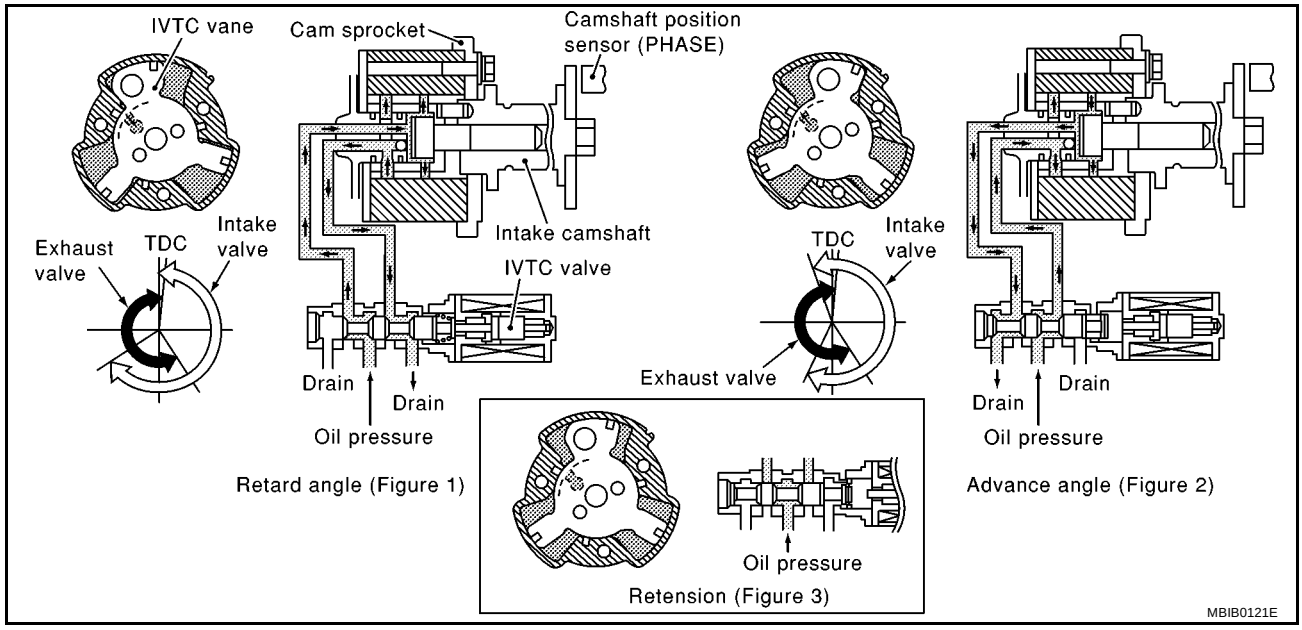
Description

EBS00R3C

SYSTEM DESCRIPTION

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

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



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 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 DESCRIPTION

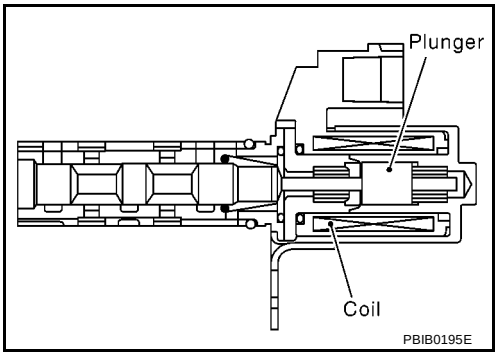
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R3D

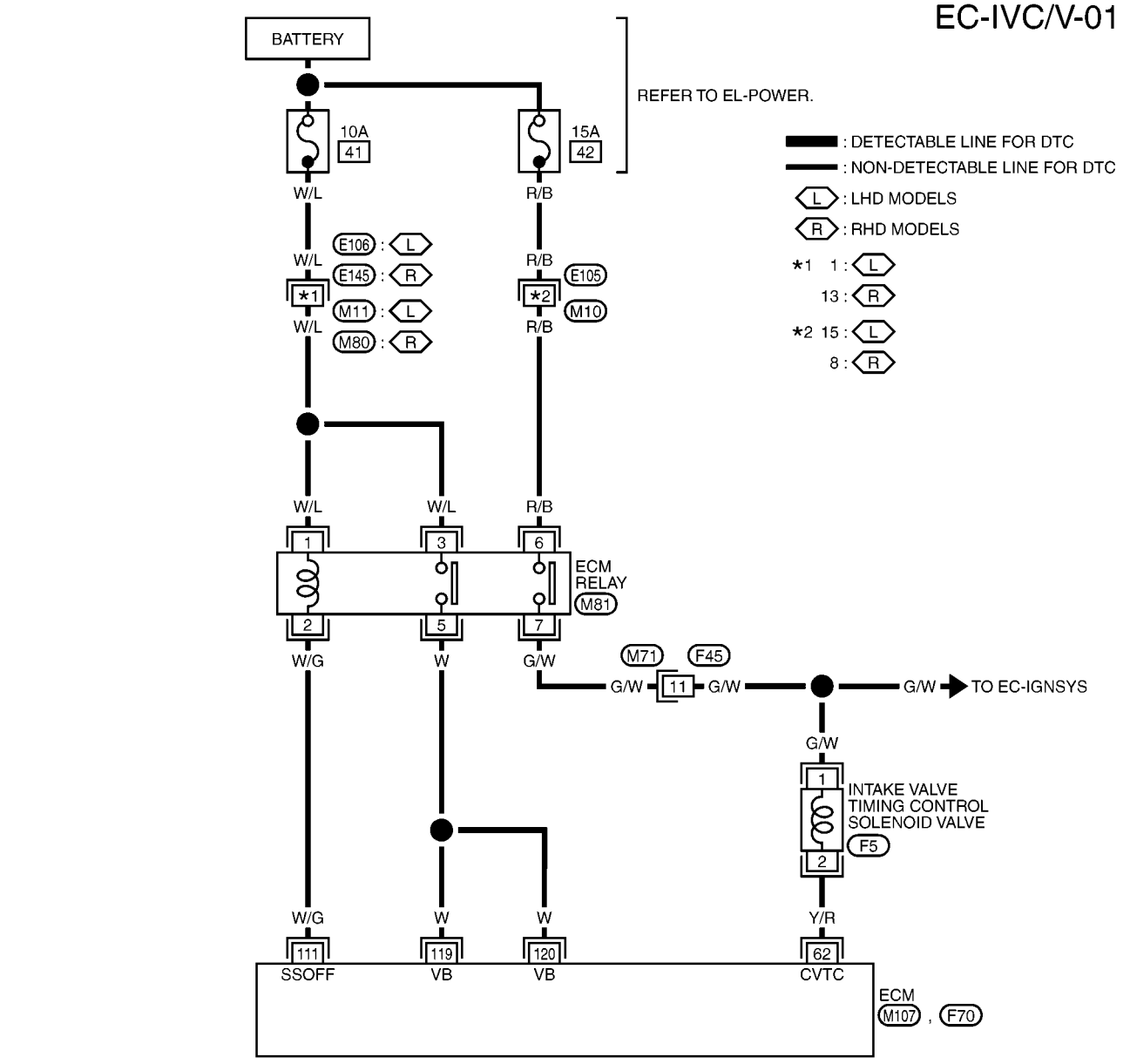
Specification data are reference values.

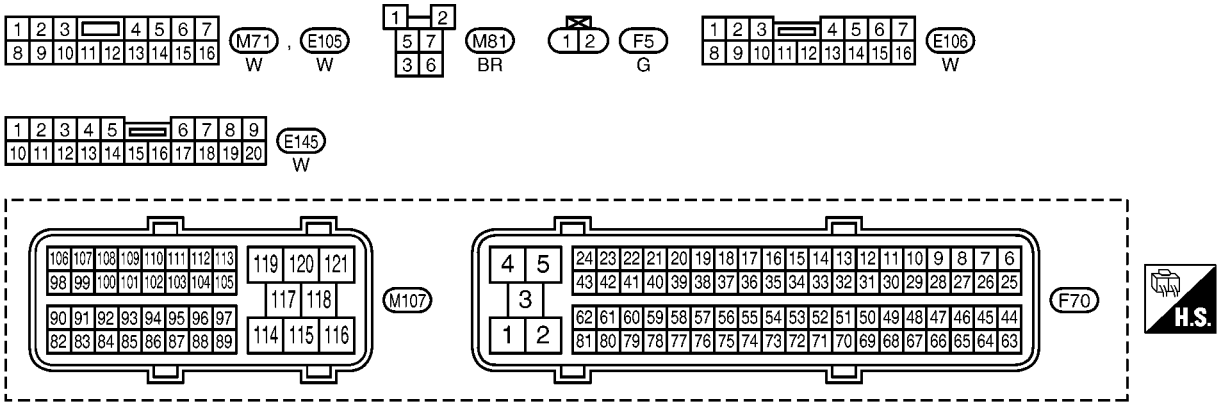
MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 60%

Wiring Diagram

EBS00R3E

EC-IVC/V-01



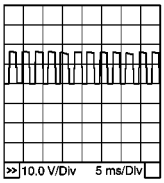


YEC490A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y/R	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,000 rpm quickly	7 - 10V★  PBIB0532E

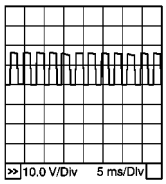
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

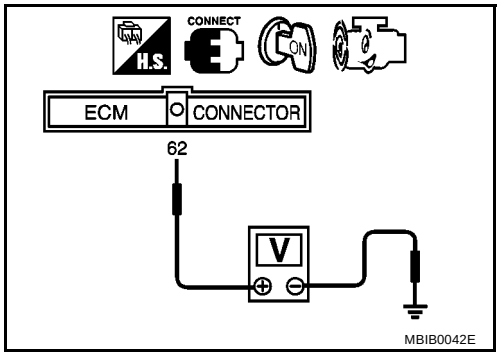
Diagnostic Procedure

EBS00R3F

1. CHECK IVT CONTROL SOLENOID VALVE OVERALL 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 the tester probe between ECM terminals 62 (IVT control solenoid valve signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.

Conditions	Voltage
At idle	BATTERY VOLTAGE (11 - 14V)
When revving engine up to 2,000 rpm quickly	7 - 10V★  PBIB0532E



MBIB0042E

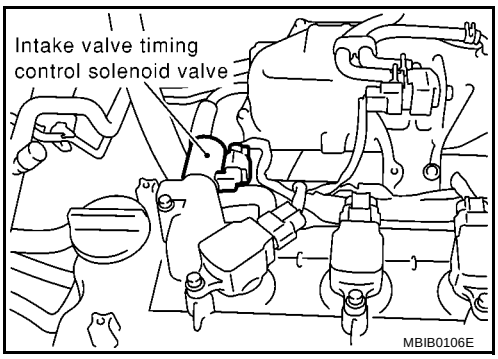
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

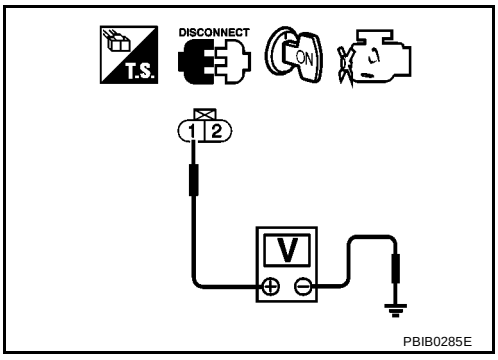
2. CHECK IVT CONTROL SOLENOID VALVE POWER SUPPLY CIRCIUT

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTION PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between intake valve timing control solenoid valve and ECM relay

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

4. CHECK IVT CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 62 and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-902, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace intake valve timing control solenoid valve.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-743, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-750, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor (PHASE).

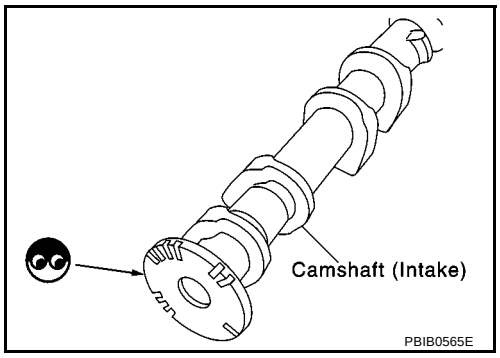
8. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 9.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

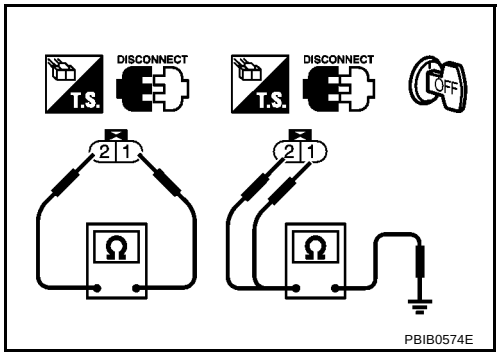
Component Inspection

EBS00R3G

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals 1 and 2.

Terminals	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

EBS00R3H

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-50, "TIMING CHAIN" .

PNP SWITCH

PFP:32006

Component Description

EBS00R3I

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

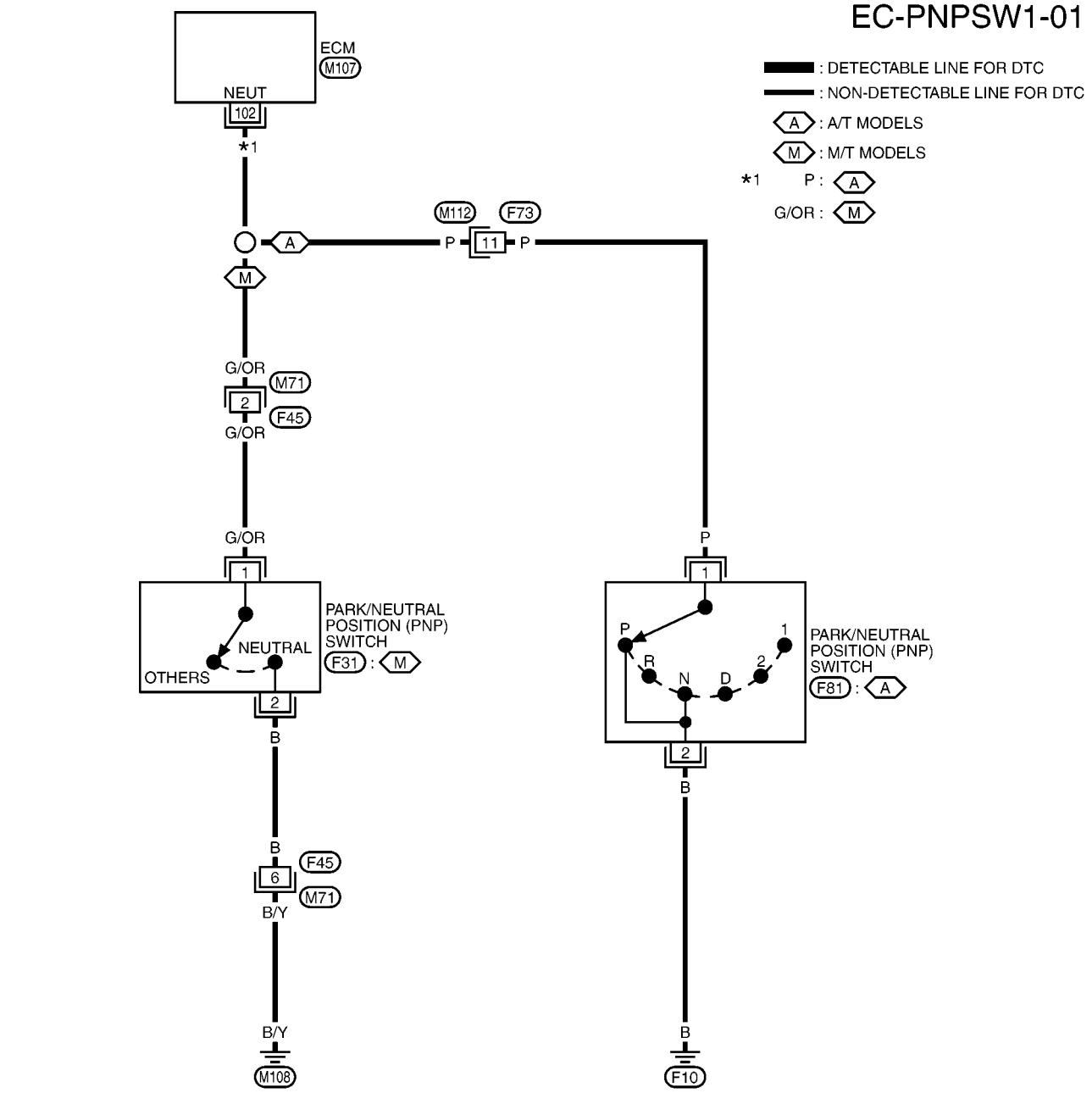
EBS00R3J

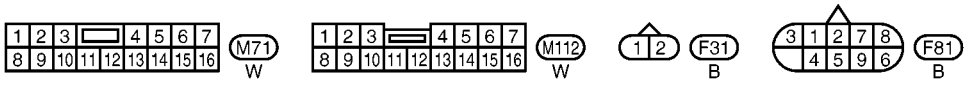
Specification data are reference values.

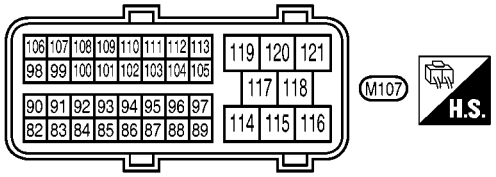
MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T models) Neutral (M/T models)	ON
		Shift lever: Except above	OFF

Wiring Diagram

EBS00R3K







YEC491A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	P (A/T models) G/OR (M/T models)	PNP switch	**[Ignition switch "ON"]** ● Shift lever position is "P" or "N" (A/T models), "Neutral" (M/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

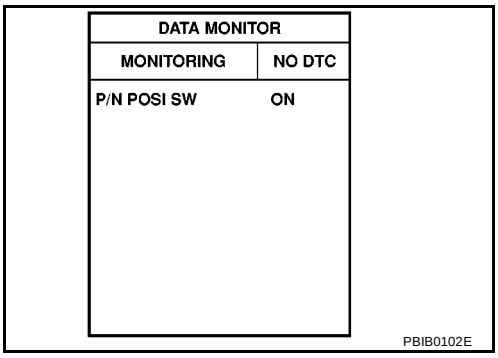
EBS00R3L

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II.
3. Check the "P/N POSI SW" signal under the following conditions.

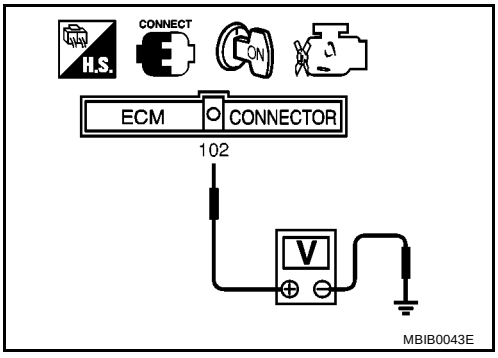
Selector lever position	P/N POSI SW signal
"P" and "N" position (A/T models) Neutral position (M/T models)	ON
Except the above position	OFF



Without CONSULT-II

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 102 and ground under the following conditions.

Selector lever position	Voltage
"P" and "N" position (A/T models) Neutral position (M/T models)	Approximately 0V
Except the above position	A/T models: Battery voltage M/T models: Approximately 5V



OK or NG

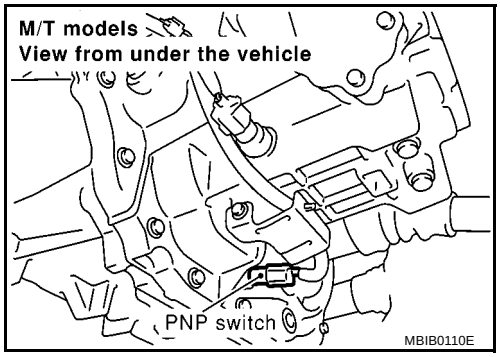
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and body ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3. (M/T models)
NG >> Repair open circuit or short to power in harness or connectors. (A/T models)

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between Park/Neutral position (PNP) switch and ground

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

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5.

Check the following.

- Harness connectors M112, F73 (A/T models)
- Harness connectors M71, F45 (M/T models)
- Harness for open or short between Park/Neutral position (PNP) switch and ECM

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

6. CHECK PNP SWITCH

Refer to AT-410, "ON-VEHICLE SERVICE" (A/T models) or “PNP SWITCH”, MT-17 (5MT) (M/T models).

OK or NG

OK >> GO TO 7.
NG >> Replace PNP switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

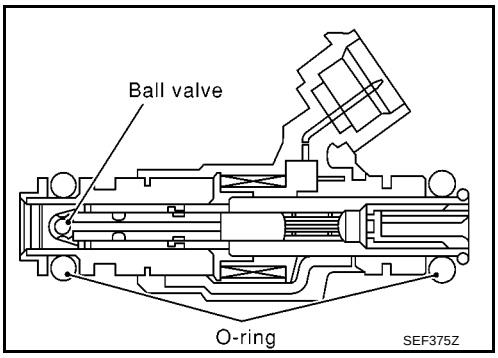
INJECTOR CIRCUIT

PFP:16600

Component Description

EBS00R3M

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

EBS00R3N

Specification data are reference values.

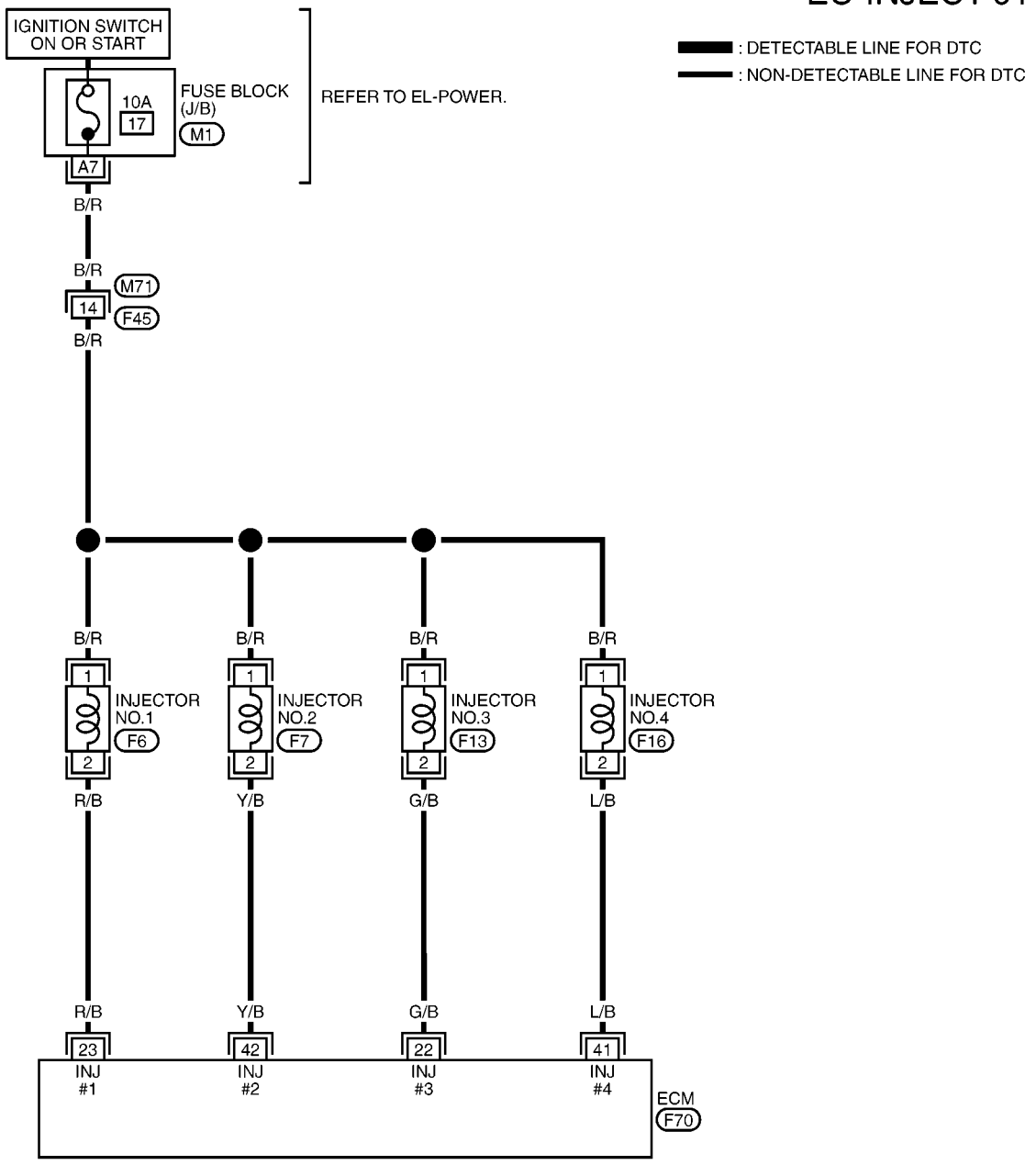
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	1.5 - 3.0 msec
		2,000 rpm	1.2 - 3.0 msec
INJ PULSE-B1 INJ PULSE-B2*	● Engine: After warming up ● Shift lever: N (A/T models) Neutral (M/T models) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.5 msec
		2,000 rpm	1.5 - 3.5 msec

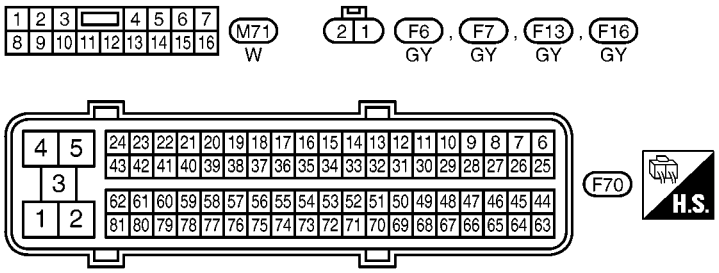
*: This item is displayed with A/T models.

Wiring Diagram

EBS00R3O

EC-INJECT-01





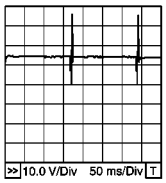
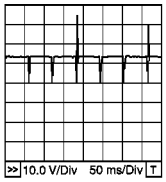
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC474A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

EBS00R3P

1. INSPECTION START

Turn ignition switch to “START”.

Is any cylinder ignited?

Yes or No

Yes >> GO TO 2.

No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

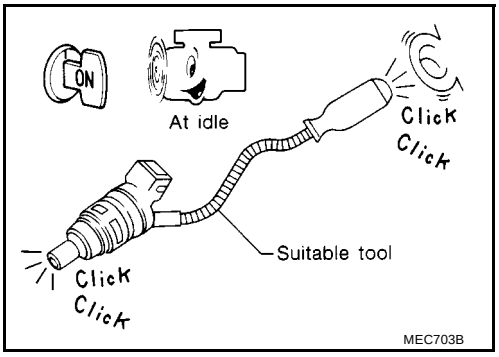
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

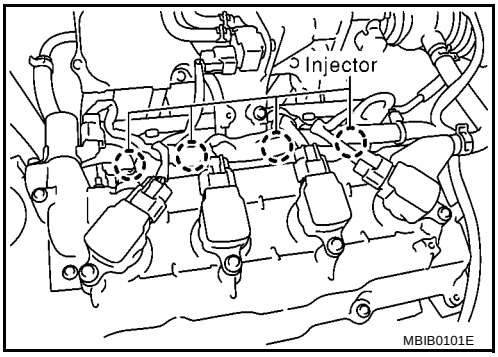


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect injector harness connector.
3. Turn ignition switch “ON”.

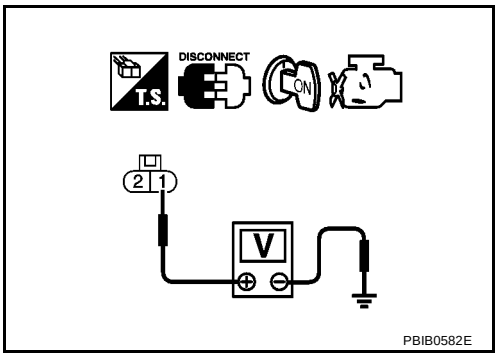


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

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

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INJECTOR

Refer to EC-912, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

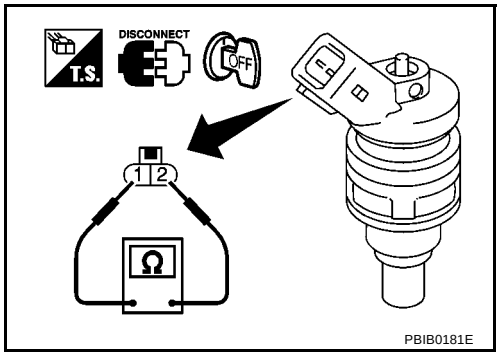
Component Inspection

EBS00R3Q

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 20°C (68°F)]



Removal and Installation

EBS00R3R

INJECTOR

Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE" .

FUEL PUMP CIRCUIT

PFP:17042

Description

EBS00R3S

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

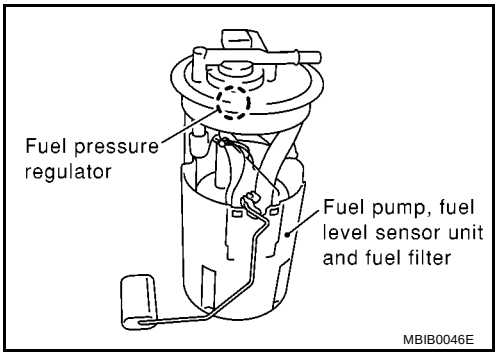
*: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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 (POS) 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 DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

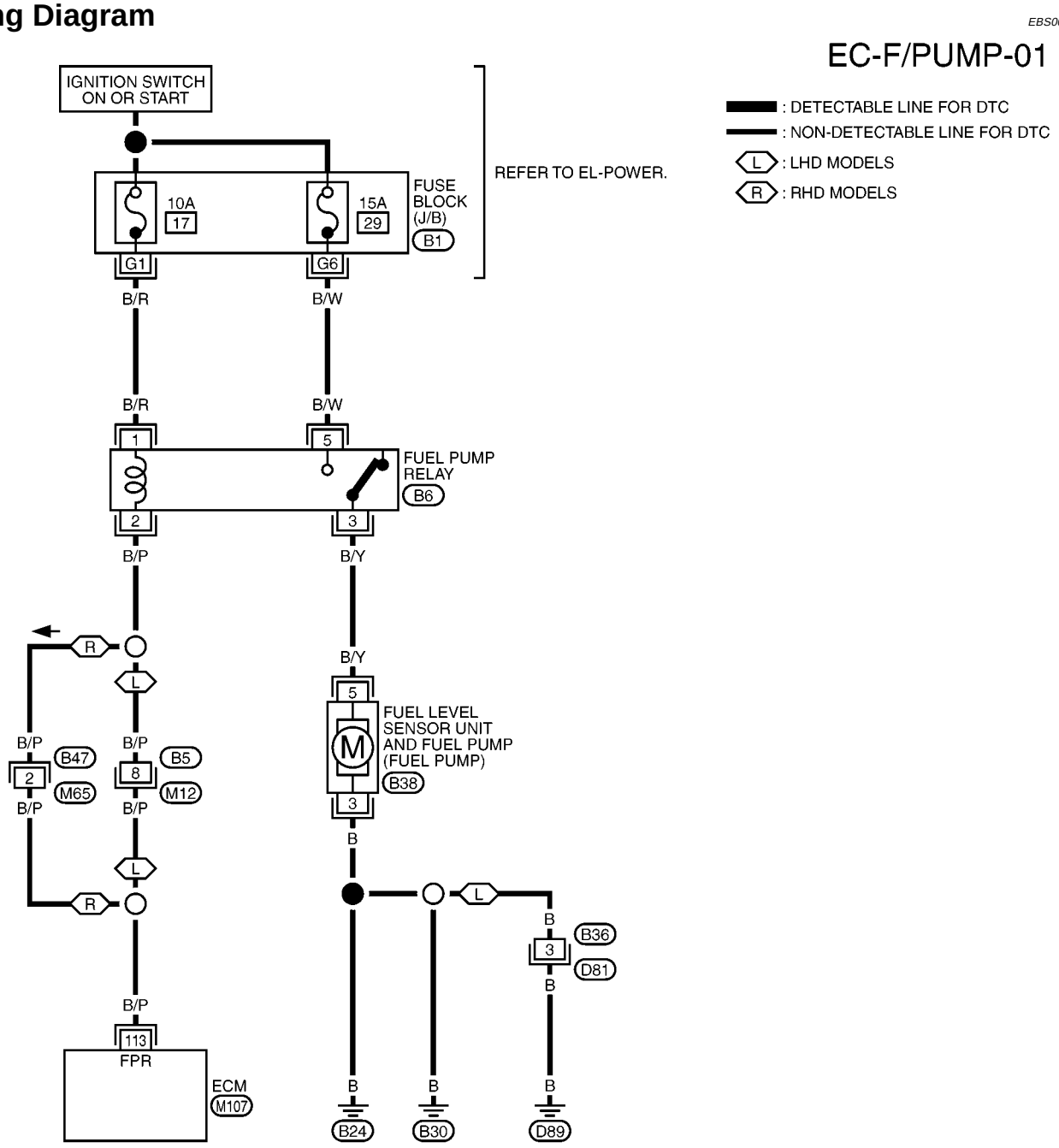
EBS00R3T

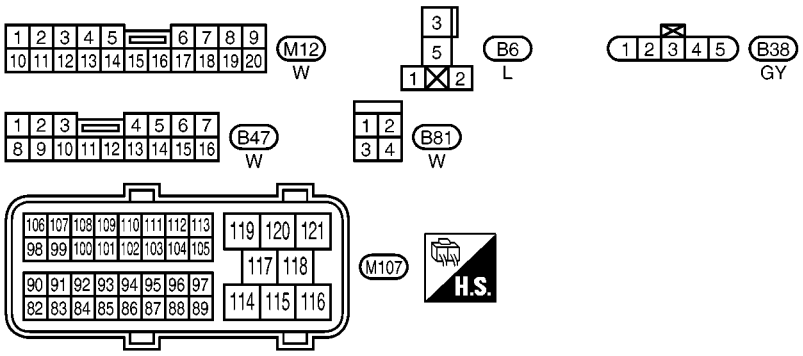
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

EBS00R3U





REFER TO THE FOLLOWING.
B1 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC475A

Specification data are reference values and are measured between each terminal 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.

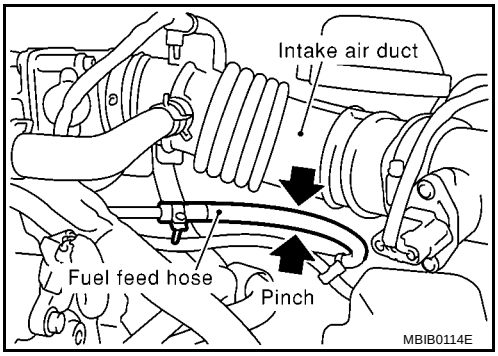
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1.0V
			[Ignition switch "ON"] ● More than 1 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

EBS00R3V

1. CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned "ON".

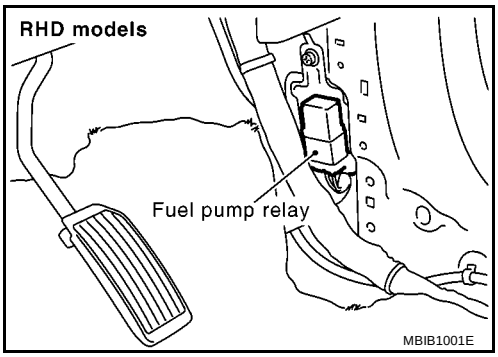


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

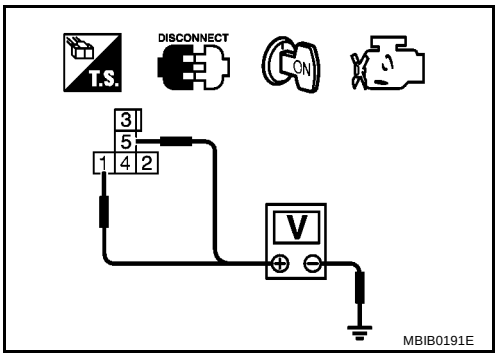
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector B1
- 10A fuse
- 15A fuse
- Harness for open or short between fuel pump relay and fuse

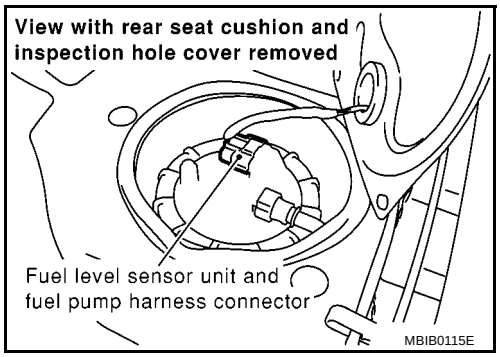
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between fuel pump relay terminal 3 and fuel level sensor unit and fuel pump terminal 5, fuel level sensor unit and fuel pump terminal 3 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B36, D81
- Harness for open or short between fuel level sensor unit and fuel pump and fuel pump relay
- Harness for open or short between fuel level sensor unit and fuel pump and body ground

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

6. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and fuel pump relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B5, M12 (LHD models)
- Harness connectors B47, M65 (RHD models)
- Harness for open or short between ECM and fuel pump relay

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

8. CHECK FUEL PUMP RELAY

Refer to EC-917, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

Refer to EC-917, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

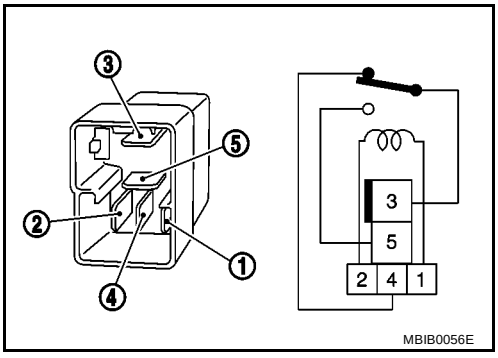
Component Inspection

EBS00R3W

FUEL PUMP RELAY

Check continuity between terminals 3 and 4, 3 and 5 under the following conditions.

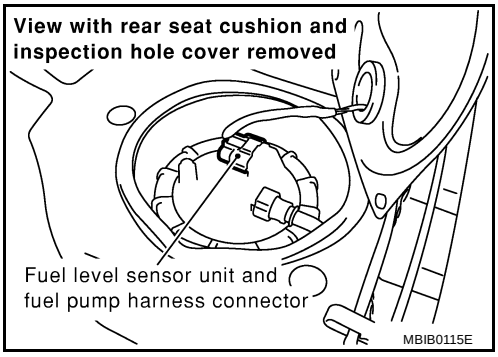
Conditions	Terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	No
	3 and 5	Yes
No current supply	3 and 4	Yes
	3 and 5	No



MBIB0056E

FUEL PUMP

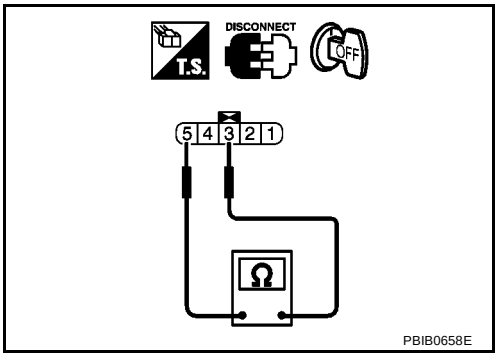
1. Disconnect fuel level sensor unit and fuel pump harness connector.



MBIB0115E

2. Check resistance between fuel level sensor unit and fuel pump terminals 3 and 5.

Resistance: Approximately 1.0Ω [at 25°C (77°F)]



PBIB0658E

Removal and Installation

EBS00R3X

FUEL PUMP

Refer to “Fuel Pump, Fuel Level Sensor Unit and Fuel Filter”, FE-9.

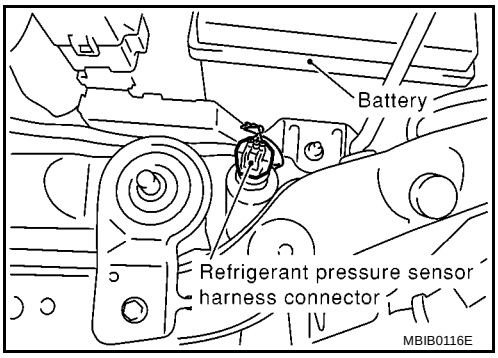
REFRIGERANT PRESSURE SENSOR

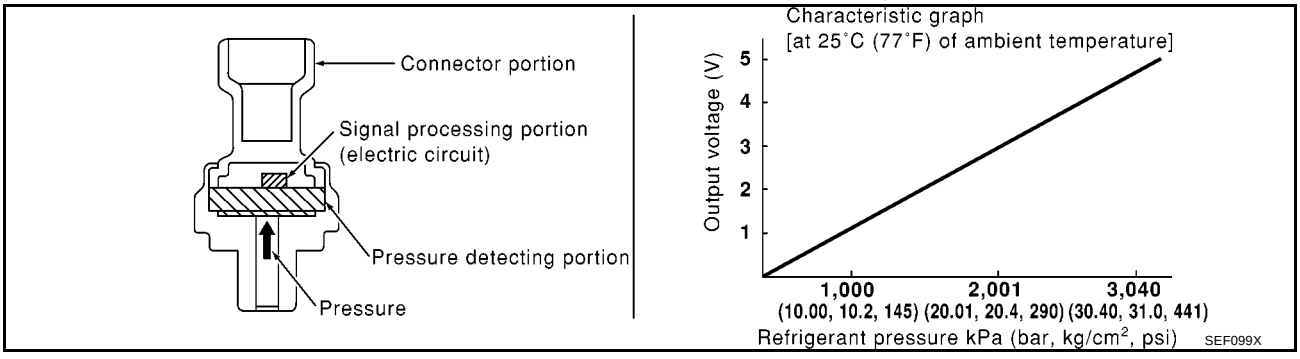
PFP:92136

Component Description

EBS00R3Y

The refrigerant pressure sensor is installed at the liquid tank 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.

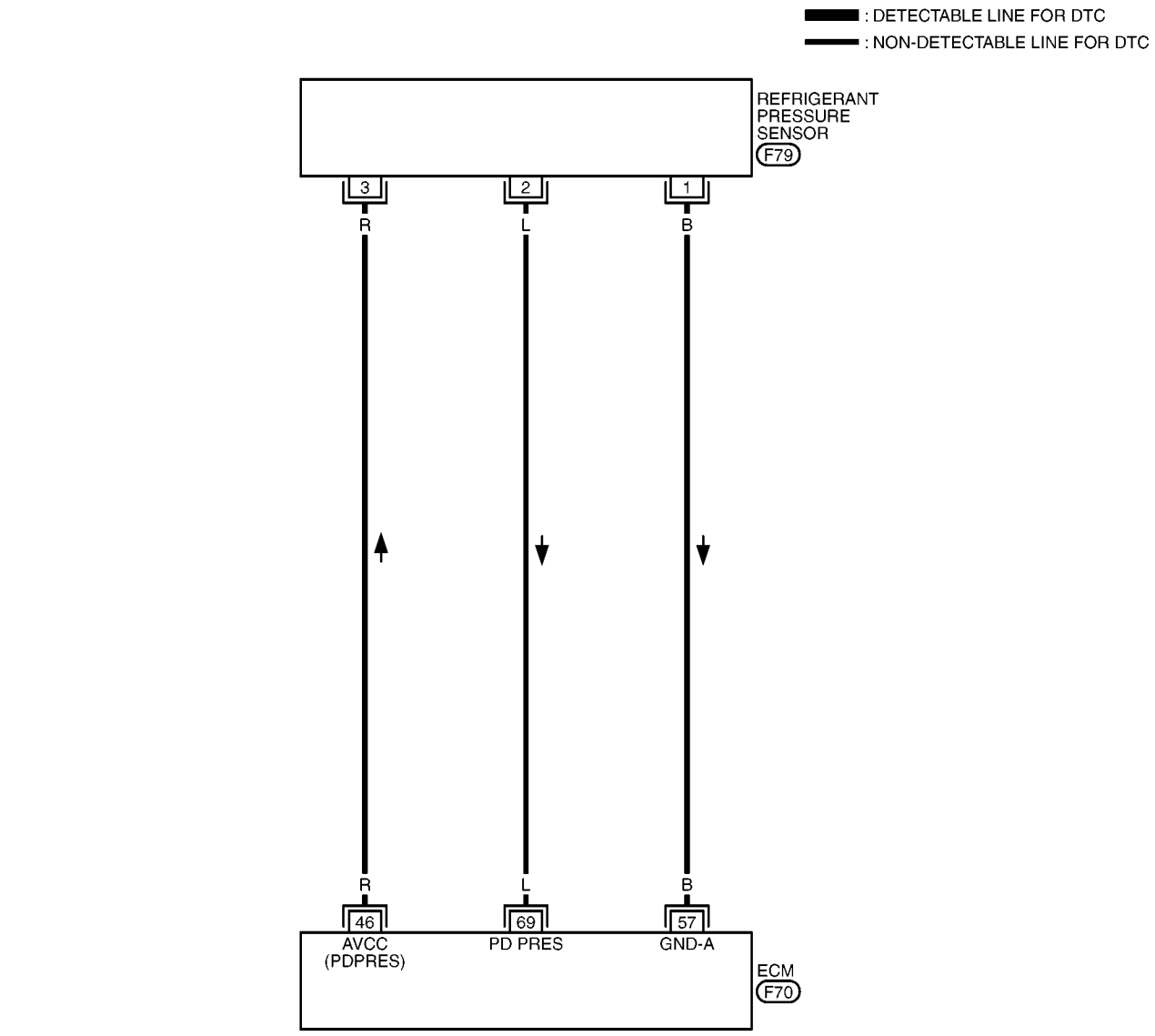


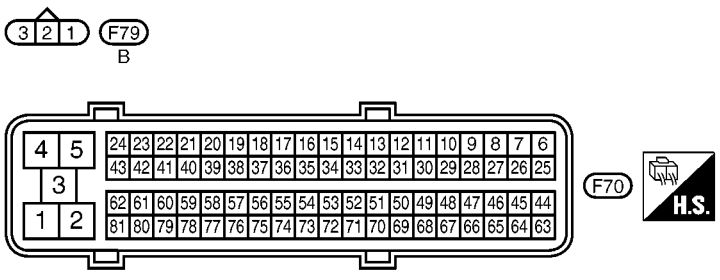


Wiring Diagram

EBS00R3Z

EC-RP/SEN-01





YEC476A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch "ON"]**	Approximately 5V
57	B	Sensors' ground (Power steering pressure sensor/Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V

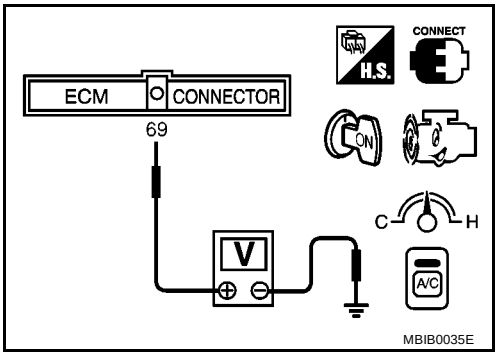
Diagnostic Procedure

EBS00R40

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 switch "ON".
3. Check voltage between ECM terminal 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

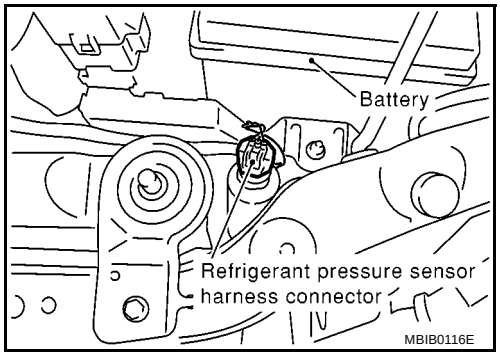


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

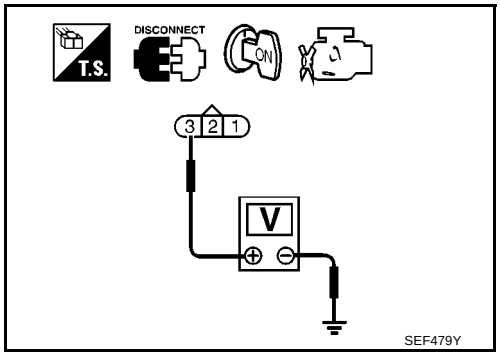
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch “ON”.



5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 57 and refrigerant pressure sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

EBS00R41

REFRIGERANT PRESSURE SENSOR

Refer to “REFRIGERANT SYSTEM”, ATC-15.

ELECTRICAL LOAD SIGNAL

PFP:25350

Description

EBS00R42

The electrical load signals except headlamp switch signal are transferred through the CAN communication line.

CONSULT-II Reference Value in Data Monitor Mode

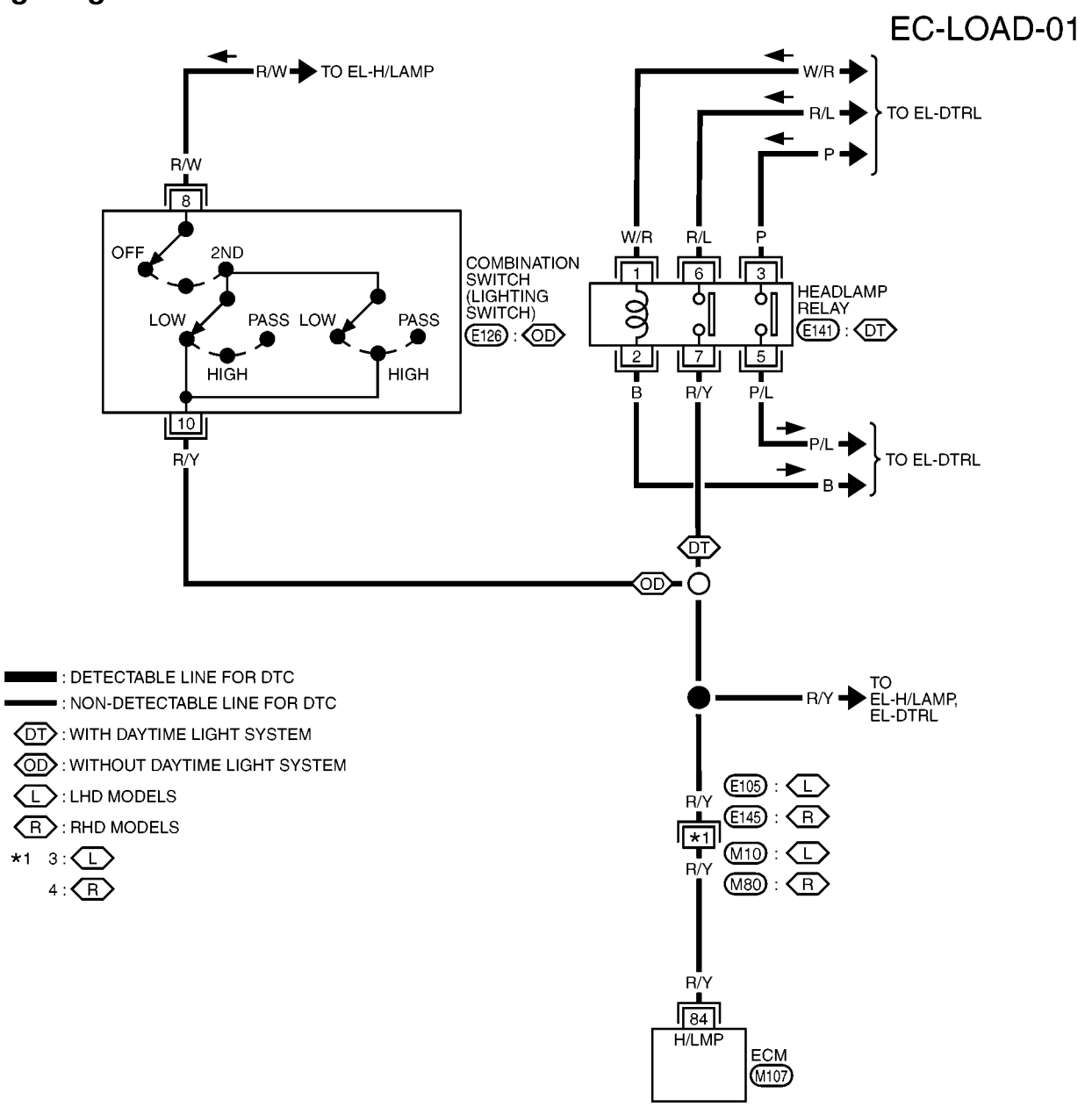
EBS00R43

Specification data are reference values.

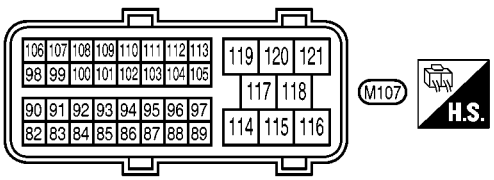
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF

Wiring Diagram

EBS00R44







YEC477A

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	R/Y	Electrical load signal (Headlamp signal)	**[Ignition switch "ON"]** ● Lighting switch is "2ND" position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Lighting switch is "OFF"	Approximately 0V

Diagnostic Procedure

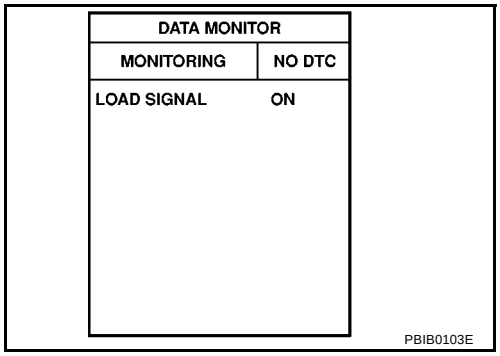
EBS00R45

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch "ON".
2. Connect CONSULT-II and select "DATA MONITOR" mode.
3. Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch "ON"	ON
Rear window defogger switch "OFF"	OFF



OK or NG

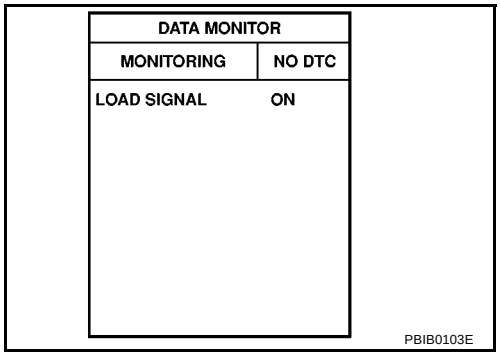
OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> GO TO 4.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch "ON" at 2nd position	ON
Lighting switch "OFF"	OFF



OK or NG

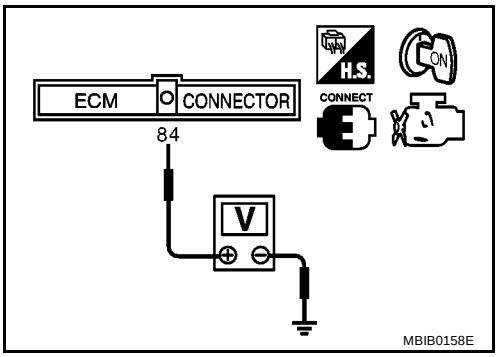
OK >> **INSPECTION END**
NG >> GO TO 5.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch “ON” at 2nd position	Battery voltage
Lighting switch “OFF”	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to “REAR WINDOW DEFOGGER”, EL-177.

>> **INSPECTION END**

5. CHECK HEADLAMP FUNCTION

1. Turn lighting switch “ON” at 2nd position.
2. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 6.
NG >> Refer to “HEADLAMP-DAYTIME LIGHT SYSTEM-”, EL-45 or “HEADLAMP-HEADLAMP AIMING CONTROL-”, EL-52.

6. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

WITHOUT DAYTIME LIGHT SYSTEM

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect combination switch (lighting switch) harness connector.
4. Check harness continuity between ECM terminal 84 and combination switch (lighting switch) terminal 10. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

WITH DAYTIME LIGHT SYSTEM

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Disconnect headlamp relay.
4. Check harness continuity between ECM terminal 84 and headlamp relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10 (LHD models)
- Harness connectors E145, M80 (RHD models)
- harness for open and short between ECM and combination switch (lighting switch)
- harness for open and short between ECM and headlamp relay

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

8. CHECK INTERMITTENT INCIDENT

Refer to EC-644, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

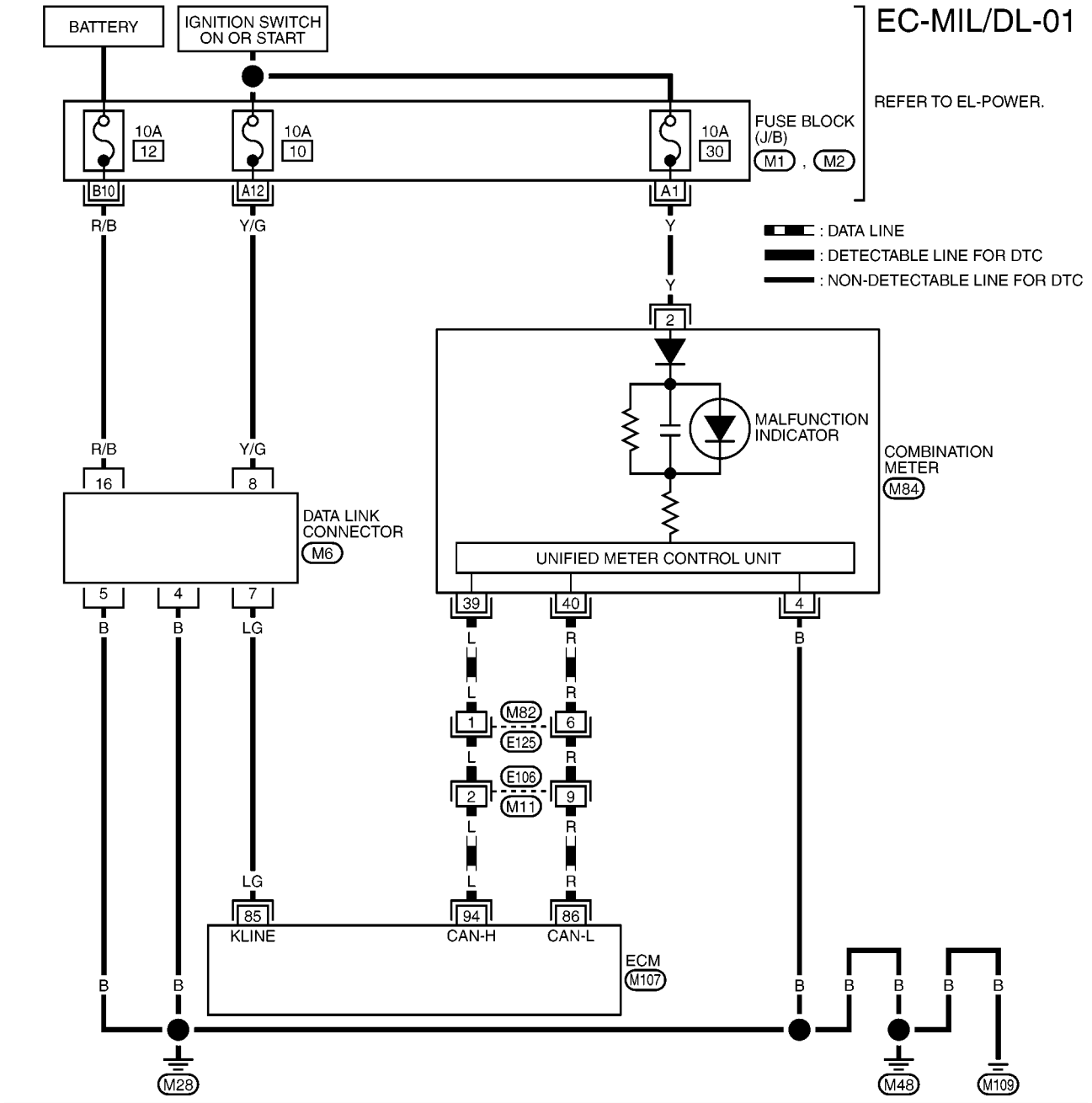
>> **INSPECTION END**

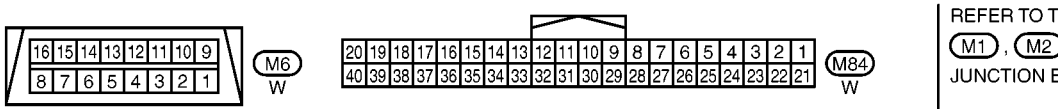
MI & DATA LINK CONNECTORS

PFP:24814

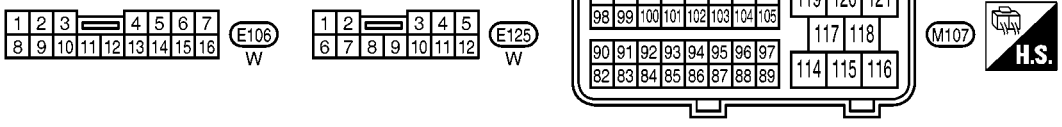
Wiring Diagram—LHD Models

EBS00R46





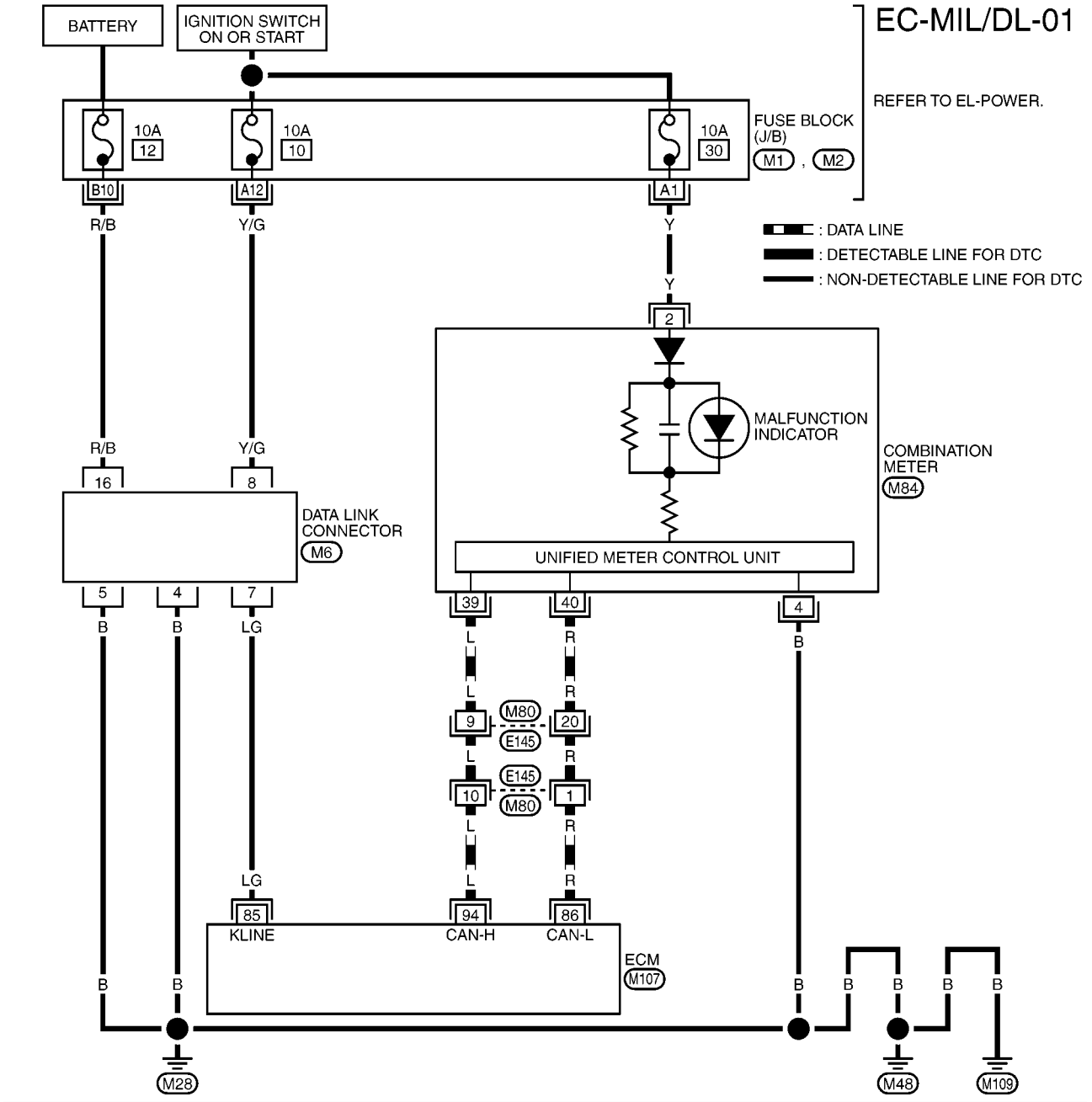
REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

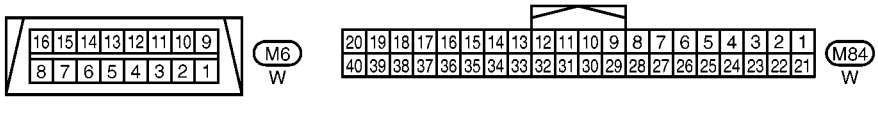


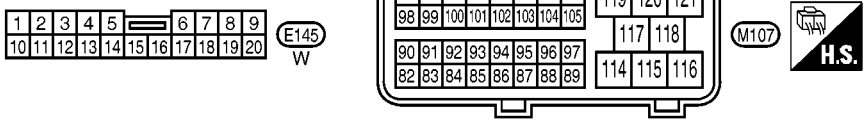
YEC478A

Wiring Diagram—RHD Models

EBS00R47







REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

YEC479A

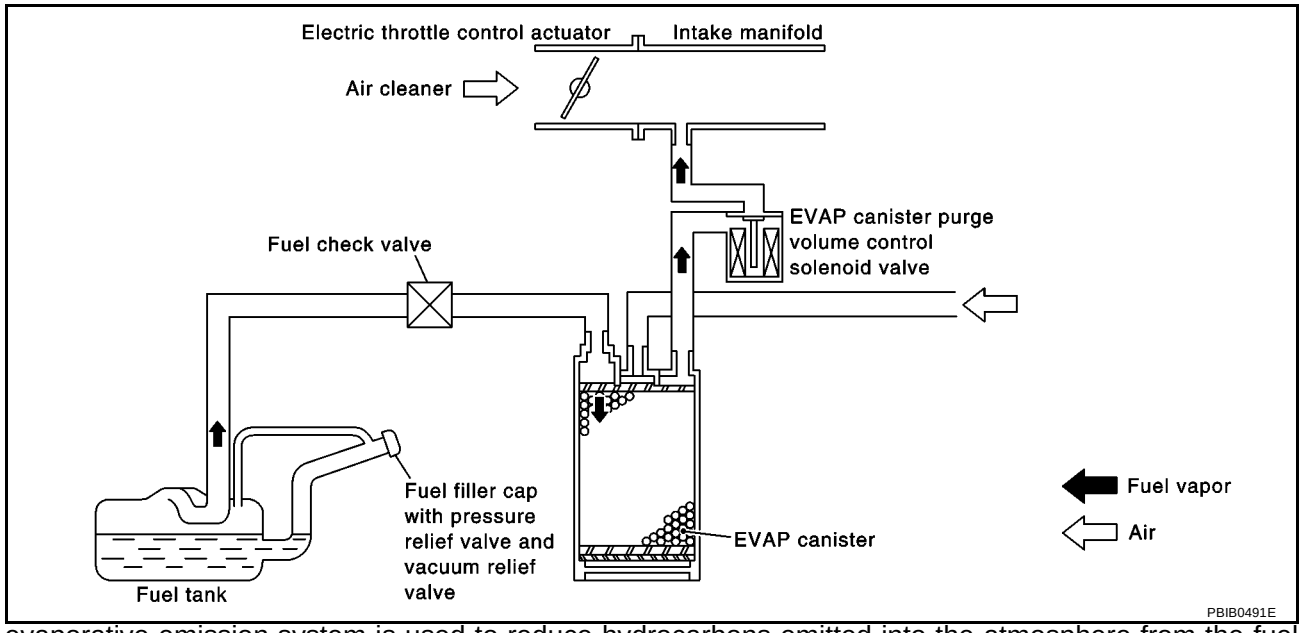
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

EBS00R48

SYSTEM DESCRIPTION



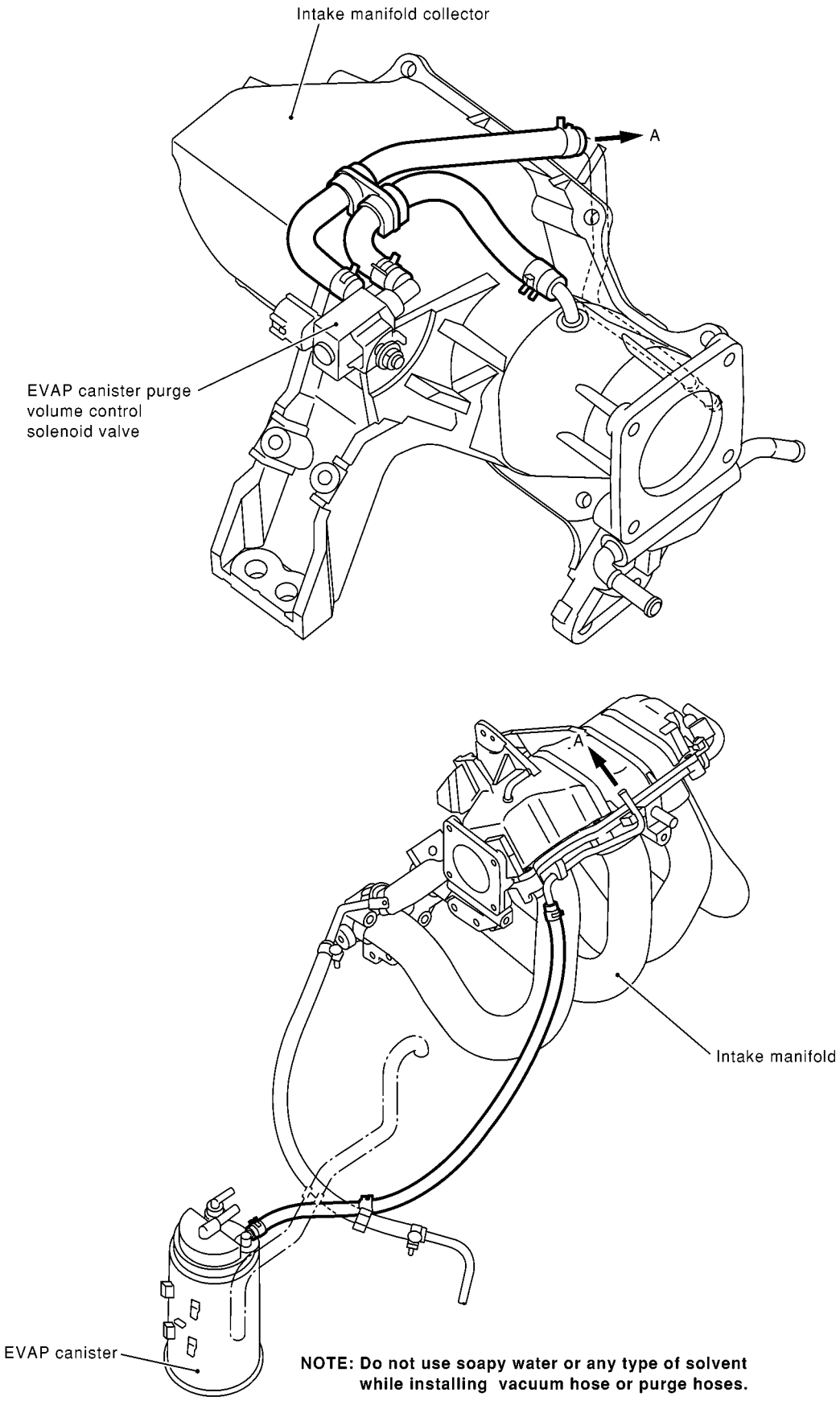
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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 and idling.

EVAPORATIVE EMISSION LINE DRAWING



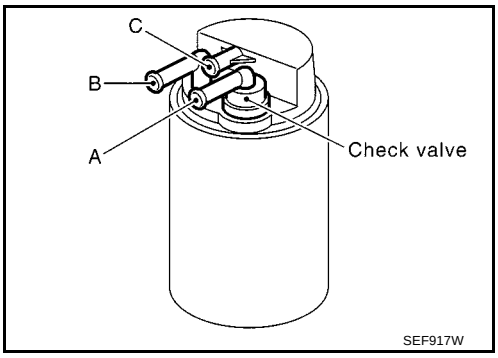
Component Inspection

EBS00R49

EVAP CANISTER

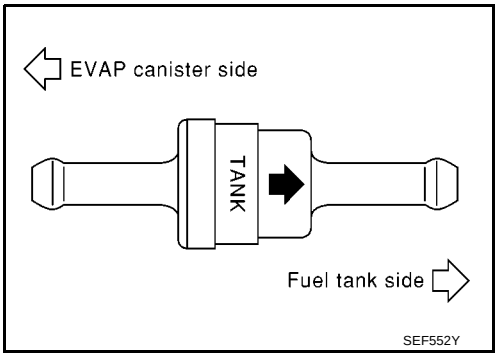
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** . Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** . Check that air flows freely through port **C** .



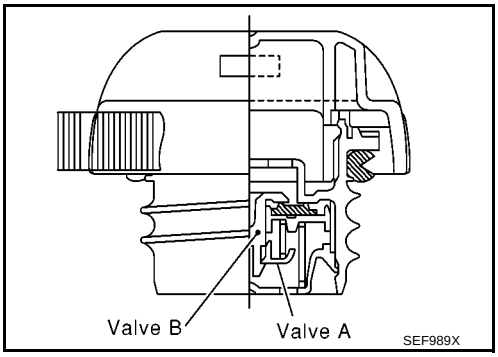
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

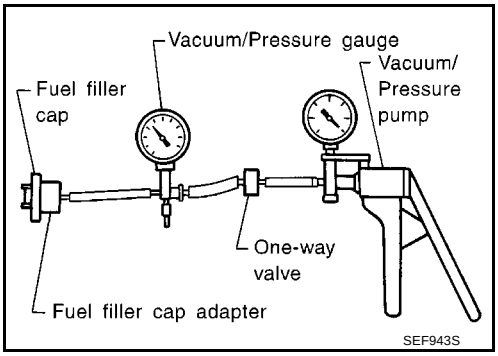
1. Wipe clean valve housing.



2. 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 –3.3 kPa (–0.060 to –0.033 bar, –0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)**

3. If out of specification, replace fuel filler cap as an assembly.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-890, "Component Inspection" .

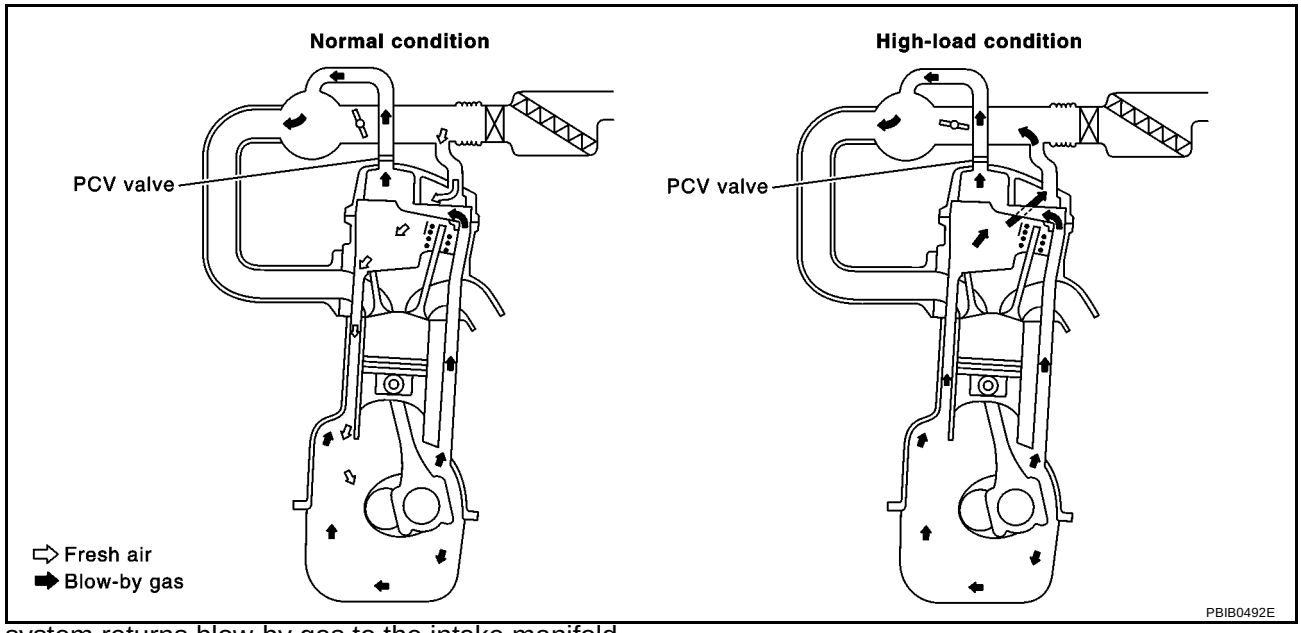
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

EBS00R4A

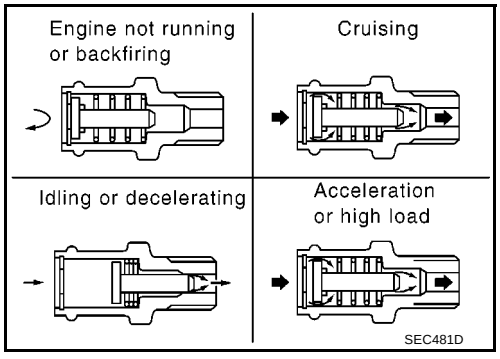
SYSTEM DESCRIPTION



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.

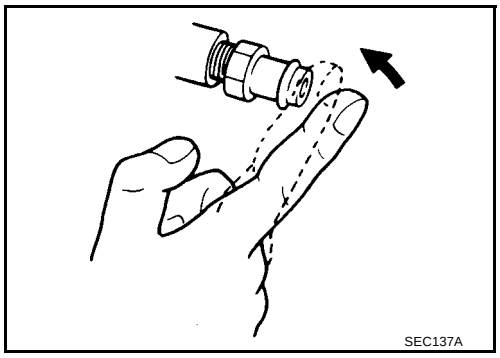


Component Inspection

EBS00R4B

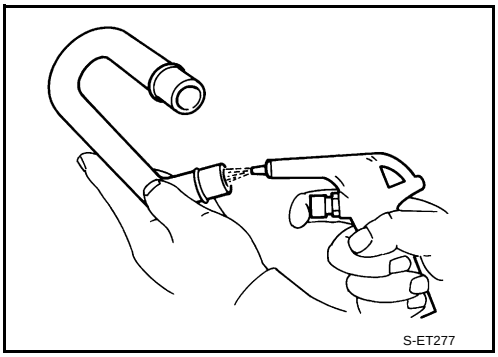
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

EBS00R4C

Fuel pressure at idle	Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

Idle Speed and Ignition Timing

EBS00R4D

Target idle speed	A/T	No-load*1 (in “P” or N” position)	800±50 rpm
	M/T	No-load*1 (in “Neutral” position)	700±50 rpm
Air conditioner: ON	A/T	In “P” or N” position	900 rpm or more
	M/T	In “Neutral” position	
Ignition timing	A/T	In “P” or N” position	10°±5° BTDC
	M/T	In “Neutral” position	8°±5° BTDC

*1: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

EBS00R4F

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.7*V

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

EBS00R4G

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1
80 (176)	0.31 - 0.37

Engine Coolant Temperature Sensor

EBS00R4H

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

EBS00R4I

Resistance [at 25°C (77°F)]	8 - 10Ω

Heated Oxygen sensor 2 Heater

EBS00R4J

Resistance [at 25°C (77°F)]	5.0 - 7.0Ω

Crankshaft Position Sensor (POS)

EBS00R4K

Refer to EC-743, "Component Inspection" .

Camshaft Position Sensor (PHASE)

EBS00R4L

Refer to EC-750, "Component Inspection" .

Throttle Control Motor

EBS00R4M

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

EBS00R4N

Resistance [at 20°C (68°F)]	13.5 - 17.5Ω

Fuel Pump

EBS00R4O

Resistance [at 25°C (77°F)]	Approximately 1.0Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

EBS0137I

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-40, “IDENTIFICATION PLATE”.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1011, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1 *2 (CONSULT-II, GST)	Trip	MI lighting up	Reference page
APP SEN 1/CIRCUIT	P0122	1	—	EC-1050
APP SEN 1/CIRCUIT	P0123	1	—	EC-1050
APP SEN 2/CIRCUIT	P0222	1	—	EC-1088
APP SEN 2/CIRCUIT	P0223	1	—	EC-1088
APP SENSOR	P2135	1	—	EC-1209
BARO SEN/CIRC	P2228	3	×	EC-1225
BARO SEN/CIRC	P2229	3	×	EC-1225
BATTERY VOLTAGE	P0563	1	—	EC-1151
CAN COMM CIRCUIT	U1000	1	—	EC-1011
CKP SEN/CIRCUIT	P0335	3	×	EC-1106
CKP SENSOR	P0336	3	×	EC-1111
CMP SEN/CIRCUIT	P0340	3	×	EC-1117
CMP SENSOR	P0341	3	×	EC-1123
CMP/CKP RELATION	P0016	3	×	EC-1014
CYL1 INJECTOR	P0201	3	×	EC-1066
CYL2 INJECTOR	P0202	3	×	EC-1066
CYL3 INJECTOR	P0203	3	×	EC-1066
CYL4 INJECTOR	P0204	3	×	EC-1066
ECM	P0605	3	×	EC-1153
ECM	P0606	3	×	EC-1155
ECM RELAY	P0686	1	—	EC-1172
ECT SEN/CIRCUIT	P0117	3	×	EC-1046
ECT SEN/CIRCUIT	P0118	3	×	EC-1046
EGR SYSTEM*3	P0401	3	×	EC-1133
EGR VALVE	P0404	3	×	EC-1142
ENG OVER TEMP	P0217	1	×	EC-1072
FRP RELIEF VALVE	P1272	3	×	EC-1188
FRP SEN/CIRC	P0192	3	×	EC-1059
FRP SEN/CIRC	P0193	3	×	EC-1059
FUEL LEAK	P0093	3	×	EC-1026
FUEL PUMP	P0089	3	×	EC-1023
FUEL PUMP	P1273	3	×	EC-1194
FUEL PUMP	P1274	1	×	EC-1199
FUEL PUMP	P1275	1	×	EC-1204
FUEL PUMP/CIRC	P0628	3	×	EC-1157
FUEL PUMP/CIRC	P0629	3	×	EC-1157

Items (CONSULT-II screen terms)	DTC*1 *2 (CONSULT-II, GST)	Trip	MI lighting up	Reference page
FUEL TEMP SEN/CIRC	P0182	3	×	EC-1055
FUEL TEMP SEN/CIRC	P0183	3	×	EC-1055
GLOW RELAY	P0380	3	×	EC-1129
HIGH FUEL PRESS	P0088	3	×	EC-1021
IAT SEN/CIRCUIT	P0112	3	×	EC-1042
IAT SEN/CIRCUIT	P0113	3	×	EC-1042
INJ ADJ RES/CIRC1	P1260	3	×	EC-1177
INJ ADJ RES/CIRC1	P1261	3	×	EC-1177
INJ ADJ RES/CIRC2	P1262	3	×	EC-1177
INJ ADJ RES/CIRC2	P1263	3	×	EC-1177
INJ ADJ RES/CIRC3	P1264	3	×	EC-1177
INJ ADJ RES/CIRC3	P1265	3	×	EC-1177
INJ ADJ RES/CIRC4	P1266	3	×	EC-1177
INJ ADJ RES/CIRC4	P1267	3	×	EC-1177
INJ PWR/CIRC	P2146	3	×	EC-1214
INJ PWR/CIRC	P2149	3	×	EC-1214
INJECTOR	P0200	3	×	EC-1064
INJECTOR/CIRC	P2147	3	×	EC-1219
INJECTOR/CIRC	P2148	3	×	EC-1219
INJECTOR 1	P1268	1	—	EC-1182
INJECTOR 2	P1269	1	—	EC-1182
INJECTOR 3	P1270	1	—	EC-1182
INJECTOR 4	P1271	1	—	EC-1182
MAF SEN/CIRCUIT	P0102	3	×	EC-1037
MAF SEN/CIRCUIT	P0103	3	×	EC-1037
MAF SENSOR	P0101	3	×	EC-1030
NATS MALFUNCTION	P1610 - P1617	1	—	EC-962
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—
SENSOR PWR/CIRC1	P0642	3	×	EC-1162
SENSOR PWR/CIRC1	P0643	3	×	EC-1162
SENSOR PWR/CIRC2	P0652	3	×	EC-1167
SENSOR PWR/CIRC2	P0653	3	×	EC-1167
TC BOOST SEN/CIRC*3	P0237	3	×	EC-1101
TC BOOST SEN/CIRC*3	P0238	3	×	EC-1101
TC BOOST SOL/CIRC*3	P0045	3	×	EC-1016
TC SYSTEM	P0234	1	—	EC-1093
TCS/CIRC	P1212	1	—	EC-1176
TCS C/U FUNCTN	P1211	1	—	EC-1175

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: For YD22DDTi engine models

DTC No. Index

EBS0137J

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-40, “IDENTIFICATION PLATE”.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1011, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

DTC*1 *2 (CONSULT-II, GST)	Items (CONSULT-II screen item)	Trip	MI lighting up	Reference page
U1000	CAN COMM CIRCUIT	1	—	EC-1011
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0016	CMP/CKP RELATION	3	×	EC-1014
P0045*3	TC BOOST SOL/CIRC	3	×	EC-1016
P0088	HIGH FUEL PRESS	3	×	EC-1021
P0089	FUEL PUMP	3	×	EC-1023
P0093	FUEL LEAK	3	×	EC-1026
P0101	MAF SENSOR	3	×	EC-1030
P0102	MAF SEN/CIRCUIT	3	×	EC-1037
P0103	MAF SEN/CIRCUIT	3	×	EC-1037
P0112	IAT SEN/CIRCUIT	3	×	EC-1042
P0113	IAT SEN/CIRCUIT	3	×	EC-1042
P0117	ECT SEN/CIRCUIT	3	×	EC-1046
P0118	ECT SEN/CIRCUIT	3	×	EC-1046
P0122	APP SEN 1/CIRCUIT	1	—	EC-1050
P0123	APP SEN 1/CIRCUIT	1	—	EC-1050
P0182	FUEL TEMP SEN/CIRC	3	×	EC-1055
P0183	FUEL TEMP SEN/CIRC	3	×	EC-1055
P0192	FRP SEN/CIRC	3	×	EC-1059
P0193	FRP SEN/CIRC	3	×	EC-1059
P0200	INJECTOR	3	×	EC-1064
P0201	CYL1 INJECTOR	3	×	EC-1066
P0202	CYL2 INJECTOR	3	×	EC-1066
P0203	CYL3 INJECTOR	3	×	EC-1066
P0204	CYL4 INJECTOR	3	×	EC-1066
P0217	ENG OVER TEMP	1	×	EC-1072
P0222	APP SEN 2/CIRCUIT	1	—	EC-1088
P0223	APP SEN 2/CIRCUIT	1	—	EC-1088
P0234	TC SYSTEM	1	—	EC-1093
P0237*3	TC BOOST SEN/CIRC	3	×	EC-1101
P0238*3	TC BOOST SEN/CIRC	3	×	EC-1101
P0335	CKP SEN/CIRCUIT	3	×	EC-1106
P0336	CKP SENSOR	3	×	EC-1111
P0340	CMP SEN/CIRCUIT	3	×	EC-1117
P0341	CMP SENSOR	3	×	EC-1123
P0380	GLOW RELAY	3	×	EC-1129

DTC*1 *2 (CONSULT-II, GST)	Items (CONSULT-II screen item)	Trip	MI lighting up	Reference page
P0401*3	EGR SYSTEM	3	×	EC-1133
P0404	EGR VALVE	3	×	EC-1142
P0563	BATTERY VOLTAGE	1	—	EC-1151
P0605	ECM	3	×	EC-1153
P0606	ECM	3	×	EC-1155
P0628	FUEL PUMP/CIRC	3	×	EC-1157
P0629	FUEL PUMP/CIRC	3	×	EC-1157
P0642	SENSOR PWR/CIRC1	3	×	EC-1162
P0643	SENSOR PWR/CIRC1	3	×	EC-1162
P0652	SENSOR PWR/CIRC2	3	×	EC-1167
P0653	SENSOR PWR/CIRC2	3	×	EC-1167
P0686	ECM RELAY	1	—	EC-1172
P1211	TCS C/U FUNCTN	1	—	EC-1175
P1212	TCS/CIRC	1	—	EC-1176
P1260	INJ ADJ RES/CIRC1	3	×	EC-1177
P1261	INJ ADJ RES/CIRC1	3	×	EC-1177
P1262	INJ ADJ RES/CIRC2	3	×	EC-1177
P1263	INJ ADJ RES/CIRC2	3	×	EC-1177
P1264	INJ ADJ RES/CIRC3	3	×	EC-1177
P1265	INJ ADJ RES/CIRC3	3	×	EC-1177
P1266	INJ ADJ RES/CIRC4	3	×	EC-1177
P1267	INJ ADJ RES/CIRC4	3	×	EC-1177
P1268	INJECTOR 1	1	—	EC-1182
P1269	INJECTOR 2	1	—	EC-1182
P1270	INJECTOR 3	1	—	EC-1182
P1271	INJECTOR 4	1	—	EC-1182
P1272	FRP RELIEF VALVE	3	×	EC-1188
P1273	FUEL PUMP	3	×	EC-1194
P1274	FUEL PUMP	1	×	EC-1199
P1275	FUEL PUMP	1	×	EC-1204
P1610 - P1617	NATS MALFUNTION	1	—	EC-962
P2135	APP SENSOR	1	—	EC-1209
P2146	INJ PWR/CIRC	3	×	EC-1214
P2147	INJECTOR/CIRC	3	×	EC-1219
P2148	INJECTOR/CIRC	3	×	EC-1219
P2149	INJ PWR/CIRC	3	×	EC-1214
P2228	BARO SEN/CIRC	3	×	EC-1225
P2229	BARO SEN/CIRC	3	×	EC-1225

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: For YD22DDTi engine models

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS0137K

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. Information necessary to service the system safely is included in the SRS 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 SRS 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.**

On Board Diagnostic (OBD) System of Engine

EBS0137L

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.

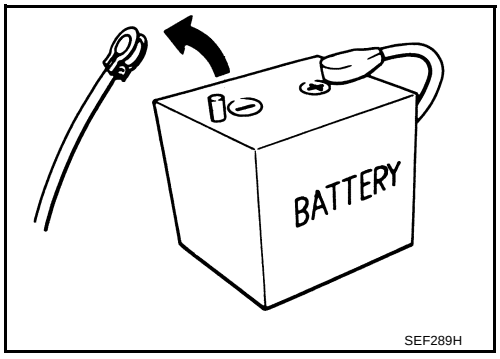
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground 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 EL-7, HARNESS CONNECTOR.**
- **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.**

Precautions

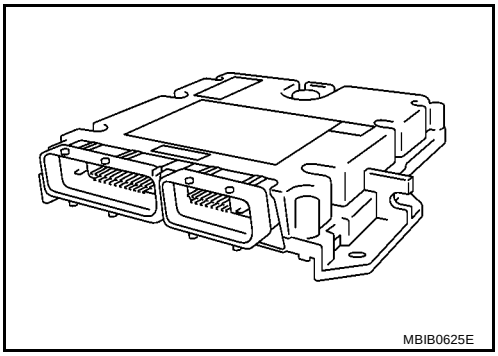
EBS0137M

- **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 battery ground 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.**

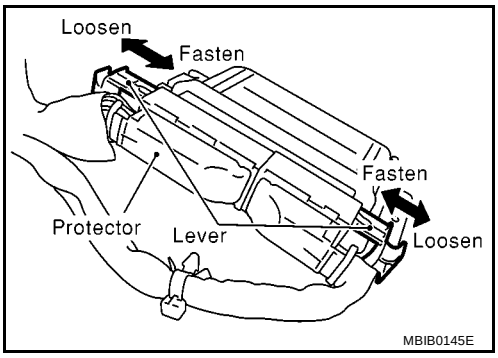


SEF289H

- **Do not disassemble ECM.**

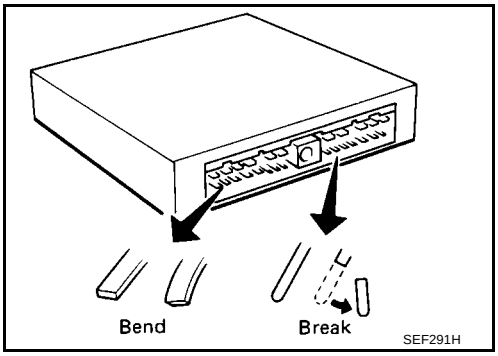

MBIB0625E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



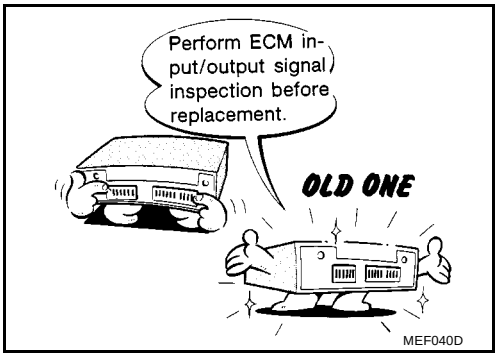
MBIB0145E

- **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.**



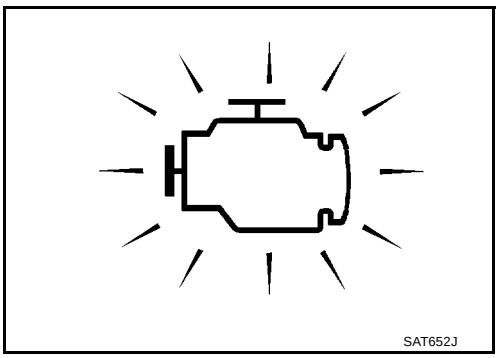
SEF291H

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-984, "ECM Terminals And Reference Value" .**
- **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.**

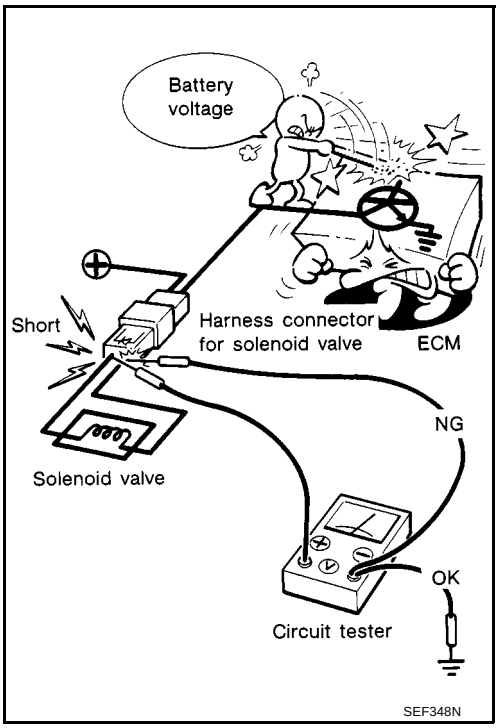


MEF040D

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

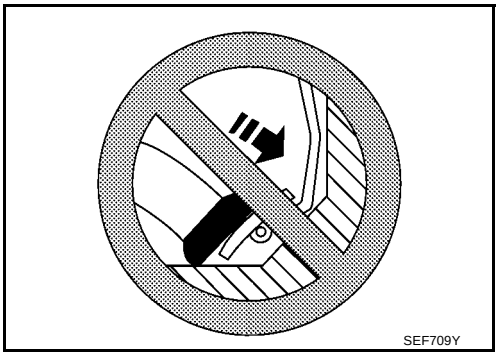

SAT652J

- **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.

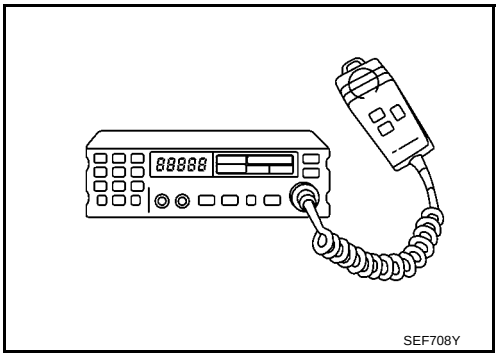


SEF348N

- **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.**


SEF709Y

- **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.**


SEF708Y

Wiring Diagrams and Trouble Diagnosis

EBS0137N

When you read Wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAM”
- EL-11, “POWER SUPPLY ROUTING” for power distribution circuit

When you perform trouble diagnosis, refer to the following:

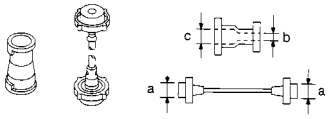
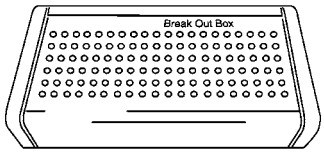
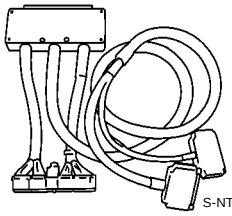
- GI-32, “How to Follow Test Groups in Trouble Diagnoses”
- GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”

PREPARATION

PFP:00002

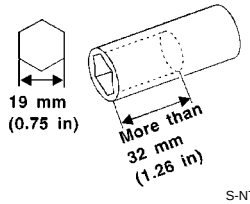
Special Service Tools

EBS0137O

Tool number Tool name	Description	
EG17650301 Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

EBS0137P

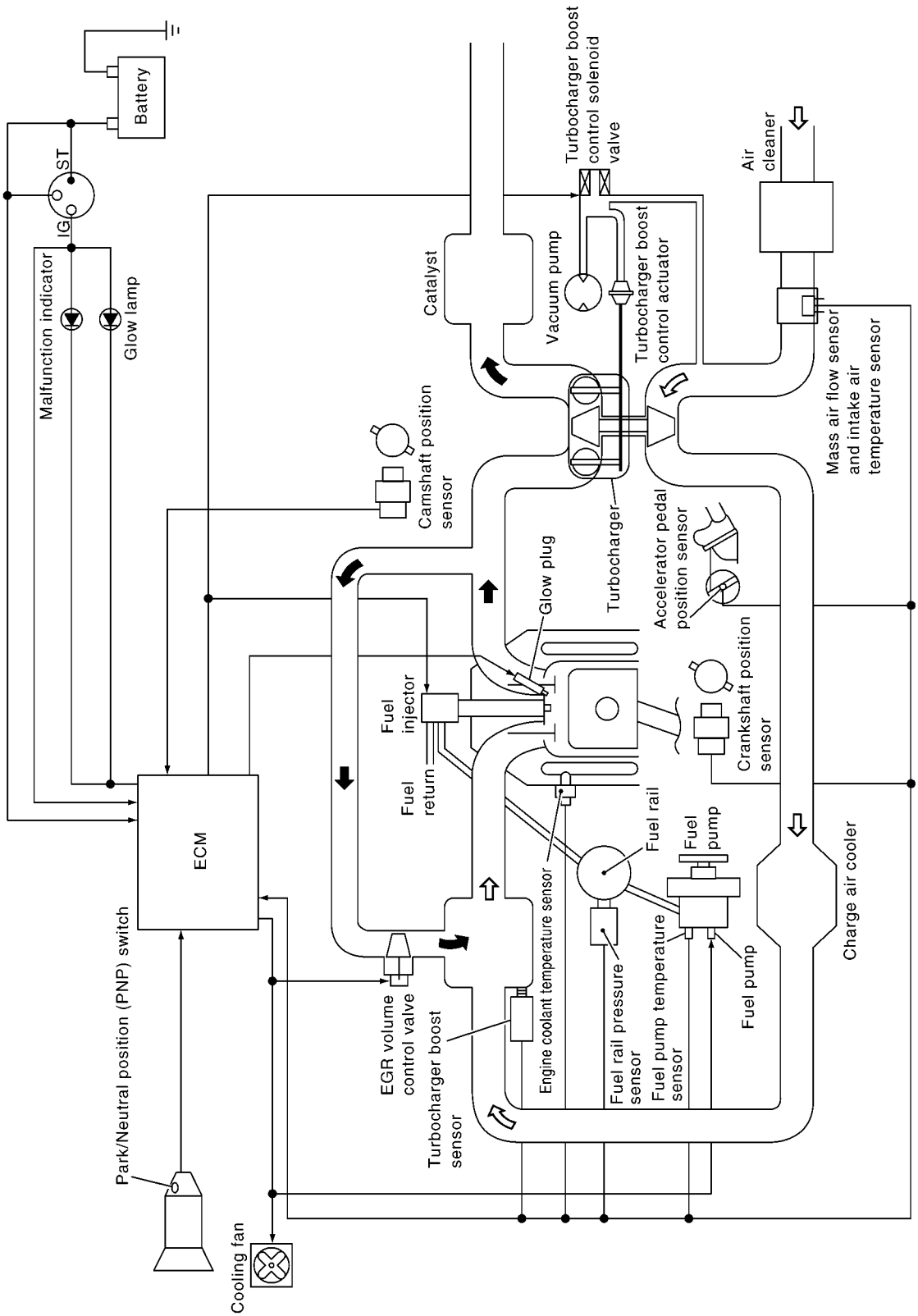
Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram(YD22DDTi Engine Models)

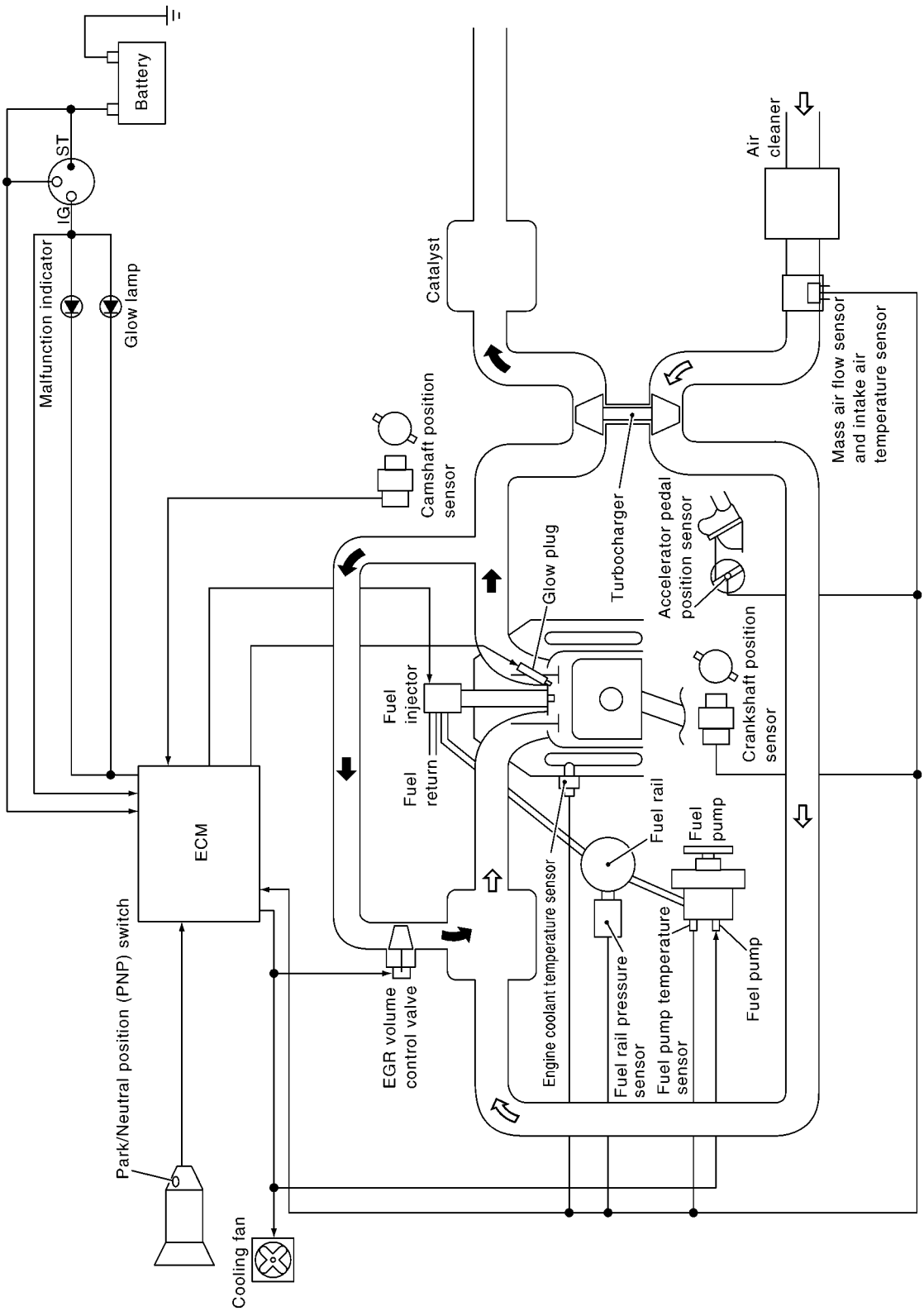
EBS0137Q



MBIB0608E

System Diagram(YD22DDT Engine Models)

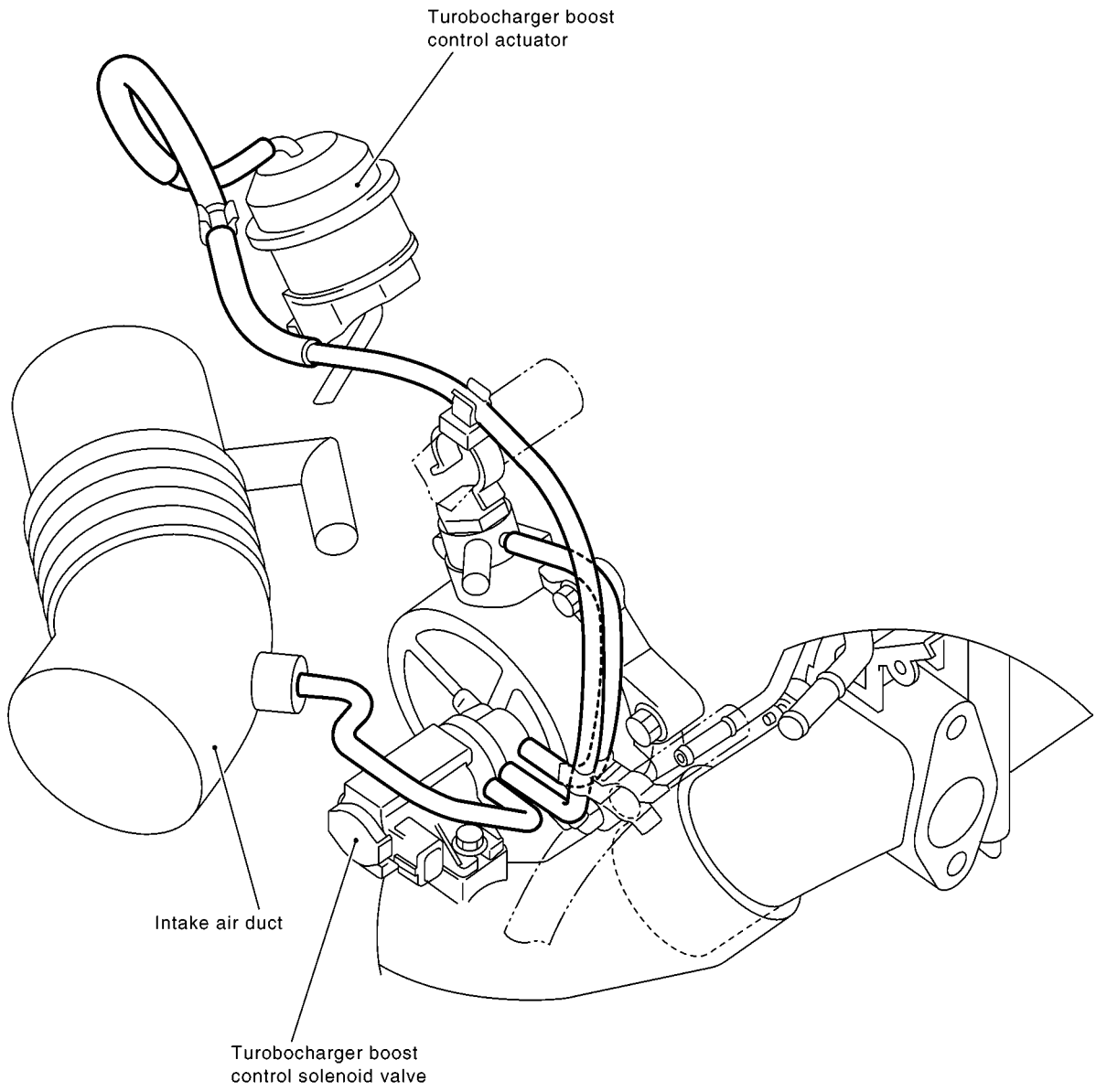
EBS016L9



MBIB0620E

Vacuum Hose Drawing(YD22DDTi Engine Models)

EBS0137R



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

MBIB0609E

Refer to EC-947, "System Diagram(YD22DDTi Engine Models)" for Vacuum Control System.

System Chart

EBS0137S

Input (Sensor)	ECM Function	Output (Actuator)
● Accelerator pedal position sensor ● Fuel rail pressure sensor ● Fuel pump temperature sensor ● Engine coolant temperature sensor ● Mass air flow sensor ● Intake air temperature sensor ● Crankshaft position sensor ● Camshaft position sensor ● Turbocharger boost sensor*3 ● Vehicle speed sensor*1 ● ESP/TCS/ABS control unit*1 ● Ignition switch ● Stop lamp switch ● Air conditioner switch*1 ● Park/neutral position switch ● Battery voltage ● Power steering pressure switch	Fuel injection control	Fuel injector and Fuel pump
	Fuel injection timing control	Fuel injector and Fuel pump
	Fuel cut control	Fuel injector and Fuel pump
	Glow control system	Glow relay and glow indicator lamp*2
	On board diagnostic system	Malfunction indicator (MI)*2
	EGR volume control	EGR volume control valve
	Cooling fan control	Cooling fan relay*2
	Turbocharger boost control*3	Turbocharger boost control solenoid valve*3
	Air conditioning cut control	Air conditioner relay*2

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.
*3: For YD22DDTi engine models

Fuel Injection Control System

EBS0137T

SYSTEM DESCRIPTION

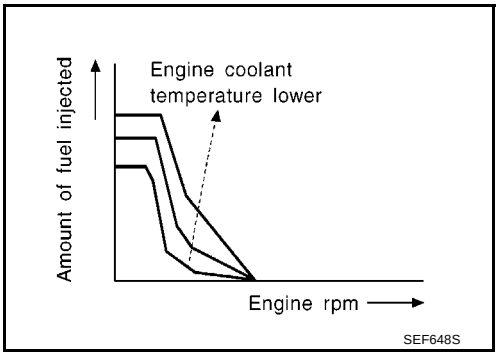
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.
Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (start control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Piston position		
Ignition switch	Start signal		
Fuel rail pressure sensor	Fuel rail pressure		

When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.
For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.



IDLE CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (Idle control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Battery	Battery voltage		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Vehicle speed sensor*	Vehicle speed		
Air conditioner switch*	Air conditioner signal		

*: The input signal is sent to the ECM through CAN communication line.

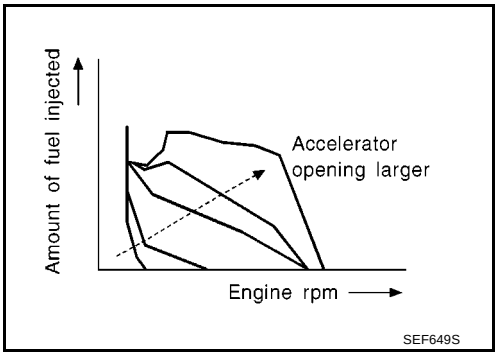
When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Accelerator pedal position sensor	Accelerator position		
Fuel rail pressure sensor	Fuel rail pressure		

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM.
The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.



MAXIMUM AMOUNT CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection control (Maximum amount control)	Fuel Injector
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor	Engine speed		
Accelerator pedal position sensor	Accelerator pedal position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions.
This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection control (Deceleration control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

EBS0137U

DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

Air Conditioning Cut Control

EBS0137V

INPUT / OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay*2
Accelerator pedal position sensor	Accelerator pedal opening angle		
Vehicle speed sensor*1	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.
When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (At No Load & High Engine Speed)

EBS0137W

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor*	Vehicle speed	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor	Engine speed		

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 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.

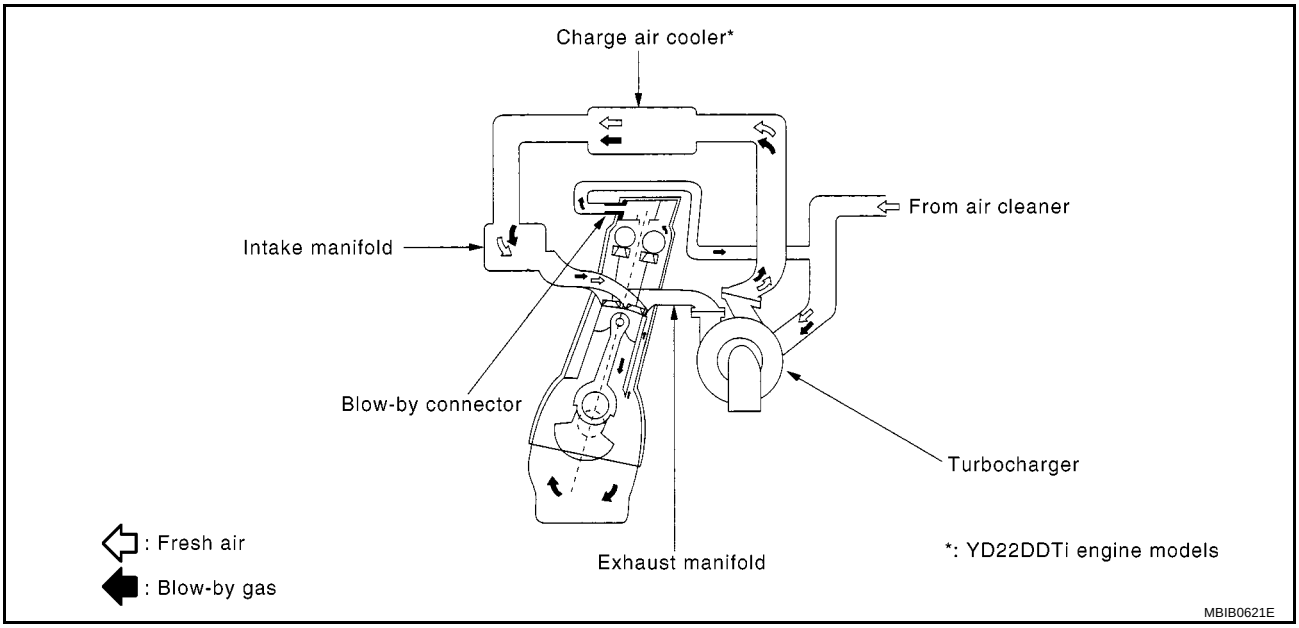
NOTE:
This function is different from deceleration control listed under EC-950, "Fuel Injection Control System" .

Crankcase Ventilation System

EBS0137X

DESCRIPTION

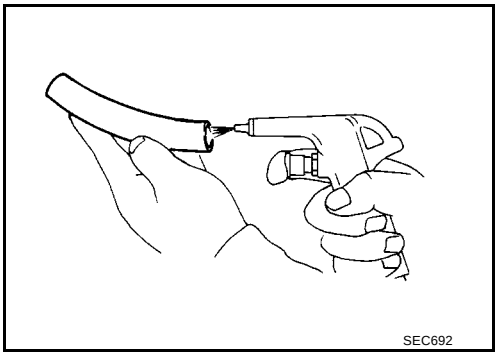
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



INSPECTION

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



CAN Communication

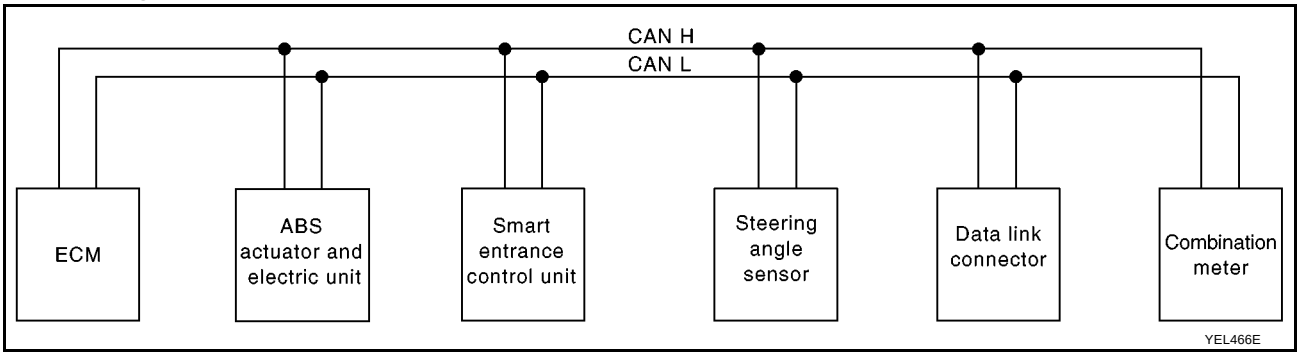
EBS0160I

SYSTEM DESCRIPTION

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.

MODELS WITH ESP

System diagram



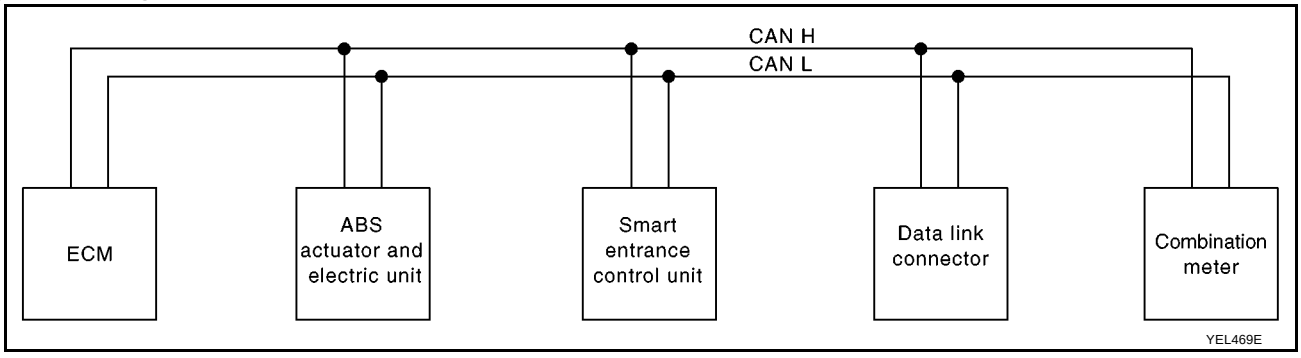
Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ESP/TCS/ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Engine speed signal	T	R			R
Air conditioner switch signal	R				T
MI signal	T				R
Glow indicator lamp signal	T				R
Engine coolant temperature signal	T				R
Fuel consumption signal	T				R
Vehicle speed signal		T			R
	R				T
Seat belt reminder signal			R		T
Headlamp switch signal			T		R
Flashing indicator signal			T		R
Engine cooling fan speed signal	T		R		
Door switches state signal			T		R
A/C compressor signal	T		R		
Accelerator pedal position signal	T	R			
Steering angle sensor signal		R		T	
ABS warning lamp signal		T			R
Slip indicator lamp signal		T			R
VDC off indicator lamp signal		T			R
Brake warning lamp signal		T			R

MODELS WITHOUT ESP

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T			R
Air conditioner switch signal	R			T
MI signal	T			R
Glow indicator lamp signal	T			R
Engine coolant temperature signal	T			R
Fuel consumption signal	T			R

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Vehicle speed signal		T		R
	R			T
Seat belt reminder signal			R	T
Headlamp switch signal			T	R
Flashing indicator signal			T	R
Engine cooling fan speed signal	T		R	
Door switches state signal			T	R
A/C compressor signal	T		R	
ABS operation signal		T		R
ABS warning lamp signal		T		R

BASIC SERVICE PROCEDURE

PFP:00018

Fuel Filter

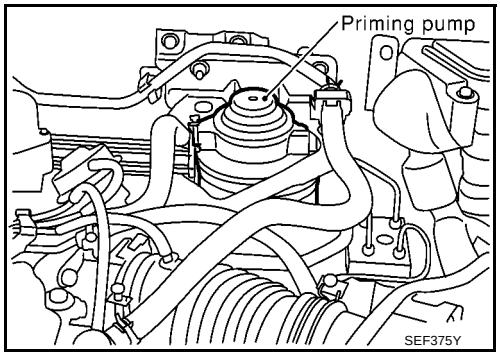
EBS0137Z

DESCRIPTION

A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING

Pump the priming pump to bleed air.



- When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop the operation at that time.
- If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the fuel gallery. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, then bleed air again.
- Start engine and let it idle for at least 1 minute after performing air bleeding.

WATER DRAINING

1. Remove the fuel filter, filter bracket, protector assembly from the dash panel as follows.

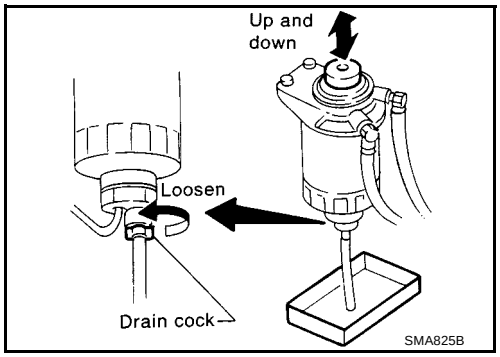
a. Remove the air cleaner case (upper), air duct assembly, and vacuum hose for brake booster (between the vacuum pump and vacuum pipe).

CAUTION:
After the duct is removed, cover the opening with gum tape, etc. to prevent foreign object from getting into the engine during the operation.

b. Remove the mounting nuts on the dash panel, then remove the fuel filter, filter bracket, and protector assembly from the dash panel.

- It is not necessary to disconnect the fuel hose.

2. Using a tool such as a pliers, loosen the water draining cock at the bottom of the fuel filter.
Loosening drain cock four to five turns causes water to start draining.
Do not remove drain cock by loosening it excessively.
If water dose not drain properly, move the priming up and down.



CAUTION:
When the water is drained, the fuel is also drained. Use a pan, etc. to avoid fuel adherence to the rubber parts such as the engine mount insulator.
Do not over-tighten the water draining cock. This will damage the cock thread, resulting in water or fuel leak.

3. Bleed air of the fuel filter. Refer to EC-956, "AIR BLEEDING" .
4. Start the engine.

Fuel Pump Learning Value Clearing

EBS01380

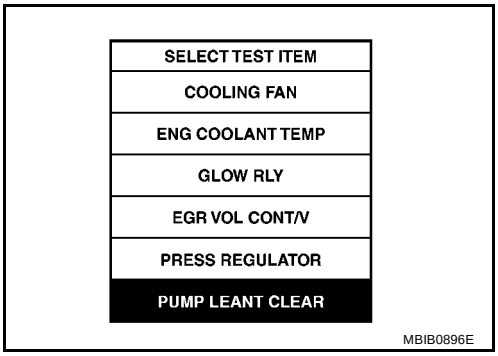
DESCRIPTION

In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.
Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operating to clear the value of the fuel pump learning.
It must be performed after the fuel pump is changed. When the ECM is replaced with brand new one, the Fuel Pump Learning Value Clearing is not necessary to be performed. If the ECM to be replaced has the possibility of learning the characteristic value of fuel pump, the Fuel Pump Learning Value Clearing is necessary to be performed after the ECM has been replaced.

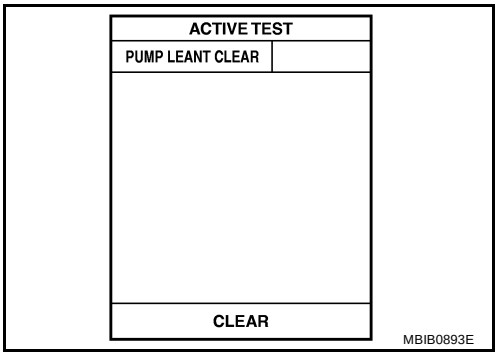
OPERATION PROCEDURE

NOTE:
Remove fuel pump without starting engine after performing Fuel Pump Learning Value Clearing.

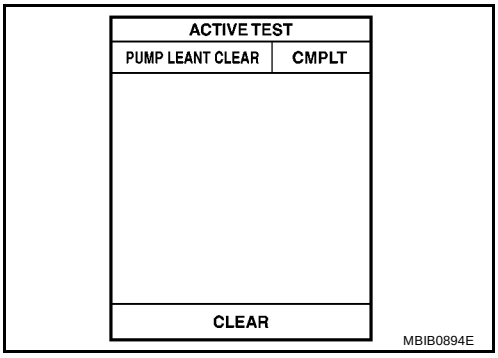
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

EBS01381

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	ISO Standard
Diagnostic Trouble Code (DTC)	Mode 3 of ISO 15031-5
Freeze Frame data	Mode 2 of ISO 15031-5
1st/2nd Trip Diagnostic Trouble Code (1st/2nd Trip DTC)	Mode 7 of ISO 15031-5
Calibration ID	Mode 9 of ISO 15031-5

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

×: Applicable —: Not applicable

	DTC	1st trip DTC	2nd trip DTC	Freeze Frame data
CONSULT-II	×	×	×	×
GST	×	×	×	×

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in three consecutive trips (Three trip detection logic).

Three Trip Detection Logic and One Trip Detection Logic

EBS01382

On board diagnosis (OBD) system of this vehicle has “Three Trip Detection Logic” and “One Trip Detection Logic”. For which logic each self-diagnosis corresponds with, refer to EC-938, "INDEX FOR DTC" .
“Trip” of “Three Trip Detection Logic” means a driving mode in which the self-diagnosis is performed while driving.

THREE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this stage. <1st trip>
When the same malfunction is detected again during the next driving, 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this stage. <2nd trip>
When the same malfunction is detected again at the third driving, DTC and Freeze Frame Data are stored in the ECM memory and 2nd trip DTC is cleared from the ECM memory. MI illuminates at the same time when DTC is stored. <3rd trip>
In other words, DTC and Freeze Frame Data are stored and MI illuminates when the same malfunction occurs in 3 consecutive trips.
This is called “Three Trip Detection Logic”.

ONE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, DTC and Freeze Frame Data are stored in the ECM memory and MI lights up. This is called “One Trip Detection Logic”. Some self-diagnoses will not illuminate MI when DTC is stored. (Refer to EC-958, "Emission-related Diagnostic Information" .) 1st/2nd trip DTC is not stored for one trip detection logic.

Emission-related Diagnostic Information

EBS01383

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen item)	DTC*1 *2 (CONSULT-II, GST)	1st/2nd trip DTC	MI lighting up	Reference page
CAN COMM CIRCUIT	U1000	—	—	EC-1011
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—
CMP/CKP RELATION	P0016	×	×	EC-1014
TC BOOST SOL/CIRC*3	P0045	×	×	EC-1016
HIGH FUEL PRESS	P0088	×	×	EC-1021

Items (CONSULT-II screen item)	DTC*1 *2 (CONSULT-II, GST)	1st/2nd trip DTC	MI lighting up	Reference page
FUEL PUMP	P0089	×	×	EC-1023
FUEL LEAK	P0093	×	×	EC-1026
MAF SENSOR	P0101	×	×	EC-1030
MAF SEN/CIRCUIT	P0102	×	×	EC-1037
MAF SEN/CIRCUIT	P0103	×	×	EC-1037
IAT SEN/CIRCUIT	P0112	×	×	EC-1042
IAT SEN/CIRCUIT	P0113	×	×	EC-1042
ECT SEN/CIRCUIT	P0117	×	×	EC-1046
ECT SEN/CIRCUIT	P0118	×	×	EC-1046
APP SEN 1/CIRCUIT	P0122	—	—	EC-1050
APP SEN 1/CIRCUIT	P0123	—	—	EC-1050
FUEL TEMP SEN/CIRC	P0182	×	×	EC-1055
FUEL TEMP SEN/CIRC	P0183	×	×	EC-1055
FRP SEN/CIRC	P0192	×	×	EC-1059
FRP SEN/CIRC	P0193	×	×	EC-1059
INJECTOR	P0200	×	×	EC-1064
CYL1 INJECTOR	P0201	×	×	EC-1066
CYL2 INJECTOR	P0202	×	×	EC-1066
CYL3 INJECTOR	P0203	×	×	EC-1066
CYL4 INJECTOR	P0204	×	×	EC-1066
ENG OVER TEMP	P0217	—	×	EC-1072
APP SEN 2/CIRCUIT	P0222	—	—	EC-1088
APP SEN 2/CIRCUIT	P0223	—	—	EC-1088
TC SYSTEM	P0234	—	—	EC-1093
TC BOOST SEN/CIRC*3	P0237	×	×	EC-1101
TC BOOST SEN/CIRC*3	P0238	×	×	EC-1101
CKP SEN/CIRCUIT	P0335	×	×	EC-1106
CKP SENSOR	P0336	×	×	EC-1111
CMP SEN/CIRCUIT	P0340	×	×	EC-1117
CMP SENSOR	P0341	×	×	EC-1123
GLOW RELAY	P0380	×	×	EC-1129
EGR SYSTEM*3	P0401	×	×	EC-1133
EGR VALVE	P0404	×	×	EC-1142
BATTERY VOLTAGE	P0563	—	—	EC-1151
ECM	P0605	×	×	EC-1153
ECM	P0606	×	×	EC-1155
FUEL PUMP/CIRC	P0628	×	×	EC-1157
FUEL PUMP/CIRC	P0629	×	×	EC-1157
SENSOR PWR/CIRC1	P0642	×	×	EC-1162
SENSOR PWR/CIRC1	P0643	×	×	EC-1162
SENSOR PWR/CIRC2	P0652	×	×	EC-1167
SENSOR PWR/CIRC2	P0653	×	×	EC-1167
ECM RELAY	P0686	—	—	EC-1172

Items (CONSULT-II screen item)	DTC*1 *2 (CONSULT-II, GST)	1st/2nd trip DTC	MI lighting up	Reference page
TCS C/U FUNCTN	P1211	—	—	EC-1175
TCS/CIRC	P1212	—	—	EC-1176
INJ ADJ RES/CIRC1	P1260	×	×	EC-1177
INJ ADJ RES/CIRC1	P1261	×	×	EC-1177
INJ ADJ RES/CIRC2	P1262	×	×	EC-1177
INJ ADJ RES/CIRC2	P1263	×	×	EC-1177
INJ ADJ RES/CIRC3	P1264	×	×	EC-1177
INJ ADJ RES/CIRC3	P1265	×	×	EC-1177
INJ ADJ RES/CIRC4	P1266	×	×	EC-1177
INJ ADJ RES/CIRC4	P1267	×	×	EC-1177
INJECTOR 1	P1268	—	—	EC-1182
INJECTOR 2	P1269	—	—	EC-1182
INJECTOR 3	P1270	—	—	EC-1182
INJECTOR 4	P1271	—	—	EC-1182
FRP RELIEF VALVE	P1272	×	×	EC-1188
FUEL PUMP	P1273	×	×	EC-1194
FUEL PUMP	P1274	—	×	EC-1199
FUEL PUMP	P1275	—	×	EC-1204
NATS MALFUNTION	P1610 - P1617	—	—	EC-962
APP SENSOR	P2135	—	—	EC-1209
INJ PWR/CIRC	P2146	×	×	EC-1214
INJECTOR/CIRC	P2147	×	×	EC-1219
INJECTOR/CIRC	P2148	×	×	EC-1219
INJ PWR/CIRC	P2149	×	×	EC-1214
BARO SEN/CIRC	P2228	×	×	EC-1225
BARO SEN/CIRC	P2229	×	×	EC-1225

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: For YD22DDTi engine models

DTC AND 1ST/2ND TRIP DTC

The number of 1st/2nd trip DTC is the same as the number of DTC.
When a malfunction is detected during 1st trip, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this time. When the same malfunction is detected in the next trip (2nd trip), 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this time. In addition, DTC is stored in the ECM memory and Mi lights up when the same malfunction is detected during the following consecutive trip (3rd trip).
The procedure for erasing DTC, 1st trip DTC, and 2nd trip DTC from the ECM memory is described in EC-961, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st/2nd trip DTC are displayed, Refer to EC-958, "Emission-related Diagnostic Information" .
1st/2nd trip DTC is specified in Mode 7 of ISO15031-5. 1st/2nd trip DTC detection occurs without lighting up MI and therefore does not warn the driver of a malfunction.
When 1st/2nd trip DTC is detected, check, print out or write down, and erase 1st/2nd trip DTC as specified with step II of Work Flow, refer to EC-968, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, it is necessary to investigate the cause again.

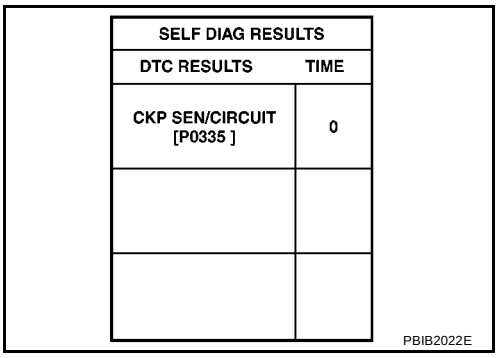
How to Read DTC and 1st/2nd Trip DTC

DTC and 1st/2nd trip DTC can be read by the following procedures.

With CONSULT-II

With GST

ONSULT-II or GST (Generic Scan Tool): Examples: P0117, P0335, P1260, etc.
These numbers are prescribed by ISO 15031-6.
(CONSULT-II also displays the malfunctioning parts and systems.)
A sample of CONSULT-II display for DTC and 1st/2nd trip DTC is shown in the figure. DTC and 1st/2nd trip DTC are displayed in the “SELF-DIAG RESULTS” mode of CONSULT-II.
“TIME” data shows how many times the vehicle was driven after the last detection of DTC or 1st/2nd trip DTC. When DTC or 1st/2nd trip DTC has been detected currently, “TIME” becomes “0”.



- CONSULT-II displays for DTC and 1st/2nd trip DTC become the same.
- The output of a DTC indicates a malfunction. However, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify the malfunction status. Therefore the use of CONSULT-II (If available) is recommended.

FREEZE FRAME DATA

ECM records driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed, and intake manifold pressure at the moment a malfunction is detected.
The data stored together with DTC is called Freeze Frame Data, and is displayed on CONSULT-II or GST.
When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.
Only a set of Freeze Frame Data can be stored in the ECM memory. When ECM records Freeze Frame Data, and another Freeze Frame Data is generated after that, the first (original) Freeze Frame Data is not updated in ECM and it remains.
When the DTC is erased from ECM memory, Freeze Frame Data is erased with DTC. The procedure for erasing DTC is described in EC-961, "How to Erase DTC" .

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

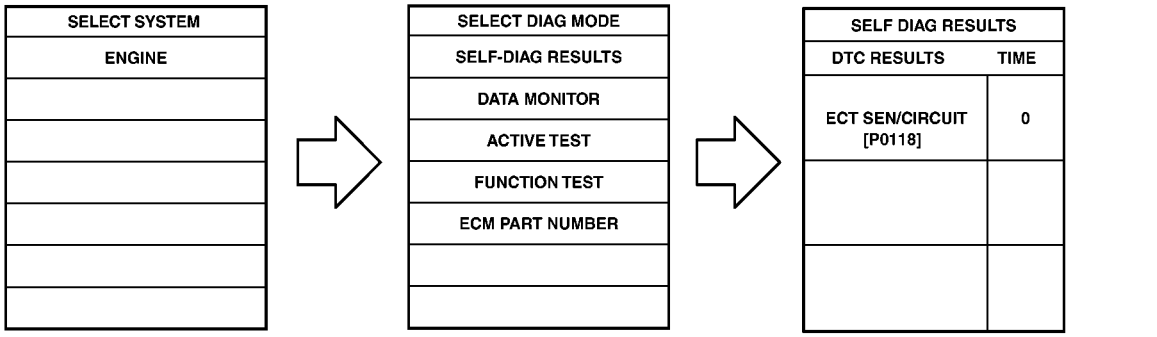
The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.

4. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” again.



2. Turn CONSULT-II “ON” and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

MBIB0895E

With GST

The emission related diagnostic information in the ECM can be erased by selecting MODE 4 with GST.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Select MODE 4 with GST (Generic Scan Tool).

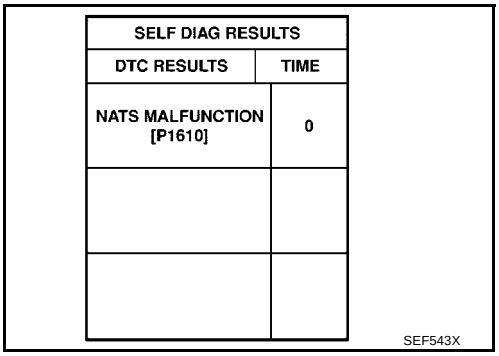
- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - 2nd trip diagnostic trouble codes
  - Freeze frame 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.

NATS (Nissan Anti-theft System)

EBS01384

- **If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to EL-352, “NATS (NISSAN ANTI-THEFT SYSTEM)”.**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DAIG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedure of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.



SEF543X

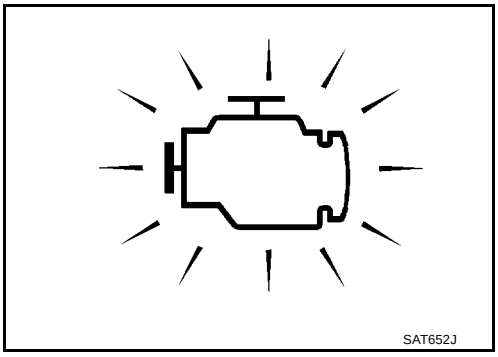
Malfunction Indicator (MI)

EBS01385

DESCRIPTION

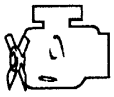
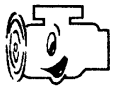
The MI is located on the instrument panel.

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 EL-115, “WARNING LAMPS” or see EC-1250, "MI & DATA LINK CONNECTORS" .
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 two 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. (See EC-1250, "MI & DATA LINK CONNECTORS" .)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.

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 EL-115, “WARNING LAMPS” or see EC-1250, "MI & DATA LINK CONNECTORS" .

Diagnostic Test Mode I - Malfunction Warning

MI	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

EBS01386

RELATIONSHIP BETWEEN MI, 1ST/2ND TRIP DTC, DTC, AND DETECTABLE ITEMS

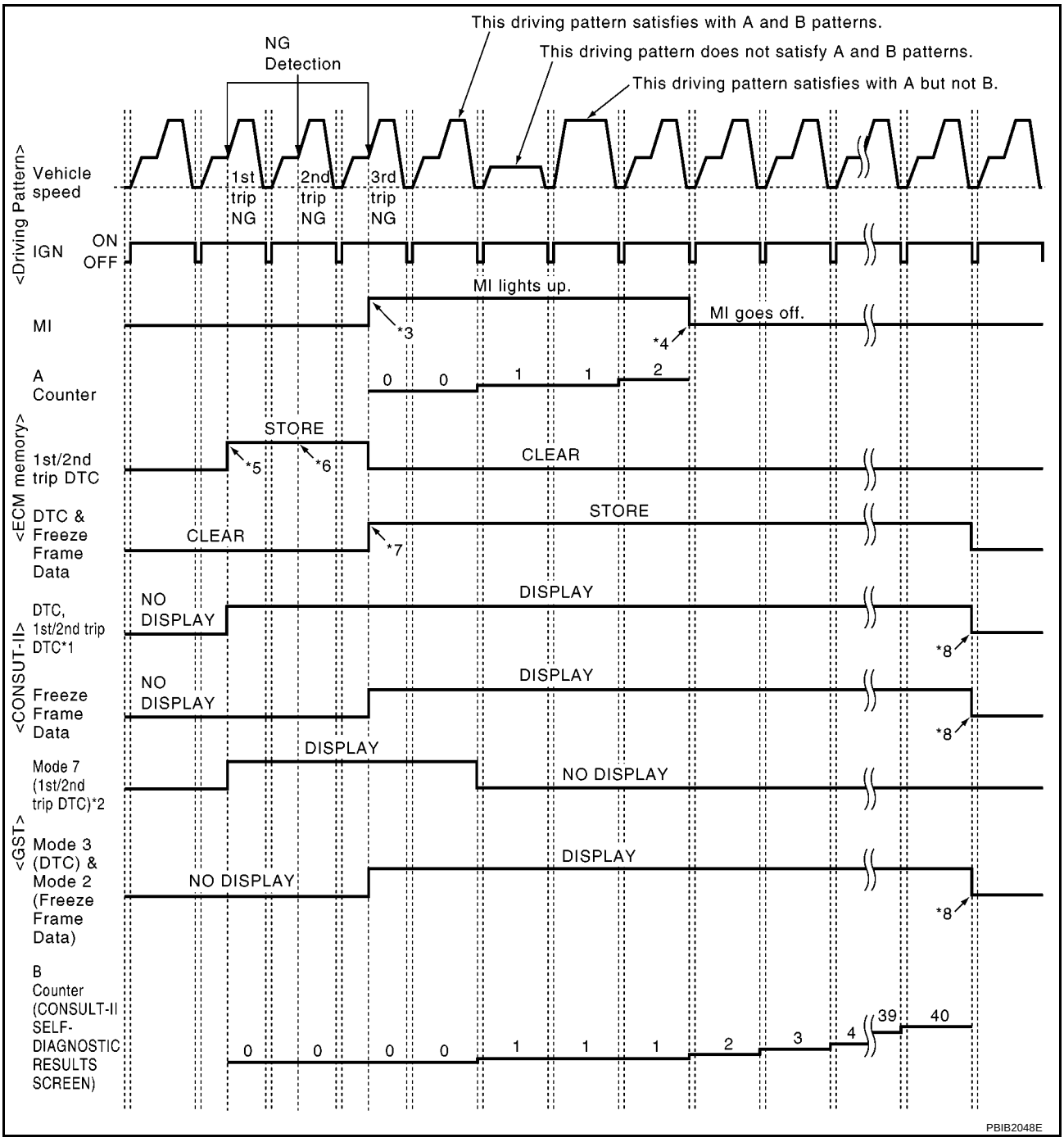
- When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.
- When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.
- When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored and MI illuminates. Refer to EC-958, "Three Trip Detection Logic and One Trip Detection Logic" for details.1st/2nd trip DTC are cleared from the ECM memory.
- MI will go off after the vehicle is driven 3 consecutive times with no malfunction (driving pattern A).
- 1st/2nd trip DTC, DTC, and Freeze Frame Data will be stored until the vehicle is driven 41 times (driving pattern B) without the same malfunction recurring. “TIME” data displayed in the “SELF-DIAG RESULTS” mode of CONSULT-II shows the number of times the vehicle is driven without the same malfunction recurring.

SUMMARY CHART

Items	Trip	Counter	Driving Pattern
MI (goes off)	3	2	A
DTC, Freeze Frame Data (clear)	41	40	B
1st/2nd Trip DTC (clear)	41	40	B

Refer to EC-966 for details of pattern A and B.

RELATIONSHIP BETWEEN MI, DTC, 1ST/ 2NDTRIP DTC AND DRIVING PATTERNS



*1: CONSULT-II displays for DTC and 1st/2nd trip DTC become the same.

*2: 1st/2nd trip DTC becomes the same display in mode7 of GST.

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

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

*5: When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.

*6: When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.

*7: When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored.

*8: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 41 times (pattern B) without the same malfunction.

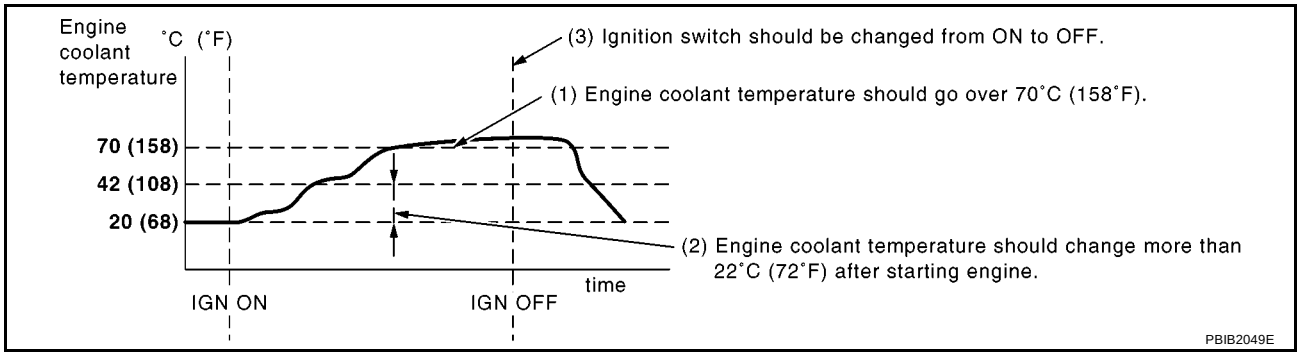
<Driving Pattern A>

Driving pattern A means the vehicle operation as follows:
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The A counter will be cleared when the same malfunction is detected.
- The A counter will be counted up when the same malfunction is not detected.
- The MI will go off when the A counter reaches 3.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
Driving pattern A and (1)-(3) are satisfied.



- The B counter will be cleared when the same malfunction is detected.
- The B counter will be counted up when the same malfunction is not detected.
- The DTC will not be displayed after the B counter reaches 40.

TROUBLE DIAGNOSIS

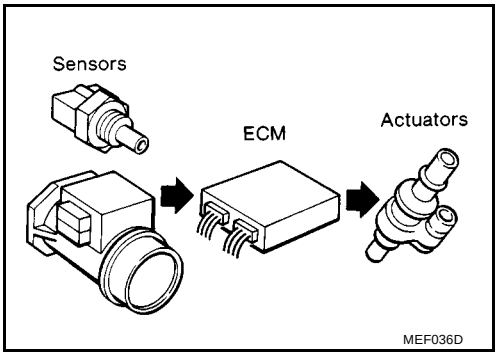
PFP:00004

Trouble Diagnosis Introduction

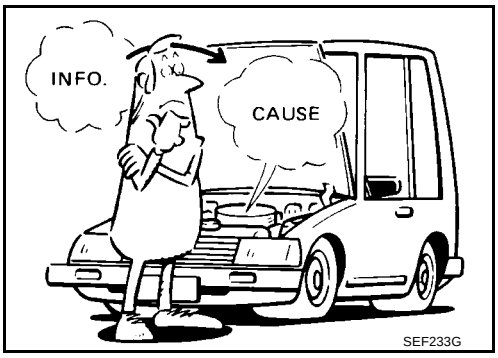
EBS01387

INTRODUCTION

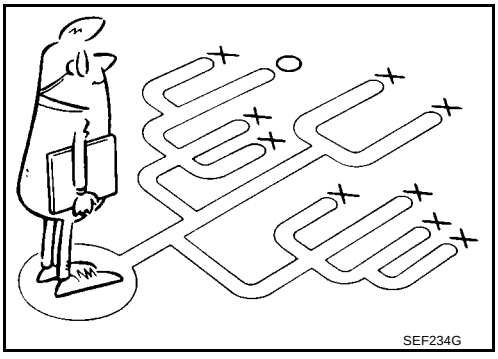
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.



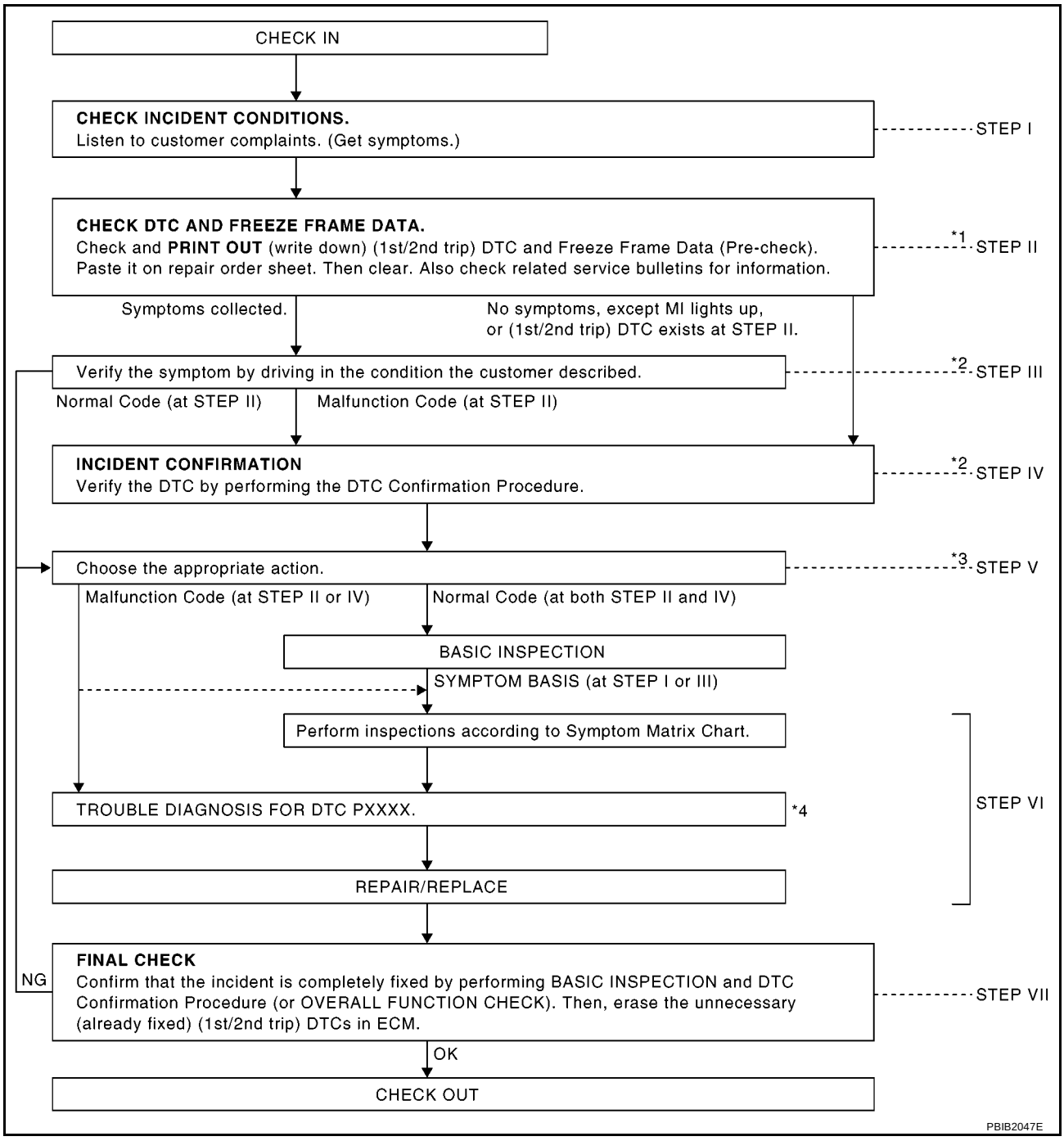
It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the EC-968, "WORK FLOW" .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.
Start your diagnosis by looking for conventional incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.



WORK FLOW



*1 If time data of “SELF-DIAG RESULTS” is other than “0”, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1003, "MAIN POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-969, "DIAGNOSTIC WORK SHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st/2nd trip) DTC and the freeze frame data (When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.), then erase the DTC and the data. (Refer to EC-961, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st/2nd trip) DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st/2nd trip) DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. See EC-975 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st/2nd trip) DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the (1st/2nd trip) DTC and freeze frame data by using CONSULT-II or GST. During the (1st/2nd trip) DTC verification, be sure to connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The (1st/2nd trip) DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The NG result of the Overall Function Check is the same as the (1st/2nd trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-971 .)Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-975 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-984, "ECM Terminals And Reference Value" , EC-999, "CONSULT-II Reference Value in Data Monitor Mode" . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-21, “HOW TO PERFOPRM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st/2nd trip) DTC in ECM. (Refer to EC-961, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)

DIAGNOSTIC WORK SHEET

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 an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one shown below 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
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion when engine is cool ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ 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		☐ Turned on ☐ Not turned on	

MTBL0533

DTC Inspection Priority Chart

EBS01388

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to **EC-1011, "DTC U1000 CAN COMMUNICATION LINE"** .

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0016 Crankshaft position - camshaft position correlation ● P0101 P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P2135 Accelerator pedal position sensor ● P0182 P0183 Fuel pump temperature sensor ● P0192 P0193 Fuel rail pressure sensor ● P0237 P0238 Turbocharger boost sensor ● P0335 P0336 Crankshaft position sensor ● P0340 P0341 Camshaft position sensor ● P0563 Battery voltage ● P0605 P0606 ECM ● P0642 P0643 P0652 P0653 Sensor power supply ● P1260 - P1267 Fuel injector adjustment resistor ● P1610 - P1617 NATS ● P2228 P2229 Barometric pressure sensor
2	● P0045 Turbocharger boost control solenoid valve ● P0089 P0628 P0629 P1272 - P1275 Fuel pump ● P0200 - P0204 P1268 - P1271 P2146 - P2149 Fuel injector ● P0380 Glow relay ● P0404 EGR volume control valve ● P0686 ECM relay ● P1212 TCS communication line
3	● P0088 P0093 Fuel system ● P0217 Engine over temperature (OVERHEAT) ● P0234 Turbocharger system ● P0401 EGR function ● P1211 TCS control unit

Basic Inspection

EBS01389

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

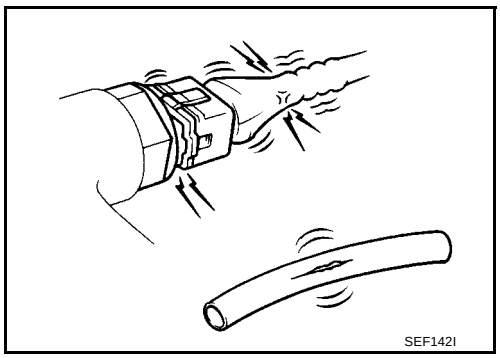
- **Headlamp switch is OFF.**
- **On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.**
- **Air conditioner switch is OFF.**
- **Rear defogger switch is OFF.**
- **Steering wheel is in the straight-ahead position, etc.**

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-8, “PERIODIC MAINTENANCE (FOR EUROPE)”.
3. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts

4. Start engine and warm it up to the normal operating temperature.


SEF142I

>> GO TO 2.

2. PREPARATION FOR CHECKING IDLE SPEED

With CONSULT-II

Connect CONSULT-II to the data link connector.

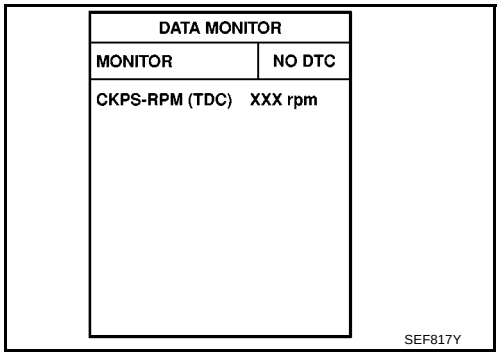
>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-II

1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
2. Read idle speed.

725±25 rpm



SEF817Y

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to EC-956, "AIR BLEEDING" .

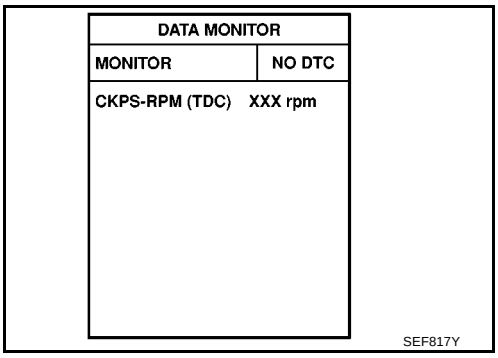
>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

Drain water from fuel filter. Refer to EC-956, "WATER DRAINING" .

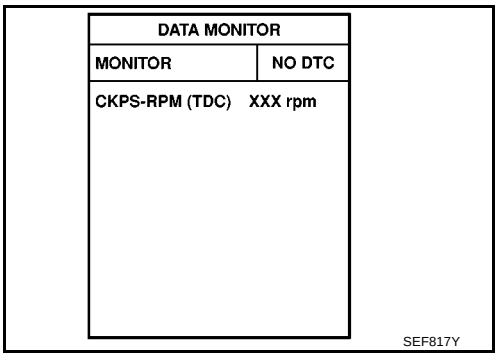
>> GO TO 8.

8. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK AIR CLEANER FILTER

Check air cleaner filter for clogging or breaks.

OK or NG

OK >> GO TO 10.
NG >> Replace air cleaner filter.

10. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK BATTERY

Refer to SC-3, “BATTERY”.

OK or NG

OK >> Check charging system. Refer to SC-24, “CHARGING SYSTEM”.
NG >> Repair or replace.

12. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-186, "CHECKING COMPRESSION PRESSURE" .

OK or NG

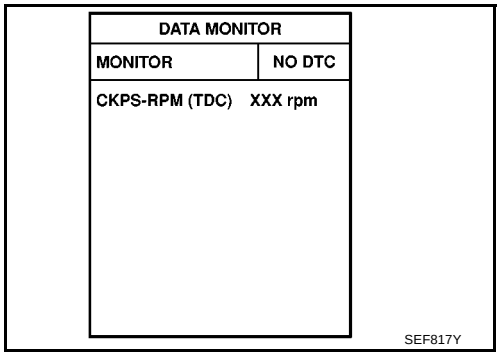
OK >> GO TO 11.
NG >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> 1. Replace fuel injector.
2. GO TO 3.

Symptom Matrix Chart

EBS0138A

SYSTEM — Basic engine control system		SYMPTOM: HARD/NO START/RESTART (EXCP. HA)				SYMPTOM: ENGINE STALL			SYMPTOM		SYMPTOM		SYMPTOM		Reference page
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
Fuel pump		5	5	5	5	5	5	5	5		5	5		5	—
Fuel injector		3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1066
Glow control system		1	1	1	1					1					EC-1227
Engine body		3	3	3	3	3	3	3		3	4	4		3	EM-197
EGR system											3	3			EC-1133
Air cleaner and duct											3	3			EM-119
Fuel rail pressure relief valve															EC-1026
ENGINE CONTROL	Fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1157
	Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1066
	Mass air flow sensor circuit								1		1	1			EC-1037
	Engine coolant temperature circuit			1		1		1						1	EC-1046
	Vehicle speed signal circuit											1			EL-110
	Accelerator pedal position sensor circuit								1		1	1			EC-1050,EC-1088 ,EC-1209
	Fuel rail pressure sensor circuit														EC-1059

SYSTEM — Basic engine control system		SYMPTOM: HARD/NO START/RESTART (EXCP. HA)				SYMPTOM: ENGINE STALL			SYMPTOM						Reference page
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1106
	Camshaft position sensor circuit			3	3										EC-1117
	Turbocharger boost sensor circuit								1		1	1			EC-1101
	Turbocharger boost control solenoid valve circuit								1		1	1			EC-1016
	Start signal circuit	1	1	1	1	1		1	1		1	1			EC-1247
	Ignition switch circuit		1			1	1	1							EC-1003
	Power supply for ECM circuit		1			1	1	1							EC-1003
	Cooling fan relay circuit														EC-1072
	EGR volume control valve circuit								1		1	1			EC-1142
	Glow relay circuit	1	1	1	1										EC-1129
	ECM relay (Self-shutoff) circuit		1				1	1	1						EC-1172
	ECM, connector circuit	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1153, EC-1155
NATS (Nissan Anti-theft System)			1												EC-962

1 - 5: The numbers refer to the order of inspection.
(continued on next page)

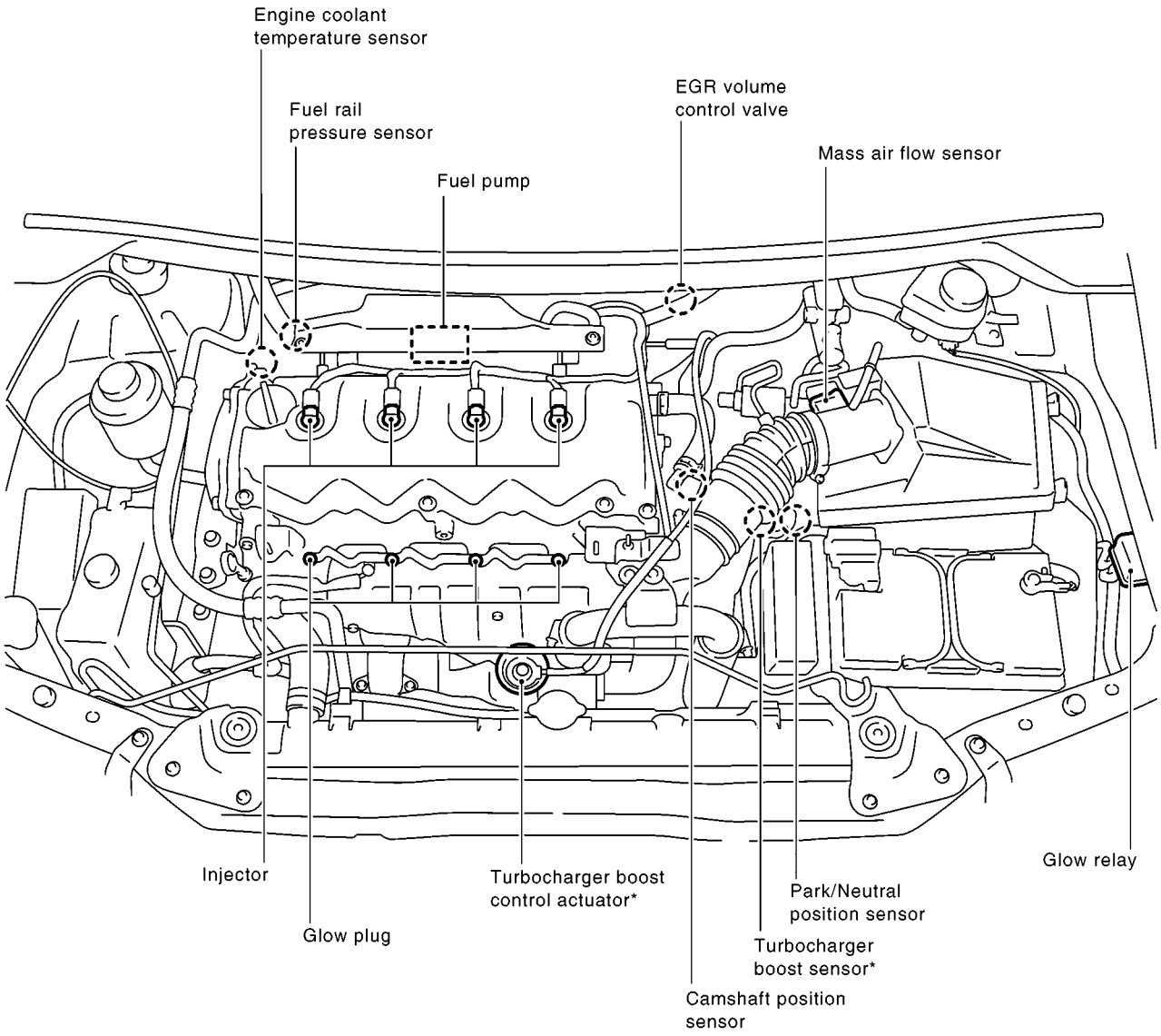
SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
Fuel pump		5	5	5		5					1	1	—
Fuel injector		3	3	3		4		4	4		1	1	EC-1066
Glow control system									1				EC-1227
Engine body			3	3	3	3	1		3				EM-197
EGR system								3					EC-1133
Air cleaner and duct								3					EM-119
Fuel rail pressure relief valve													EC-1026
ENGINE CONTROL	Fuel pump circuit	4	4	4		4					1	1	EC-1194
	Fuel injector circuit	1	1	1		1		1	1		1	1	EC-1066
	Mass air flow sensor circuit							1			1	1	EC-1037
	Engine coolant temperature circuit	1	1		1						1	1	EC-1046
	Vehicle speed signal circuit										1	1	EL-110
	Accelerator pedal position sensor circuit			1							1	1	EC-1050,EC-1088 ,EC-1209
	Fuel rail pressure sensor circuit										1	1	EC-1059

SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
ENGINE CONTROL	Crankshaft position sensor circuit	1	1								1	1	EC-1106
	Camshaft position sensor circuit										1	1	EC-1117
	Turbocharger boost sensor circuit										1	1	EC-1101
	Turbocharger boost control solenoid valve circuit							1	1				EC-1016
	Start signal circuit												EC-1247
	Ignition switch circuit												EC-1003
	Power supply for ECM circuit										1	1	EC-1003
	Cooling fan relay circuit				2								EC-1072
	EGR volume control valve circuit							1					EC-1142
	Glow relay circuit								1				EC-1129
	ECM relay (Self-shutoff) circuit											1	EC-1172
	ECM, connector circuit	2	2	2	2	2	2	2	2	2	2	2	EC-1153,EC-1225
NATS (Nissan Anti-theft System)												1	EC-962

1 - 5: The numbers refer to the order of inspection.

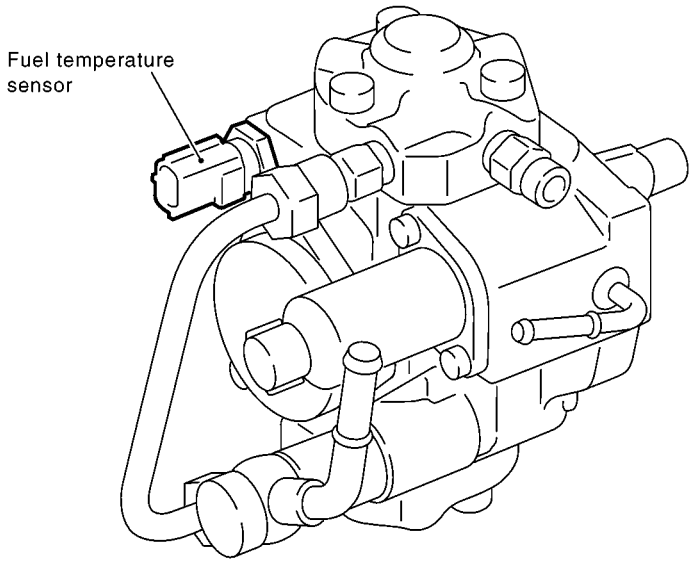
Engine Control Component Parts Location

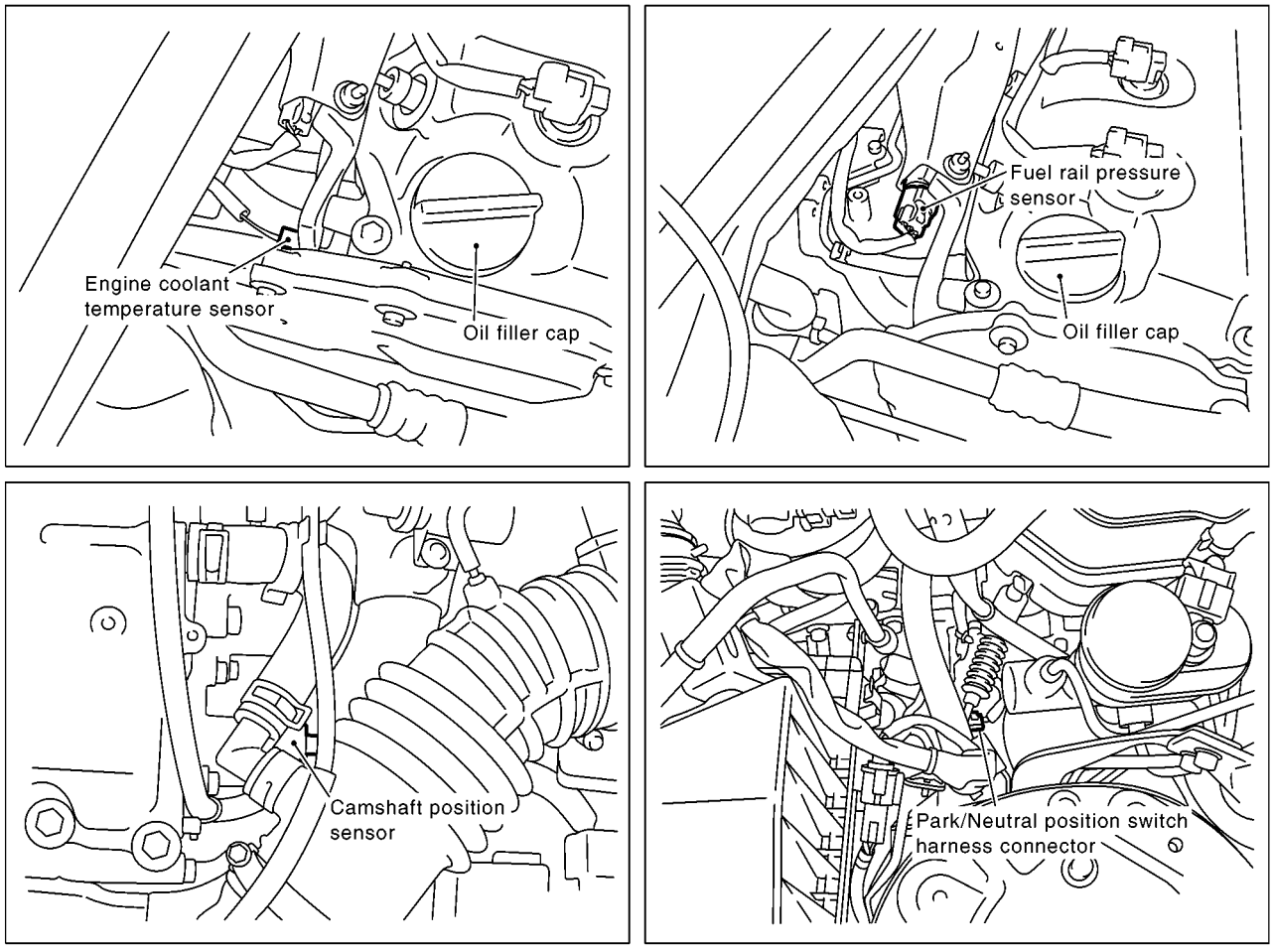
EBS0138B



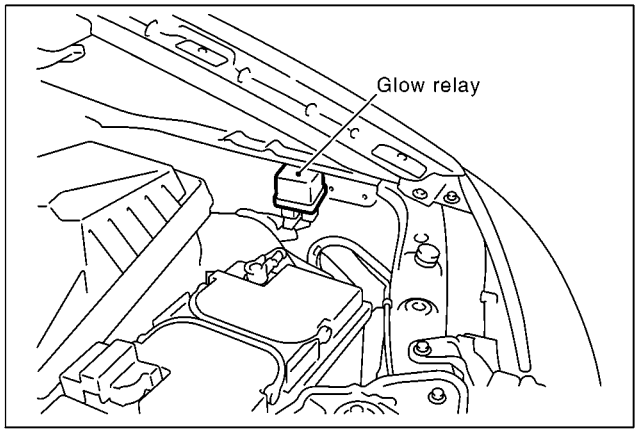
*: YD22DDTi engine models

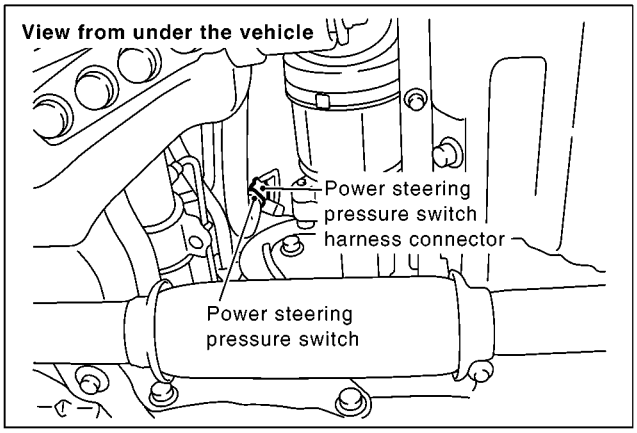
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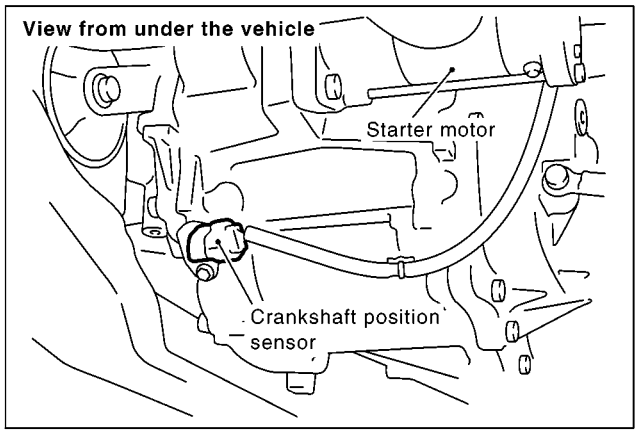

Fuel temperature
sensor

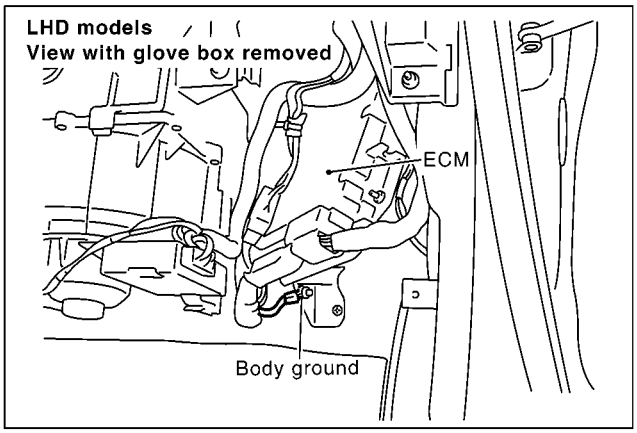

Engine coolant
temperature sensor
Oil filler cap
Fuel rail pressure
sensor
Oil filler cap
Camshaft position
sensor
Park/Neutral position switch
harness connector

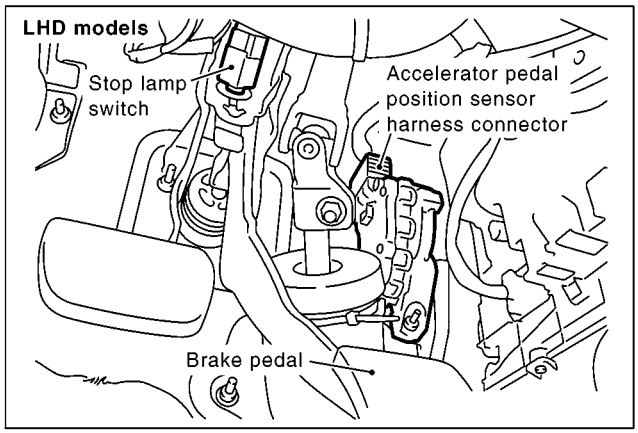
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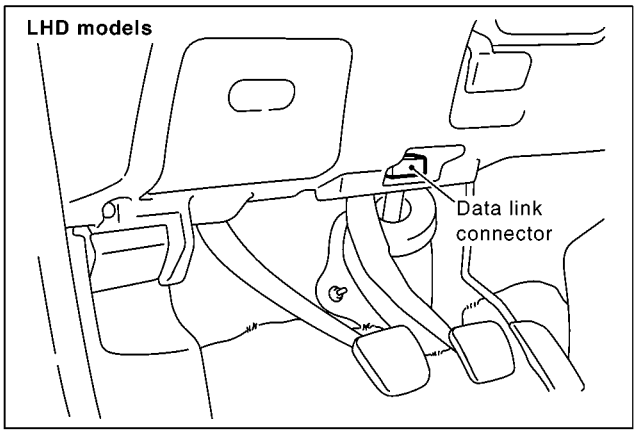

Glow relay

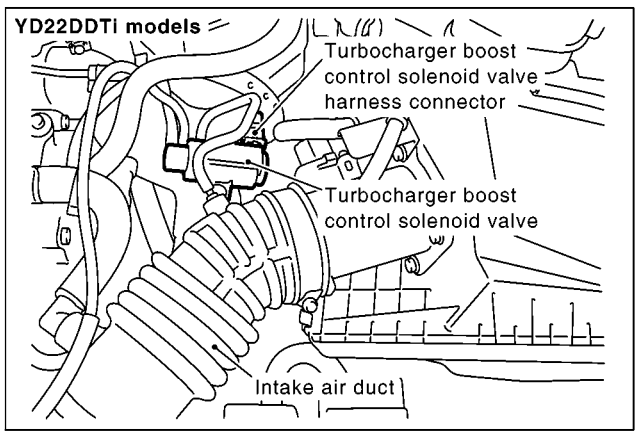

View from under the vehicle
Power steering pressure switch harness connector
Power steering pressure switch

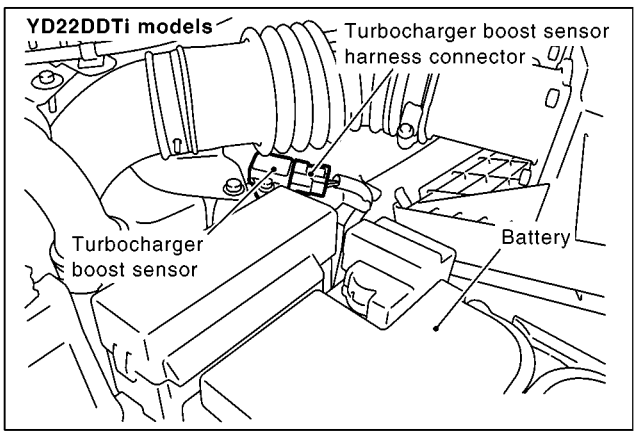

View from under the vehicle
Starter motor
Crankshaft position sensor


LHD models
View with glove box removed
ECM
Body ground


LHD models
Stop lamp switch
Accelerator pedal position sensor harness connector
Brake pedal


LHD models
Data link connector

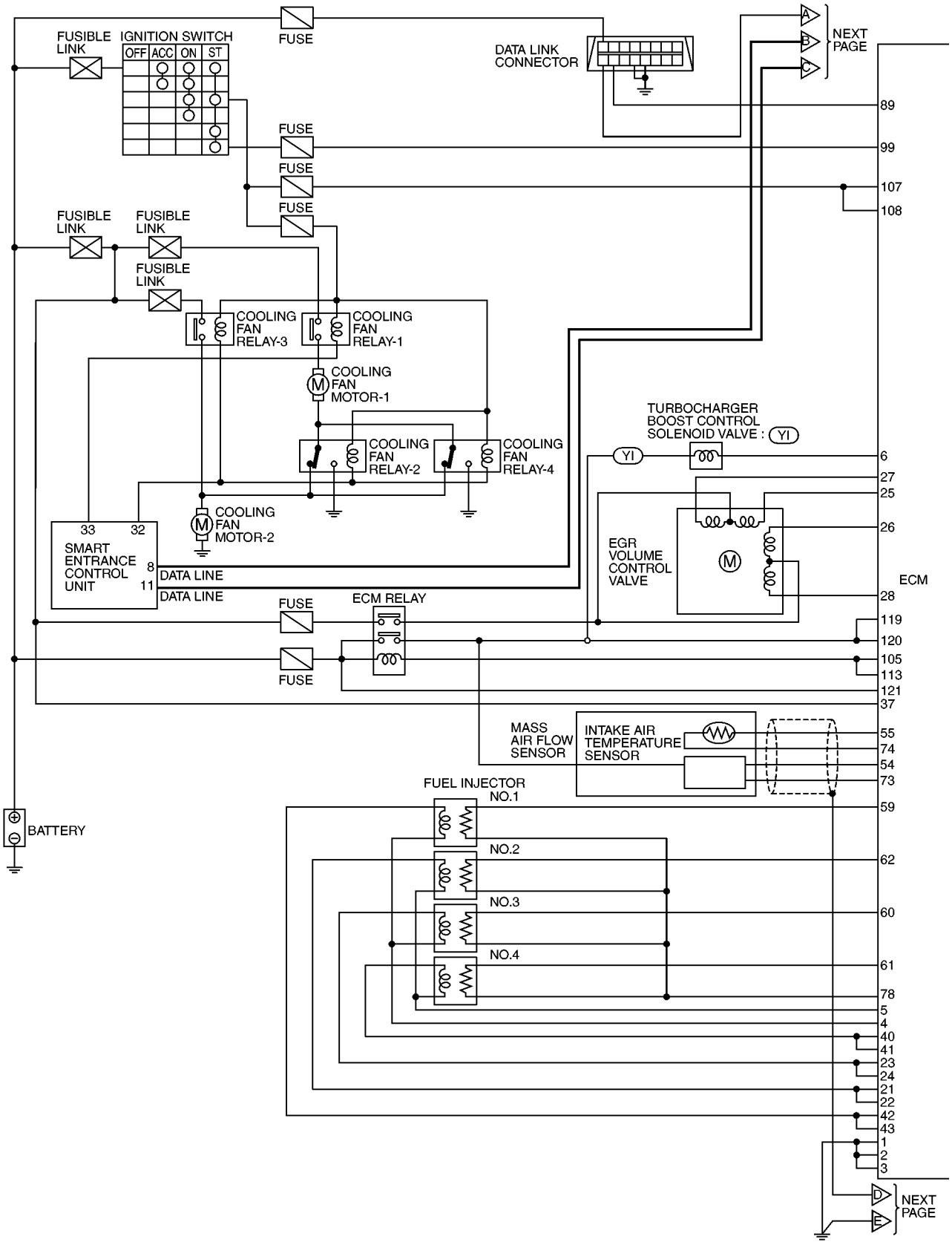

YD22DDTi models
Turbocharger boost control solenoid valve harness connector
Turbocharger boost control solenoid valve
Intake air duct


YD22DDTi models
Turbocharger boost sensor harness connector
Turbocharger boost sensor
Battery

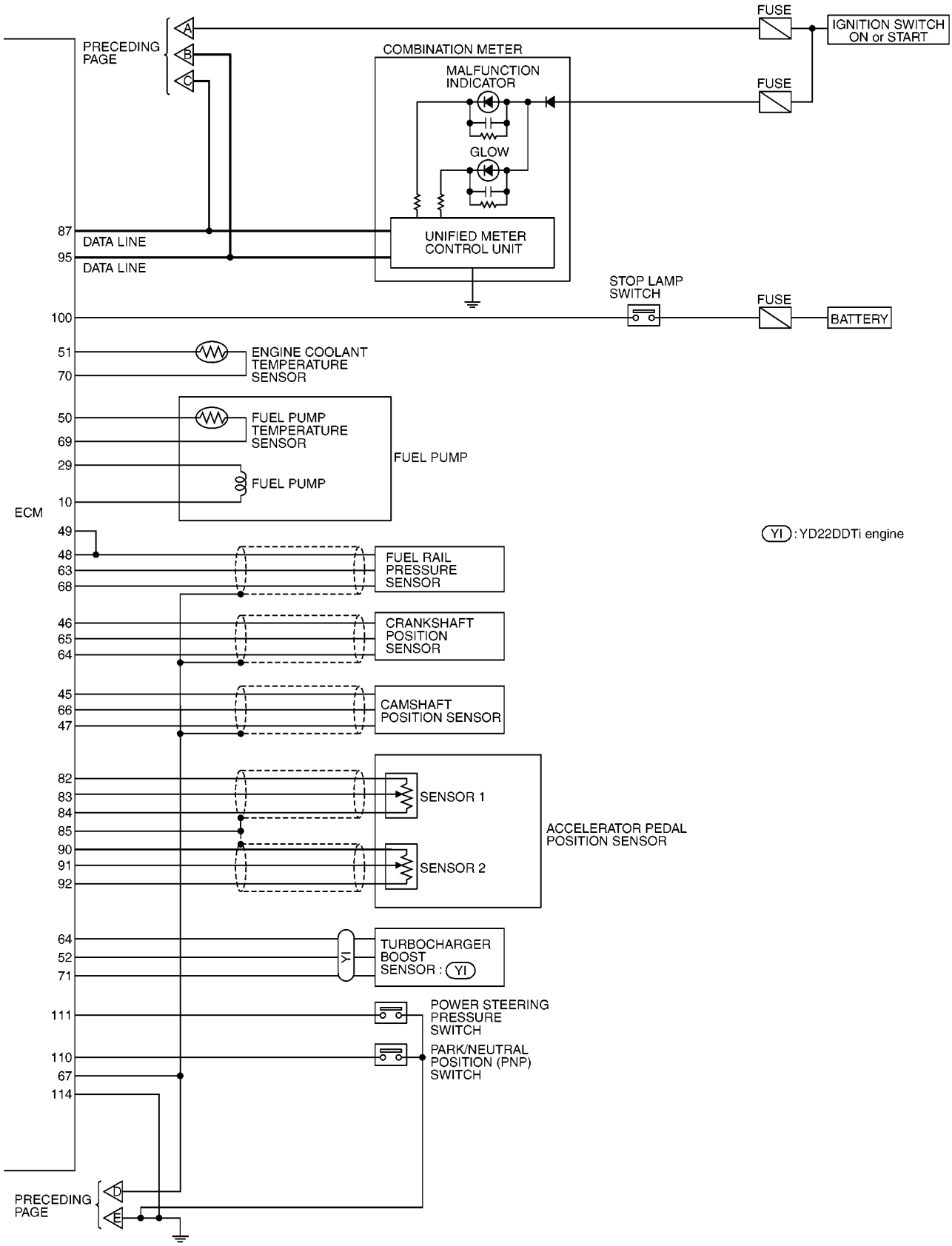
MBIB0920E

Circuit Diagram

EBS0138C



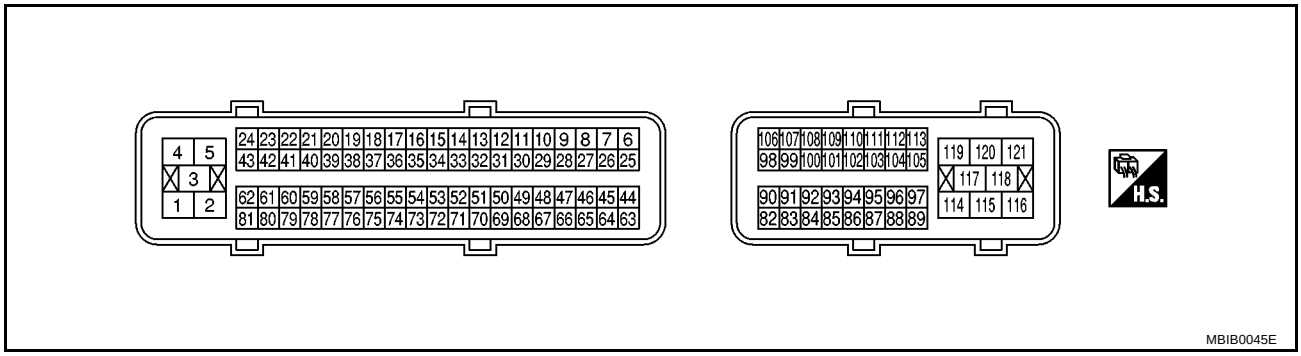
MBWA0630E


PRECEDING PAGE
A
B
C
FUSE
IGNITION SWITCH ON or START
COMBINATION METER
MALFUNCTION INDICATOR
FUSE
GLOW
87
DATA LINE
95
DATA LINE
UNIFIED METER CONTROL UNIT
STOP LAMP SWITCH
FUSE
100
BATTERY
51
70
ENGINE COOLANT TEMPERATURE SENSOR
50
69
FUEL PUMP TEMPERATURE SENSOR
29
FUEL PUMP
10
FUEL PUMP
ECM
YI : YD22DDTi engine
49
48
63
68
FUEL RAIL PRESSURE SENSOR
46
65
64
CRANKSHAFT POSITION SENSOR
45
66
47
CAMSHAFT POSITION SENSOR
82
83
84
85
90
91
92
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
64
52
71
YI
TURBOCHARGER BOOST SENSOR : YI
111
POWER STEERING PRESSURE SWITCH
110
67
PARK/NEUTRAL POSITION (PNP) SWITCH
114
PRECEDING PAGE
D
E

YEC493A

ECM Harness Connector Terminal Layout

EBS0138D

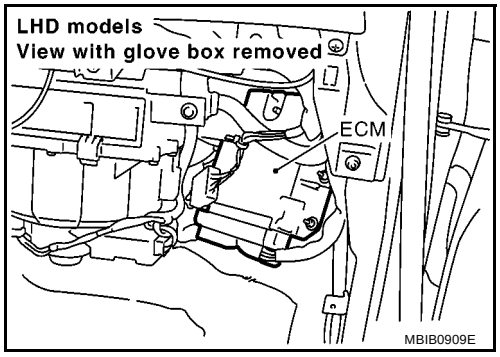


ECM Terminals And Reference Value

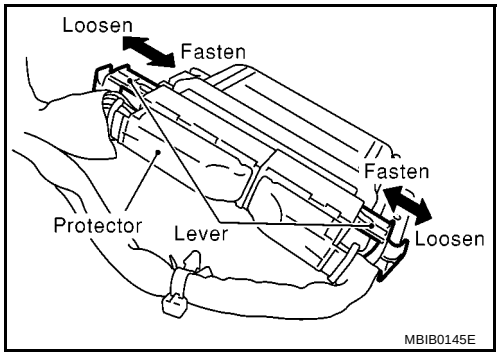
EBS0138E

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



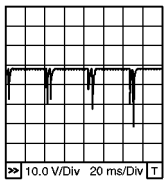
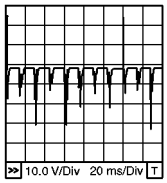
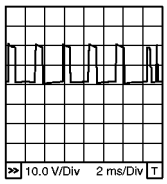
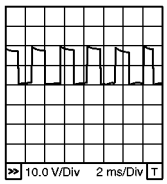
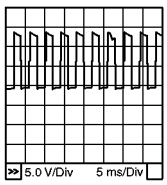
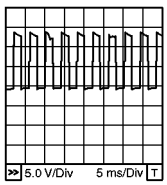
ECM INSPECTION TABLE

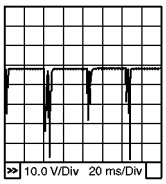
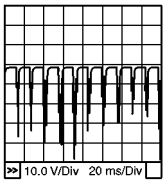
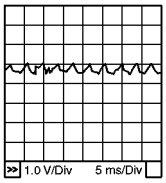
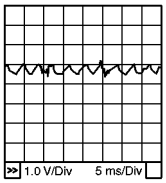
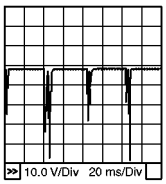
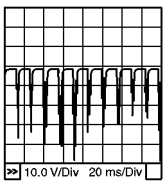
Remarks: Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

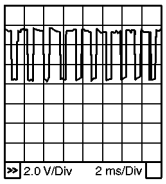
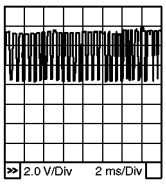
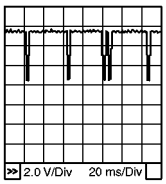
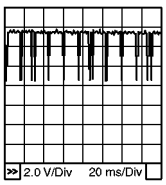
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4 5	O/B B	Fuel injector power supply (For cylinder No. 1 and 4) Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E
6	L	Turbocharger boost control solenoid valve*2	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E
37	N/R	Glow relay	Refer to EC-1227, "GLOW CONTROL SYSTEM" .	
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
48 49	R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.0 - 2.3V
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
51	L/OR	Engine coolant temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with engine coolant temperature

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
52	Y	Turbocharger boost sensor*2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 2.8V
54	W/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.8 - 2.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 3.0V
55	L/Y	Intake air temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.2V Output voltage varies with intake air temperature
59 60 61 62	L/G L/R R/Y LG/W	Fuel injector adjustment resistor No. 1 Fuel injector adjustment resistor No. 3 Fuel injector adjustment resistor No. 4 Fuel injector adjustment resistor No. 2	**[Ignition switch ON]**	0.5 - 5.1V (There are individual differences between fuel injector adjustment resistors.)
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	W	Turbocharger boost sensor power supply*2	**[Ignition switch ON]**	Approximately 5.3V
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
70	B	Engine coolant temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
71	B	Turbocharger boost sensor ground*2	**[Ignition switch ON]**	Approximately 0.3V
73	O/L	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
74	L/G	Intake air temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
78	R	Fuel injector adjustment resistor ground	**[Ignition switch ON]**	Approximately 0.3V
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
87	R	CAN communication line	**[Ignition switch ON]**	Approximately 2.0 - 2.6V Output voltage varies with the communication status.
89	LG	Data link connector	**[Ignition switch ON]** ● CONSULT-II or GST is disconnected.	Approximately 0V - Battery voltage (11 - 14V)
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V
95	L	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
99	B/Y	Start signal	**[Ignition switch ON]**	Approximately 0.3V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
100	R/G	Stop lamp switch	**[Ignition switch ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Gear position: Neutral	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
111	R/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

CONSULT-II Function

EBS0138F

FUNCTION

Diagnostic test mode	Function
Self-diagnostic results	Self-diagnostic results such as 1st/2nd trip DTC, DTC and 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-II 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.
ECM 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/2nd trip diagnostic trouble codes
- Freeze frame data

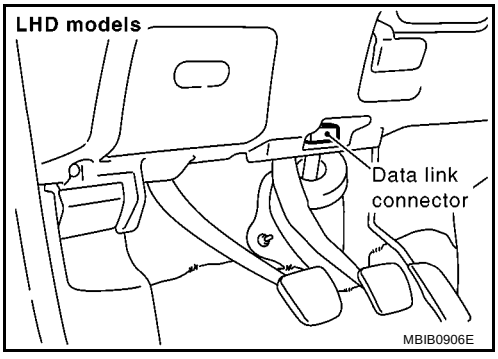
ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE			
			SELF-DIAG RESULTS		DATA MONITOR	ACTIVE TEST
			DTC*1	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor	×	×	×	
		Camshaft position sensor	×			
		Engine coolant temperature sensor	×	×	×	×
		Vehicle speed sensor	×	×	×	
		Fuel pump temperature sensor	×		×	
		Accelerator pedal position sensor 1	×		×	
		Accelerator pedal position sensor 2	×		×	
		Fuel rail pressure sensor	×		×	
		Mass air flow sensor	×		×	
		Intake air temperature sensor	×			
		Turbocharger boost sensor*2	×	×	×	
		Battery voltage	×		×	
		Park/neutral position (PNP) switch			×	
		Power steering pressure switch			×	
		Stop lamp switch			×	
		Barometric pressure sensor (built-into ECM)	×		×	
		Fuel injector adjustment resistor	×			
	OUTPUT	Fuel pump	×		×	×
		Fuel injector	×		×	×
		Glow relay	×		×	×
		Cooling fan relay	×		×	×
		EGR volume control valve	×		×	×
		Turbocharger boost control solenoid valve	×			

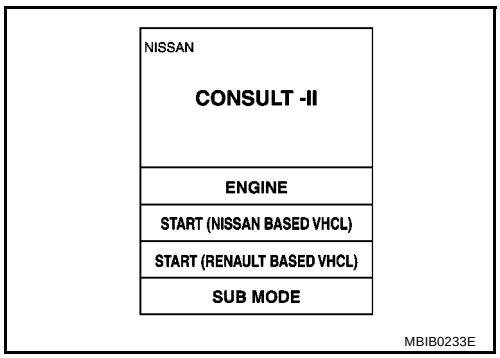
X: Applicable
*1: This item includes 1st/2nd trip DTCs.
*2: For YD22DDTi engine models

INSPECTION PROCEDURE

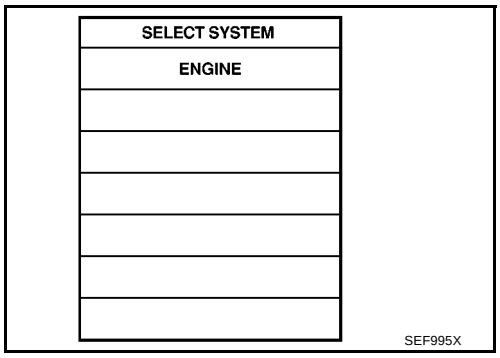
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

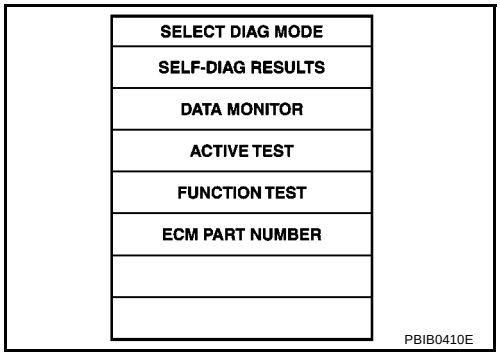


5. Touch “ENGINE”.
If “ENGINE” is not indicated, go to GI-37, “CONSULT-II Data Link Connector (DLC) Circuit”.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC and 1st/2nd trip DTC, refer to — EC-938, "INDEX FOR DTC" .

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-938, "INDEX FOR DTC" .)
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.
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.
INT MANI PRES* [kPa]	● The intake manifold pressure at the moment a malfunction is detected is displayed.

*: For YD22DDTi engine models

DATA MONITOR MODE

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	CONDITION	SPECIFICATION
CKPS·RPM (TDC) [rpm]	×	×		● The engine speed computed from the crankshaft position sensor signal is displayed.	
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 circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE [km/h] or [mph]	×	×		● The vehicle speed computed form the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	×	×		● The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN [V]	×	×		● The accelerator pedal position sensor 1 signal voltage is displayed.	
ACCEL SEN 2 [V]	×	×		● The accelerator pedal position sensor 2 signal voltage is displayed.	
ACT CR PRESS [MPa]	×	×		● The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT [V]	×	×		● The power supply voltage of ECM is displayed.	
P/N POSI SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from the park/neutral position switch signal.	
START SIGNAL [ON/OFF]	×	×		● indicates [ON/OFF] condition from the starter signal.	
PW/ST SIGNAL [ON/OFF]	×			● indicates [ON/OFF] condition from the power steering pressure switch signal.	[OFF] is always displayed for models without power steering pressure switch.
BRAKE SW [ON/OFF]	×	×		● indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from ignition switch signal.	
MAS AIR/FL SE [V]	×	×		● The signal voltage of the mass air flow sensor is displayed.	
MAIN INJ WID [msec]		×		● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT [mA]		×		● Indicates the fuel pump power supply current from the ECM.	

MONITOR ITEM	ECM INPUT SIG-NAL	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	CONDITION	SPECIFICATION
GLOW RLY [ON/OFF]		×		● The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN [LOW/HI/OFF]		×		● Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW ... Operates at low speed. HI ... Operates at high speed. OFF ... Stopped	
EGR VOL CON/V [step]		×		● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/A VOLUME [mg/]				● The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN [kPa]	×	×		● The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
INT/M PRES SE [kPa]*				● Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	
CYL COUNT [1/2/3/4]				● The cylinder being injected is displayed. 1 ... Cylinder No.1 is injected. 2 ... Cylinder No.2 is injected. 3 ... Cylinder No.3 is injected. 4 ... Cylinder No.4 is injected.	
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. [Hz] or [%]
Frequency [msec], [Hz] or [%]					
DUTY-HI					
DUTY-LOW					
PLS WIDTH-HI					
PLS WIDTH-LOW					

MONITOR ITEM	ECM INPUT SIG-NAL	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	CONDITION	SPECIFICATION
CAN COMM [OK/NG]			×	● Indicates the communication condition of CAN communication line.	● These items are not displayed in “SELECTION FROM MENU” mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		

*: For YD22DDTi engine models

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

ACTIVE TEST MODE

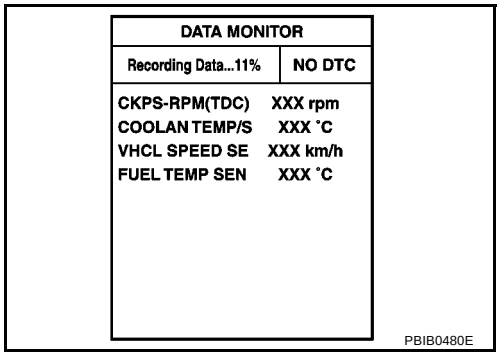
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BAL-ANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: N ● Cut off each injector signal one at a time using CONSULT-II	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector
COOLING FAN *	● Ignition switch: ON ● Operate the cooling fan at LOW, HI speed and turn OFF using CONSULT-II.	Cooling fan moves at LOW, HI speed and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
GLOW RLY	● Ignition switch: ON (Engine stopped) ● Turn the glow relay ON and OFF using CONSULT-II and listen to operating sound.	Glow relay makes the operating sound.	● Harness and connector ● Glow relay
EGR VOL CONT/V	● Ignition switch: ON ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
PRES REGULA-TOR	● Ignition switch: ON ● Change fuel rail pressure using CONSULT-II	Fuel leaks.	● Fuel line ● Fuel pressure relief valve
PUMP LEANT CLEAR	● This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .		

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

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

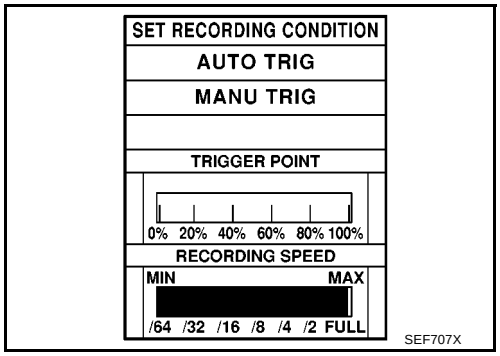
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):



– The malfunction will be identified on the CONSULT-II screen in real time.
In other words, DTC/1st trip DTC/2nd trip DTC will be displayed if the malfunction is detected by ECM.
At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):



– DTC/1st trip DTC/2nd trip DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

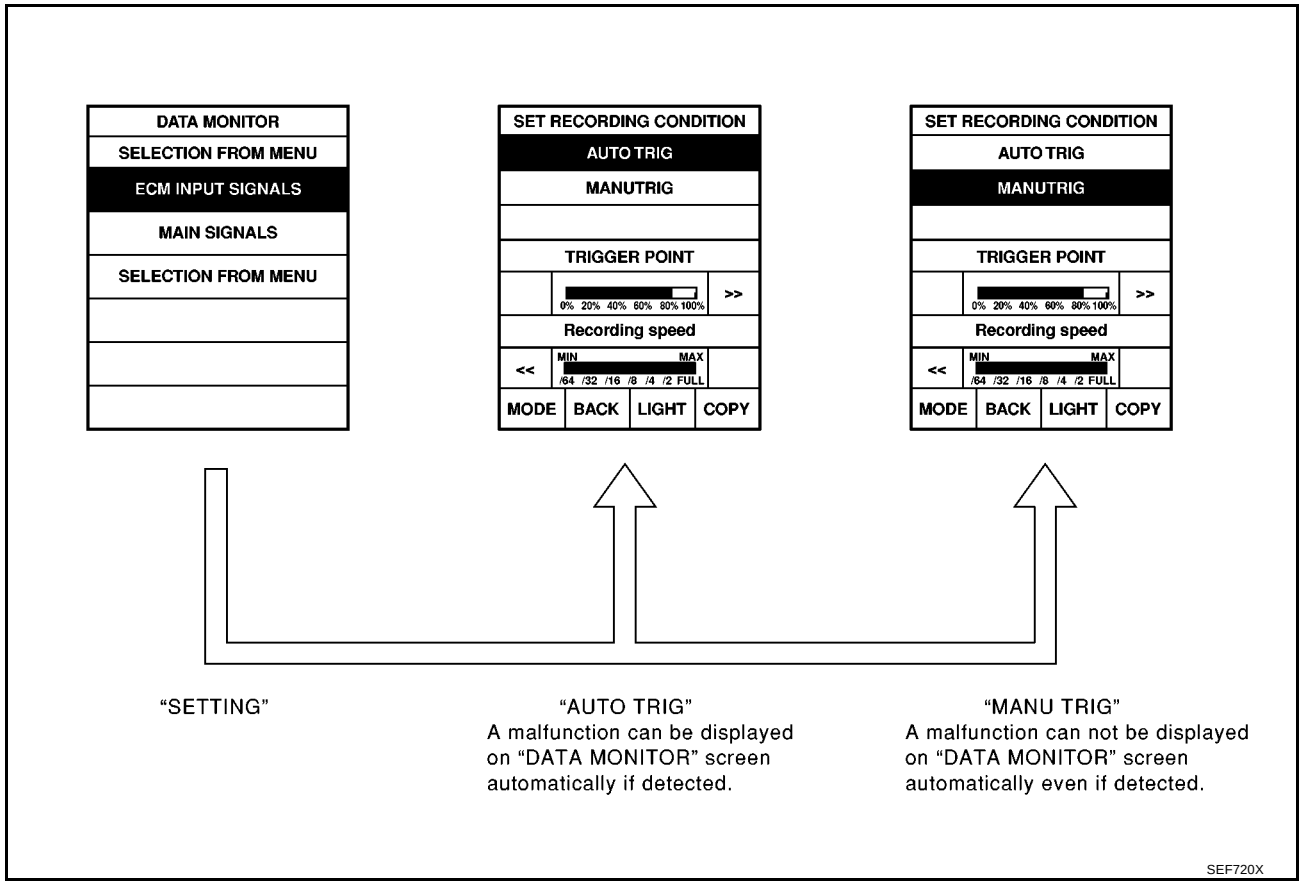
1. “AUTO TRIG”

– While trying to detect the DTC/1st trip DTC/2nd trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.

– While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC/2nd trip DTC will be displayed. Refer to GI-21, “HOW TO PERFORM EFFICIENT DIGANOSES FOR AN ELECTRICAL INCIDENT”, “Incident Simulation Tests”.

2. “MANU TRIG”

– If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



FUNCTION TEST

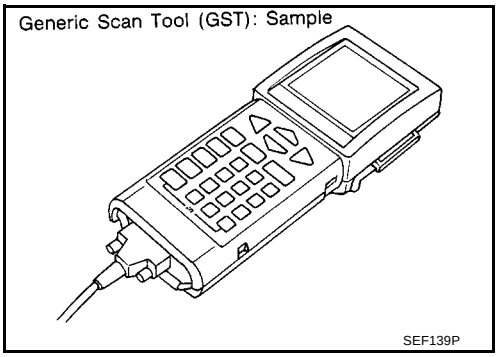
This mode is used to inform customers of their vehicle condition of periodic maintenance.

Generic Scan Tool (GST) Function

EBS0138G

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 7 different functions explained below.
ISO9141 is used as the protocol.
The name "GST" or "Generic Scan Tool" is used in this service manual.



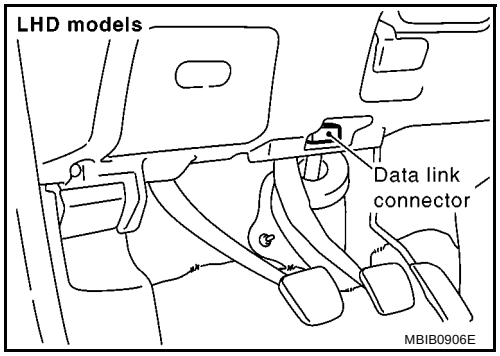
FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-961, "FREEZE FRAME DATA" .
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.

Diagnostic test mode		Function
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 7)
MODE 6	(ON BOARD TESTS)	This mode is not applicable on this vehicle.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

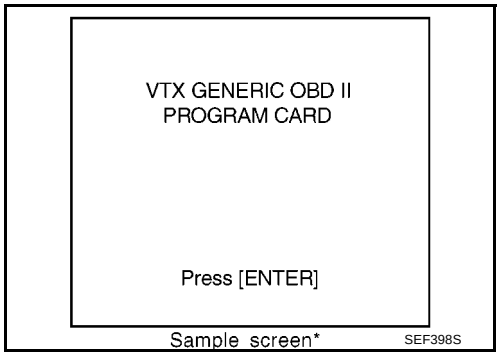
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under drivers side dash panel near the fuse box cover.
3. Turn ignition switch ON.



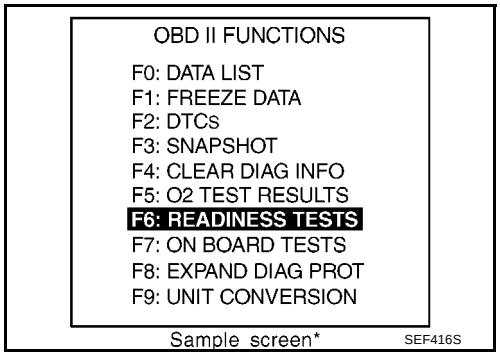
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS0138H

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.

MONITOR ITEM	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	● Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V
MAS AIR/FL SE*1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1.5 - 2.0V
		2,000 rpm	2.2 - 2.7V
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN SW	● Ignition switch: ON → OFF		ON → OFF
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec
GLOW RLY	Refer to EC-1227, "GLOW CONTROL SYSTEM" .		
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA
COOLING FAN	● When cooling fan is stopped.		OFF
	● When cooling fans operate at low speed.		LOW
	● When cooling fans operate at high speed.		HI
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

MONITOR ITEM	CONDITION		SPECIFICATION
INT/A VOLUME	● Engine: After warming up, idle the engine		150 - 450 mg/st
INT/M PRES SE*2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa
BARO SEN	● Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2 , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2 , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2 , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2 , 11.36 psi)
CYL COUNT	● Engine is running		1 → 3 → 4 → 2

*1: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.
*2: For YD22DDTi engine models

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

Major Sensor Reference Graph in Data Monitor Mode

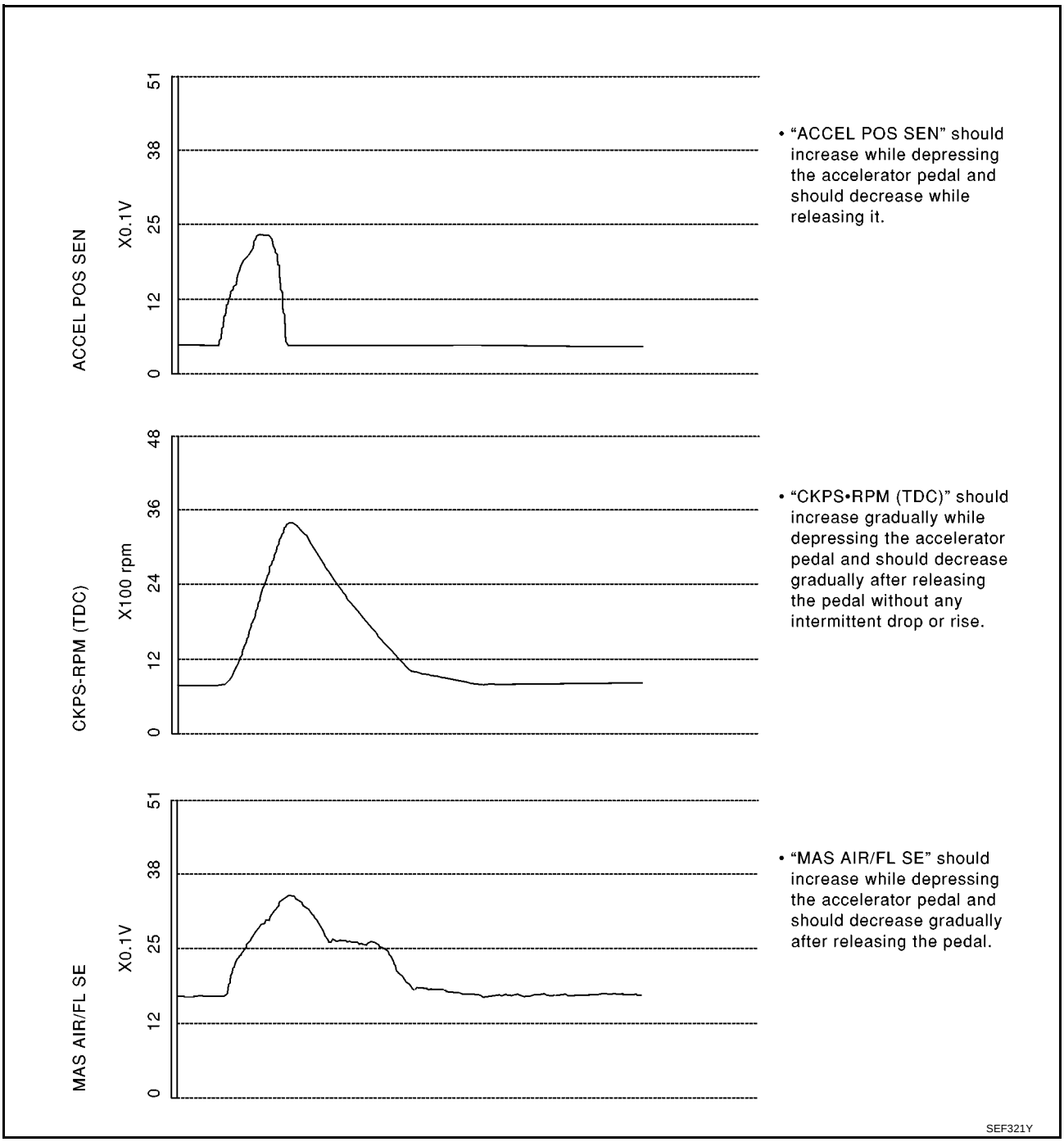
EBS0138I

The following are the major sensor reference graphs in “DATA MONITOR” mode.

ACCEL POS SEN, “CKPS·RPM (TDC)”, “MAS AIR/FL SE”

Below is the data for “ACCEL POS SEN”, “CKPS·RPM (TDC)” and “MAS AIR/FL SE” when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature.

Each value is for reference, the exact value may vary.



TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS0138J

Intermittent incidents (I/I) may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st/2nd trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0”.
III	The symptom described by the customer does not recur.
IV	(1st/2nd trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.

Diagnostic Procedure

EBS0138K

1. INSPECTION START

Erase (1st/2nd trip) DTCs. Refer to EC-961, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, “Circuit Inspection”, “GROUND INSPECTION”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, “Incident Simulation Tests”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

MAIN POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

ECM Terminals and Reference Value

EBS0138L

Remarks: Specification data are reference values and are measured between each terminal and ground.

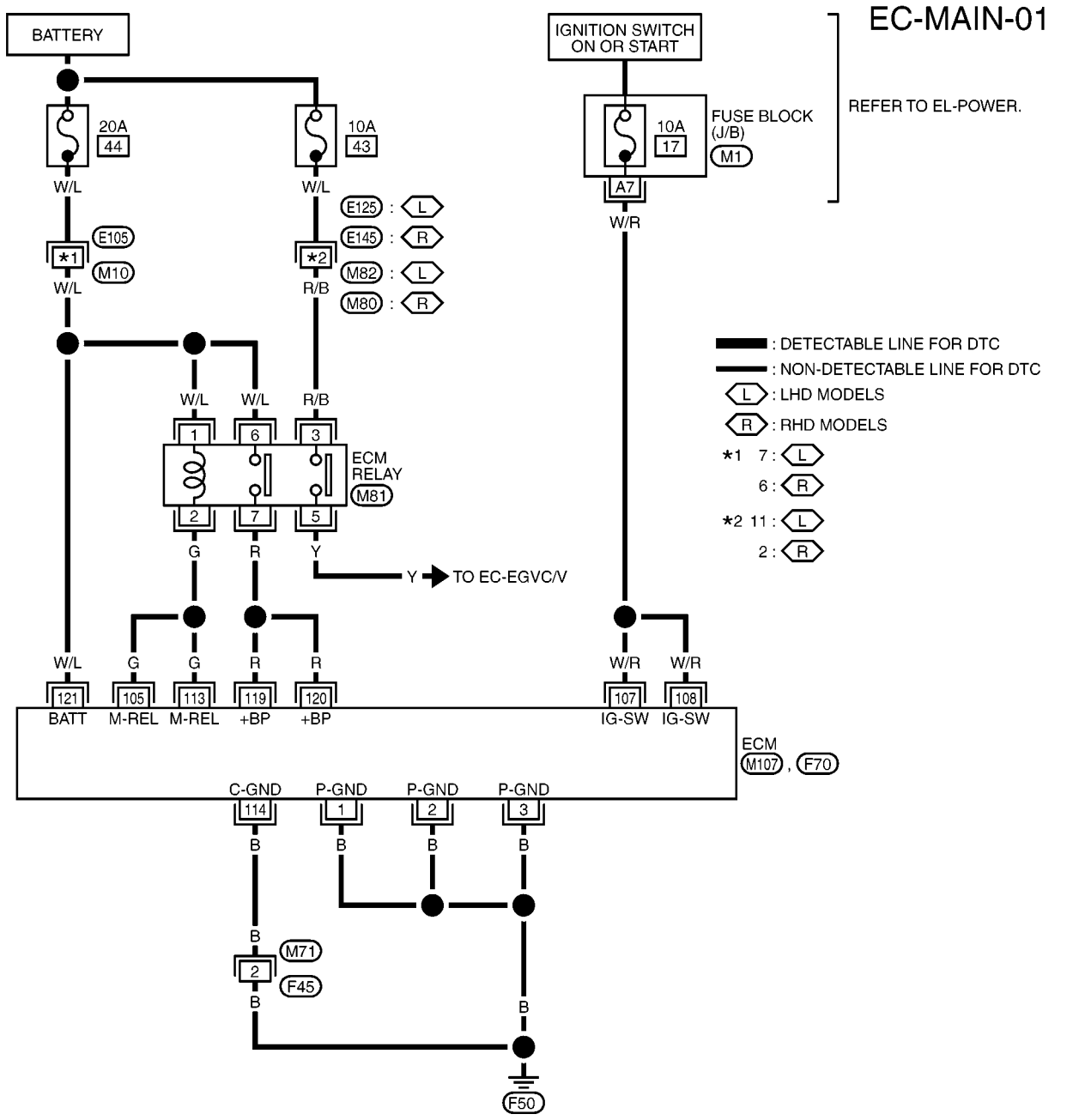
CAUTION:

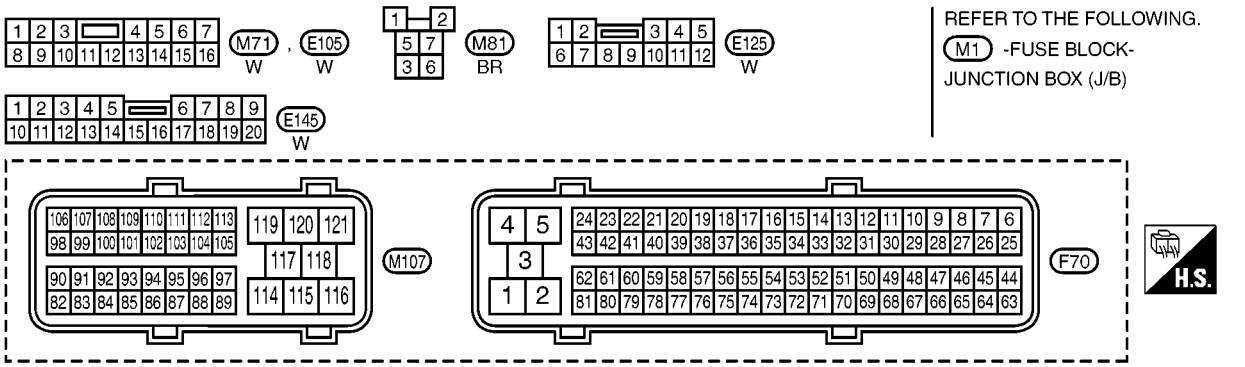
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS0138M





MBWA0650E

Diagnostic Procedure

EBS0138N

1. INSPECTION START

Start engine.
Is engine running?

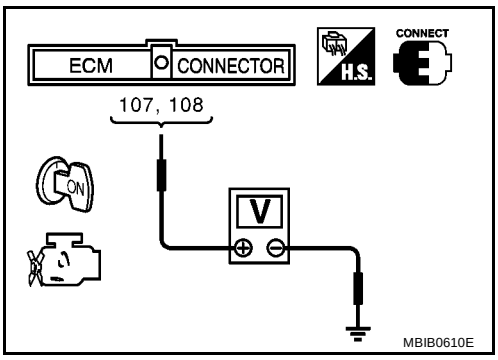
Yes or No

Yes >> GO TO 7.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 107, 108 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

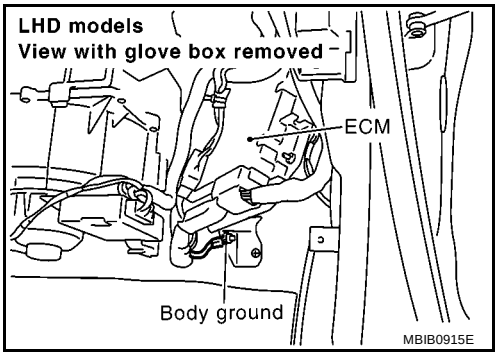
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connection.



5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

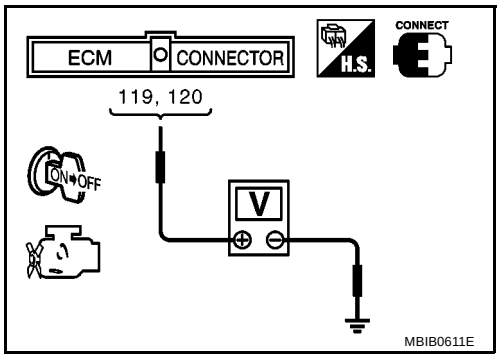
- Harness connectors M71, F45
- Harness for open or short between ECM and body ground

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

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

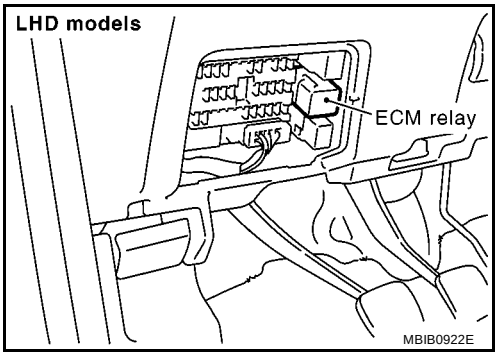


OK or NG

OK >> GO TO 13.
NG (Battery voltage does not exist)>>GO TO 8.
NG (Battery voltage exists for more then a few seconds)>>GO TO 10.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.

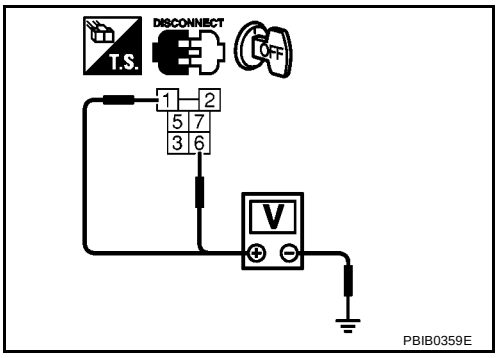


2. Check voltage between relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- 20A fuse
- Harness for open or short between ECM relay and battery

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

10. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

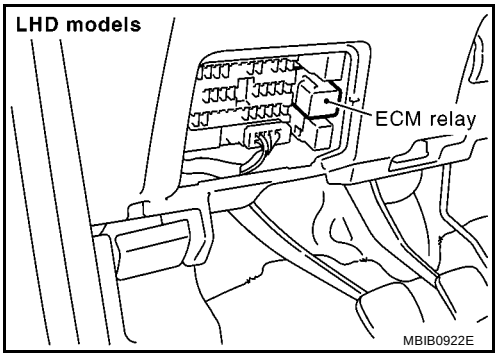
1. Disconnect ECM relay.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ECM RELAY

Refer to EC-1009, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace ECM relay.

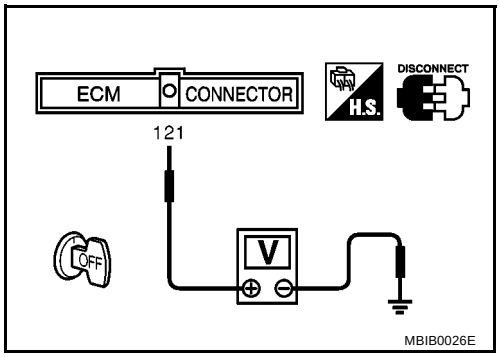
13. CHECK ECM POWER SUPPLY CIRCUIT-V

Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.



14. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- Harness connectors E105, M10
- Harness for open or short between ECM and fuse

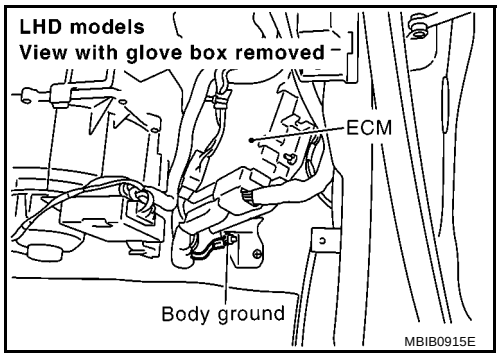
>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace ground connection.



16. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

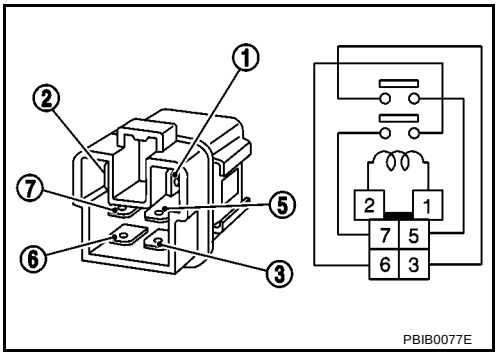
EBS0138O

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



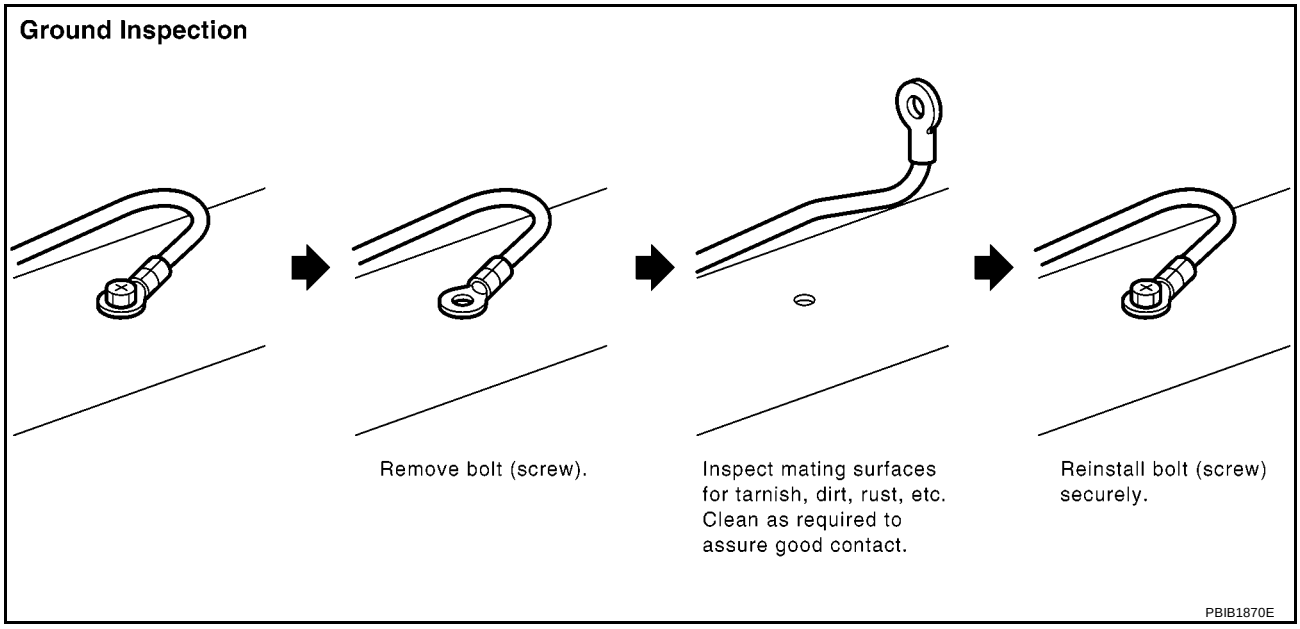
Ground Inspection

EBS0138P

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to EL-23, “GROUND”.



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

EBS0138Q

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.

On Board Diagnosis Logic

EBS0138R

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication line	● ECM can not communicate to other control unit. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

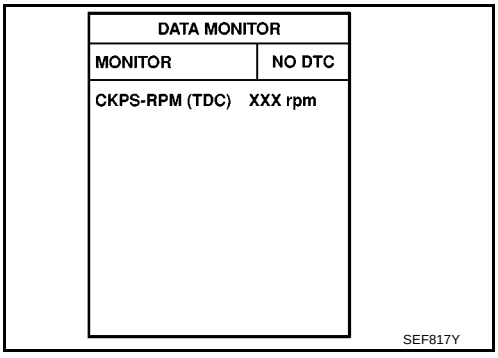
DTC Confirmation Procedure

EBS0138S

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1013, "Diagnostic Procedure" .

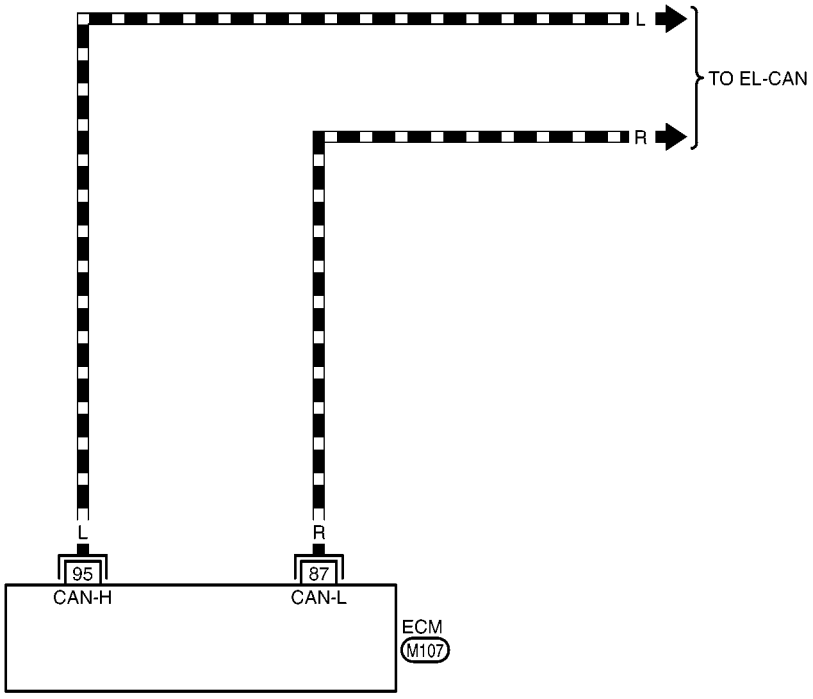


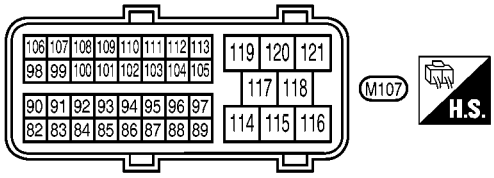
Wiring Diagram

EBS0138T

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





YEC495A

Diagnostic Procedure

EBS0138U

1. INSPECTION START

1. Turn ignition switch ON.
2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II.
3. Print out the CONSULT-II screen.

Models with ESP

OK data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	OK
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0868E

Models without ESP

OK data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0009E

>> Go to EL-459, “CAN COMMUNICATION”.

DTC P0016 CKP - CMP CORRELATION

PFP:10328

On Board Diagnosis Logic

EBS0138V

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0016	Crankshaft position - camshaft position correlation	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	● Camshaft position sensor ● Crankshaft position sensor ● Timing chain ● Signal plate

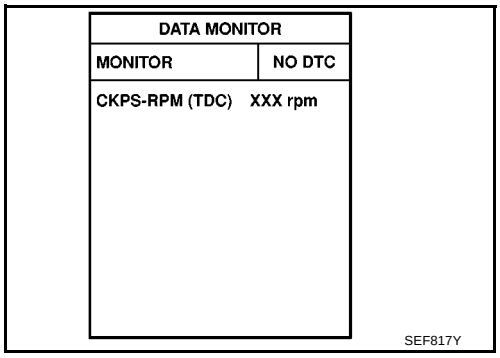
DTC Confirmation Procedure

EBS0138W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1014, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS0138X

1. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1121, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 3.
NG >> Remove debris and clean the signal plate or replace sprocket.

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor.

4. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 5.
NG >> Replace the signal plate.

5. CHECK TIMING CHAIN

Refer to EM-171, "SECONDARY TIMING CHAIN" , EM-176, "PRIMARY TIMING CHAIN" and EM-143, "VACUUM PUMP" .

OK or NG

OK >> GO TO 6.
NG >> Replace timing chain.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

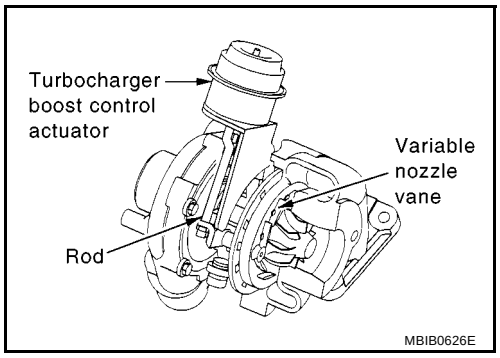
DTC P0045 TC BOOST CONTROL SOLENOID VALVE

PFP:14956

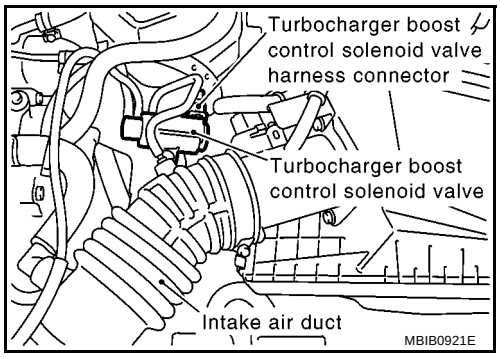
Description

EBS0138Y

The turbocharger boost control solenoid valve controls vacuum signal to the turbocharger boost control actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



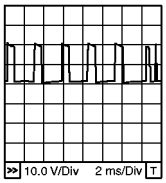
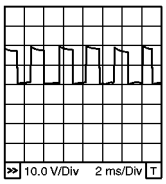
ECM Terminals and Reference Value

EBS0138Z

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS01390

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0045	Turbocharger boost control solenoid valve circuit / open	An improper voltage is sent to ECM through turbocharger boost control solenoid valve.	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● Turbocharger boost control solenoid valve

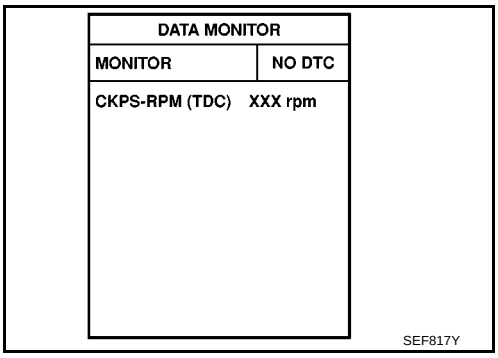
DTC Confirmation Procedure

EBS01391

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1019, "Diagnostic Procedure" .

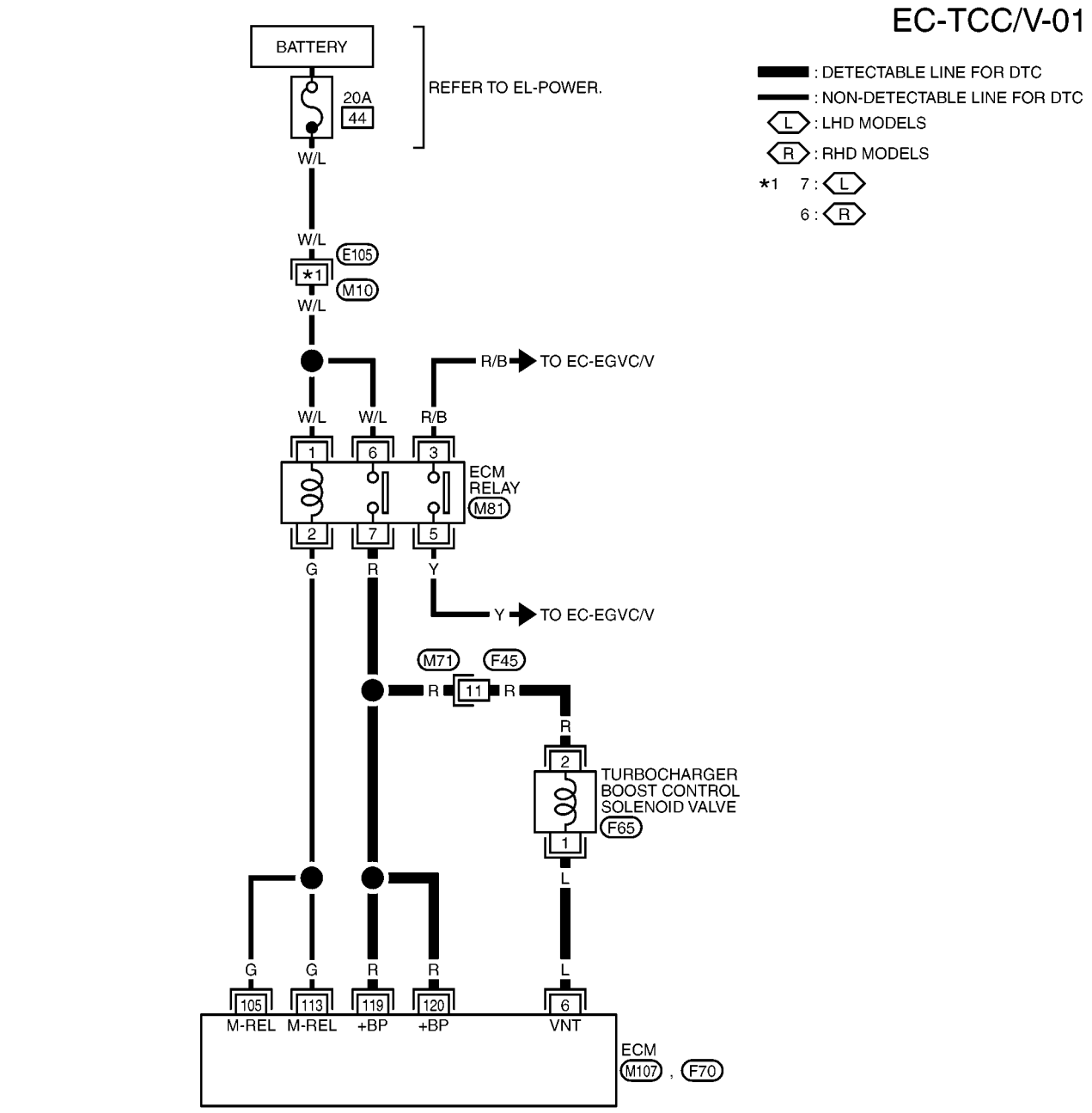


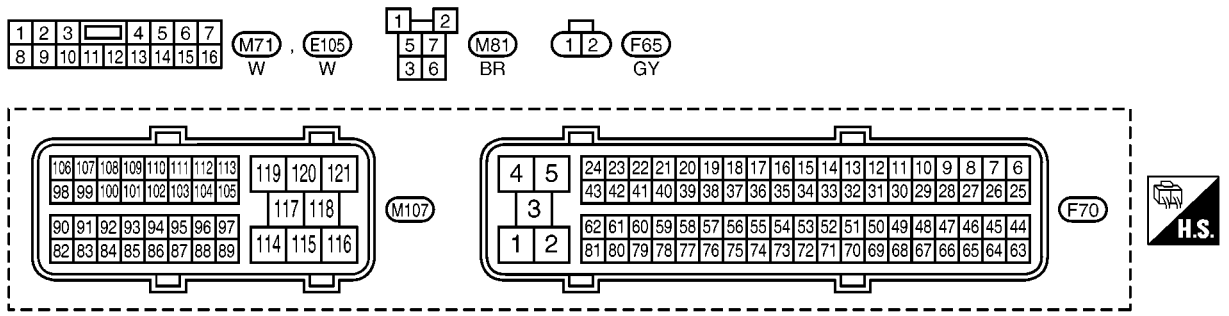
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS01392





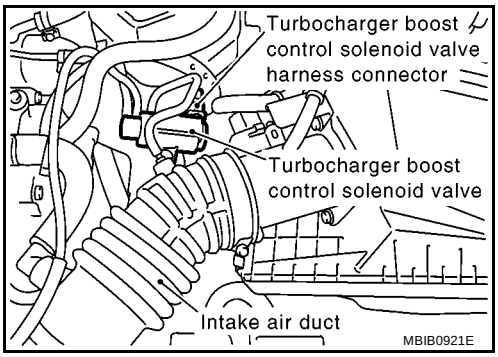
MBWA0623E

Diagnostic Procedure

EBS01393

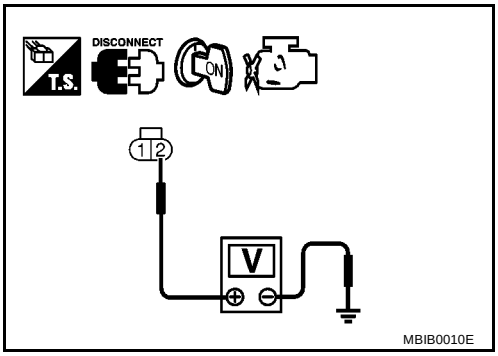
1. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharger boost control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open and short between turbocharger boost control solenoid valve and ECM relay
- Harness for open and short between turbocharger boost control solenoid valve and ECM

>> 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 harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1020, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace turbocharger boost control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

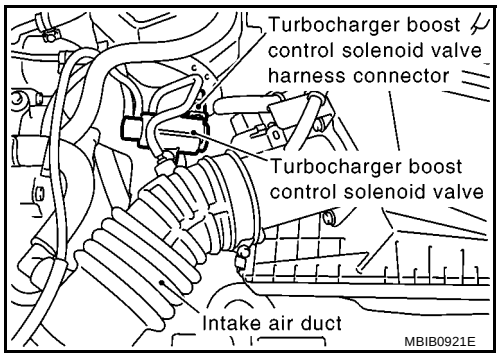
>> **INSPECTION END**

Component Inspection

EBS01394

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.

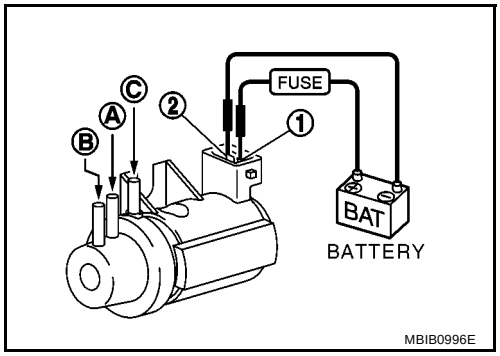


3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals **1** and **2**	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



DTC P0088 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

EBS01395

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	● Fuel pump ● Fuel injector ● Fuel rail pressure sensor

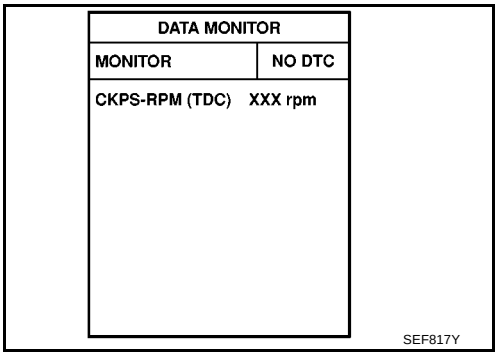
DTC Confirmation Procedure

EBS01396

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 20 seconds.
4. If 1st trip DTC is detected, go to EC-1021, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS01397

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-1071, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel injector.

3. CHECK FUEL PUMP

Refer to EC-1161, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

EBS01398

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0089 FUEL PUMP

PFP:16700

On Board Diagnosis Logic

EBS01399

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0089	Fuel pump performance	Fuel pressure is too much higher than the target value.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

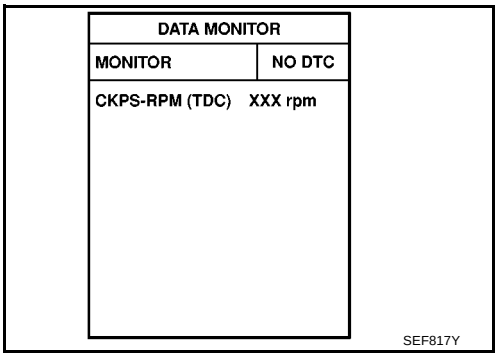
DTC Confirmation Procedure

EBS0139A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 30 seconds.
4. If 1st trip DTC is detected, go to EC-1024, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS0139B

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1023, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select MODE 4 with GST.
5. Touch “ERASE”.
6. Perform EC-1023, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel rail.

3. CHECK FUEL PUMP

Perform EC-1158, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace Fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

EBS0139C

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0093 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

EBS0139D

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0093	Fuel system leak	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	● Fuel pump ● Fuel rail ● Fuel pipe ● Fuel rail pressure relief valve ● Air mixed with fuel ● Lack of fuel

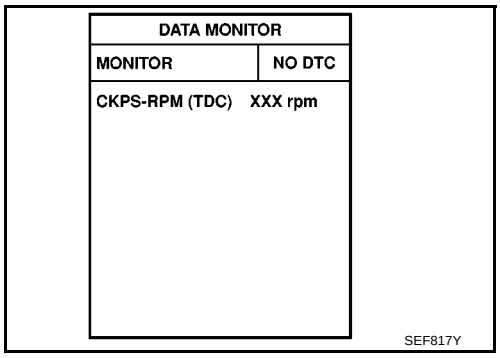
DTC Confirmation Procedure

EBS0139E

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1027, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS0139F

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1026, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select MODE 4 with GST.
5. Touch “ERASE”.
6. Perform EC-1026, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.

- Fuel tube from fuel pump to fuel rail
- Fuel rail
- Fuel tube from fuel rail to fuel injector

3. Also check for improper connection or pinches.

OK or NG

OK >> GO TO 3.
NG >> Repair malfunctioning part.

3. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-1028, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

EBS0139G

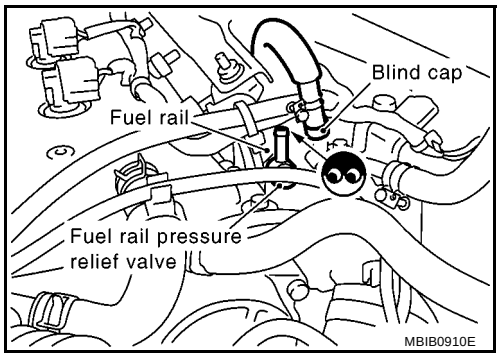
FUEL RAIL PRESSURE RELIEF VALVE

With CONSULT-II

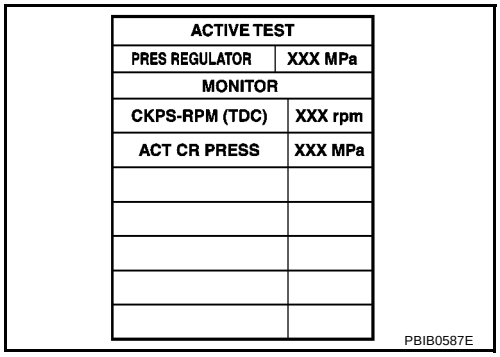
WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.



5. Select “PRES REGULATOR” in “ACTIVE TEST MODE” with CONSULT-II.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 160 MPa with touching “UP” or “Qu” on the CONSULT-II screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

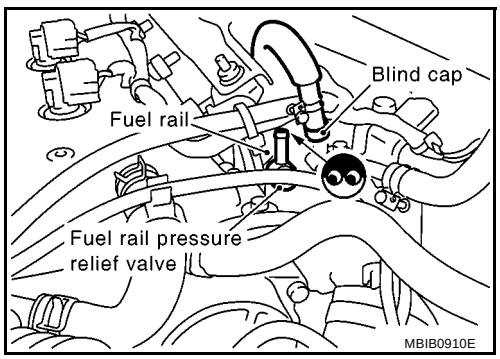
- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Without CONSULT-II

WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Removal and Installation

EBS0139H

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

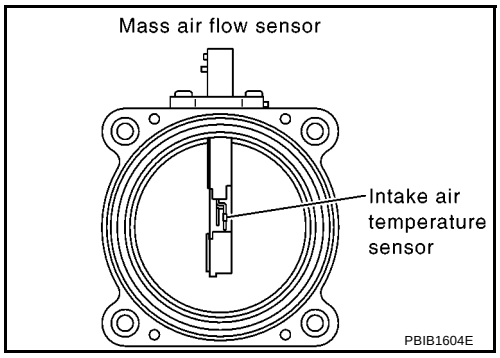
DTC P0101 MAF SENSOR

PFP:22680

Component Description

EBS0139I

The mass air flow sensor 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS0139J

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1.5 - 2.0V
		2,000 rpm	2.2 - 2.7V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS0139K

Specification data are reference values, and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.8 - 2.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 3.0V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
73	O/L	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

EBS0139L

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101	Mass air flow sensor circuit range/performance problem	Improper voltage from the sensor is sent to ECM compared with the driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor ● Intake air leaks ● Air cleaner ● EGR volume control valve ● Intake air temperature sensor ● Turbocharger boost sensor (YD22DDTi engine models)

DTC Confirmation Procedure

EBS0139M

CAUTION:
Always drive vehicle at a safe speed.

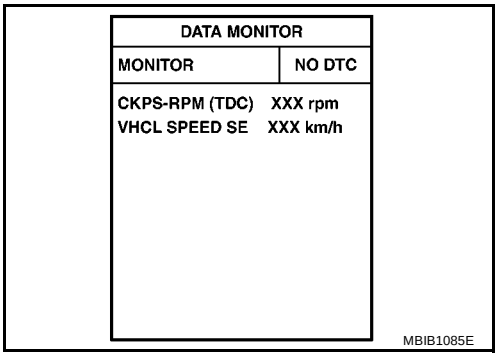
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 40 seconds.
4. Drive vehicle under the following condition.

CKPS·RPM	Approx. 2800 rpm
VHCL SPEED SE	70 - 100 km/h
Shift lever	4th position

5. Release accelerator pedal for at least 10 seconds.
   Do not depress brake pedal during this procedure.
6. If 1st trip DTC is detected, go to EC-1033, "Diagnostic Procedure" .



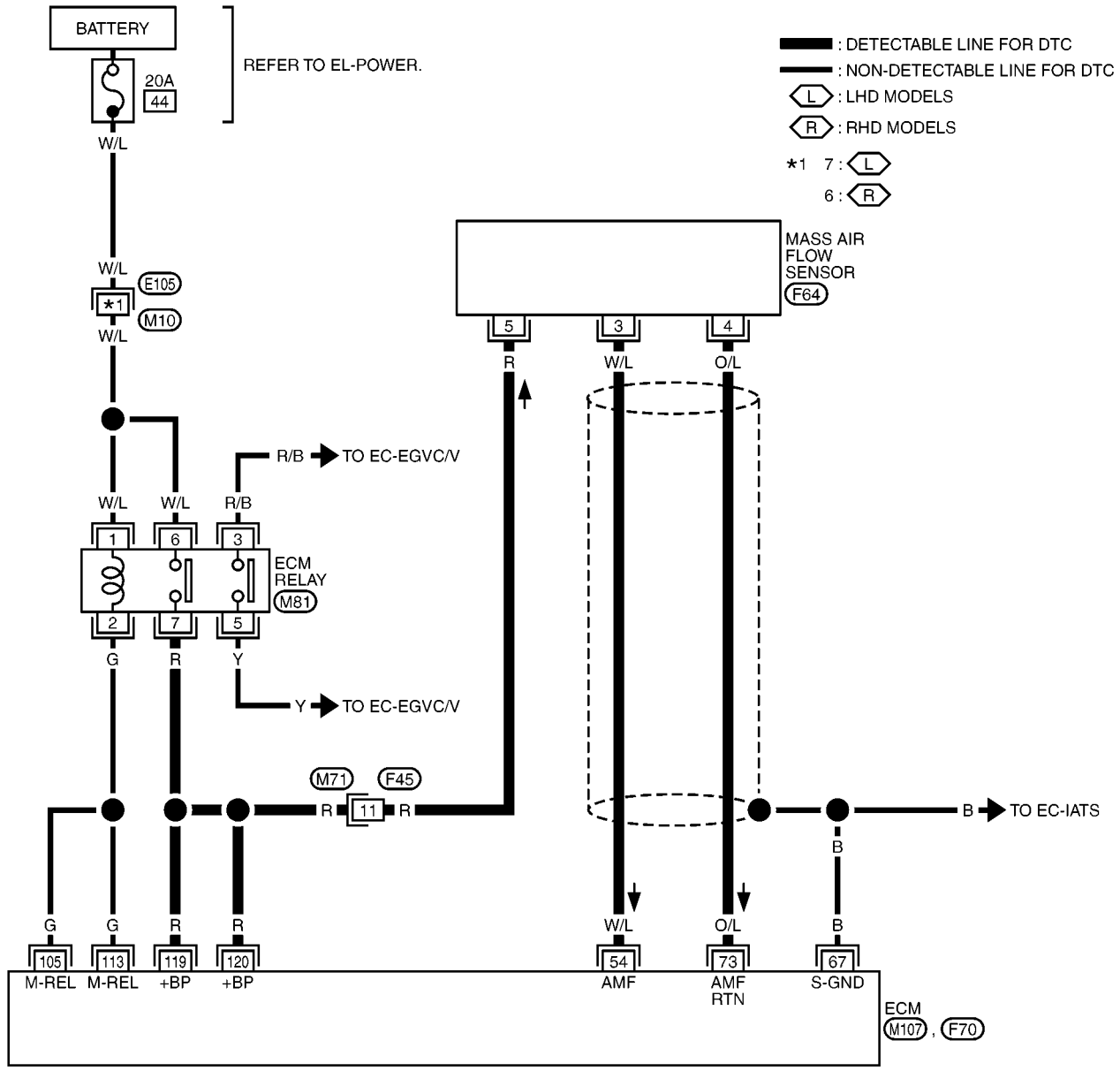
WITH GST

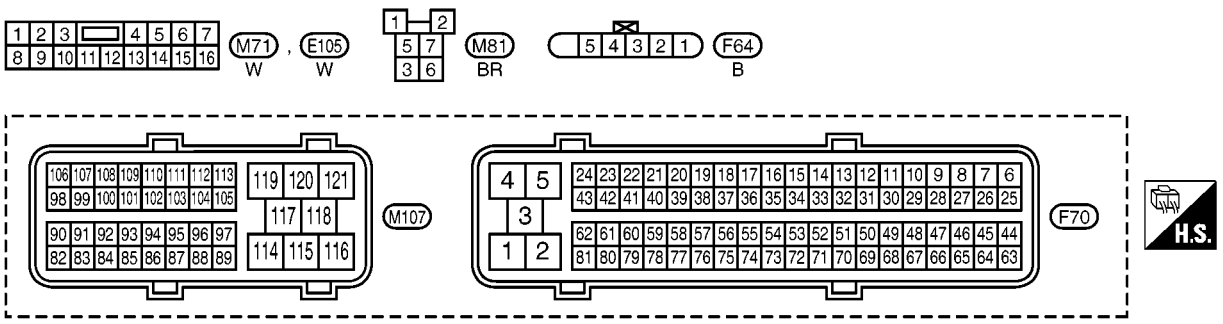
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0139N

EC-MAFS-01





MBWA0651E

Diagnostic Procedure

EBS0139O

1. CHECK INTAKE SYSTEM

1. Check air cleaner for clogging.
2. Check the following for connection and cracks.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

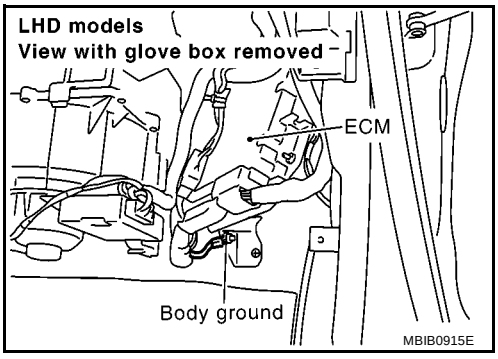
OK >> GO TO 2.
NG >> Reconnect or repair the parts.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

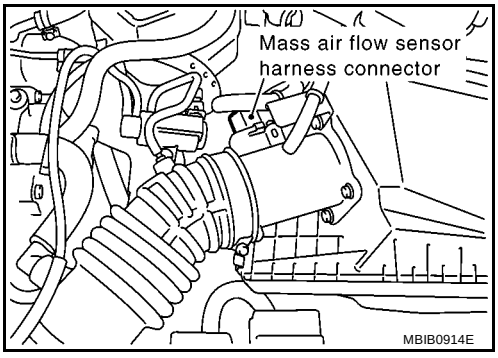
OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connection.



3. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.

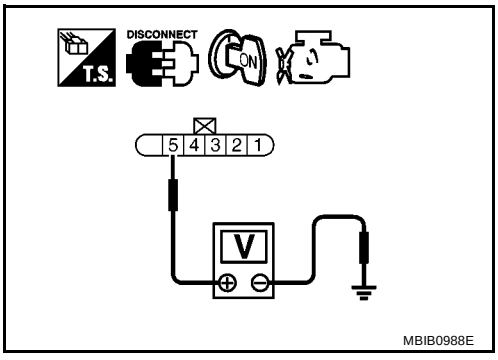


3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM

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

5. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 73.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 54.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

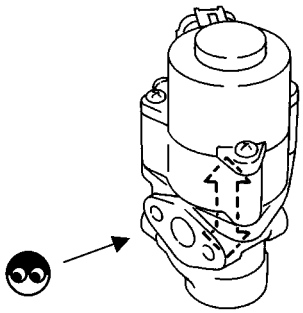
OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EGR VOLUME CONTROL VALVE FUNCTION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Remove EGR volume control valve from cylinder head.
3. Turn ignition switch ON.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm

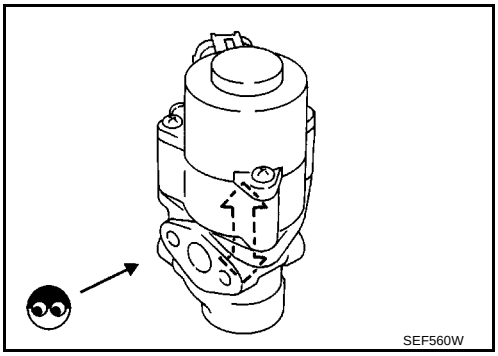


NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Remove EGR volume control valve from cylinder head.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.



OK or NG

OK >> GO TO 8.
NG >> Check EGR volume control valve and its circuit. Refer to EC-1146, "Diagnostic Procedure" .

8. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass sir flow sensor (with intake air temperature sensor).

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1105, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-1036, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

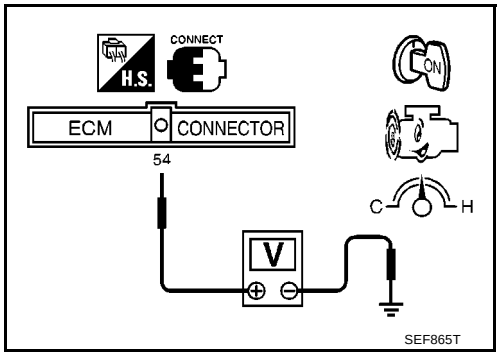
Component Inspection

EBS0139P

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed up to normal operating temperature.)	1.8 - 2.3
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.5 - 3.0



4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again.
   Then repeat above check.

Removal and Installation

EBS0139Q

MASS AIR FLOW SENSOR

Refer to EM-119, "AIR CLEANER AND AIR DUCT" .

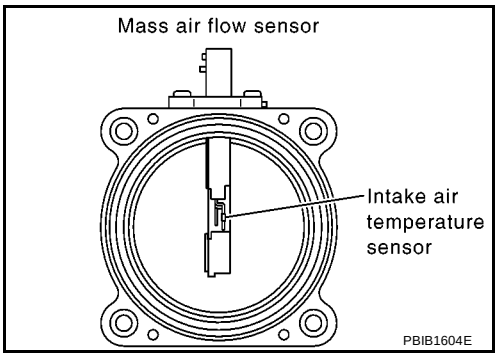
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

EBS0139R

The mass air flow sensor 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS0139S

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1.5 - 2.0V
		2,000 rpm	2.2 - 2.7V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS0139T

Specification data are reference values, and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.8 - 2.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 3.0V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
73	O/L	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

EBS0139U

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.) ● Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

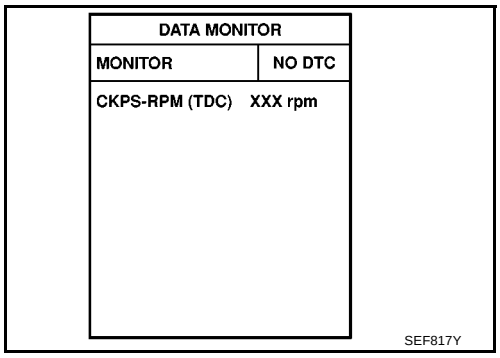
DTC Confirmation Procedure

EBS0139V

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1040, "Diagnostic Procedure" .



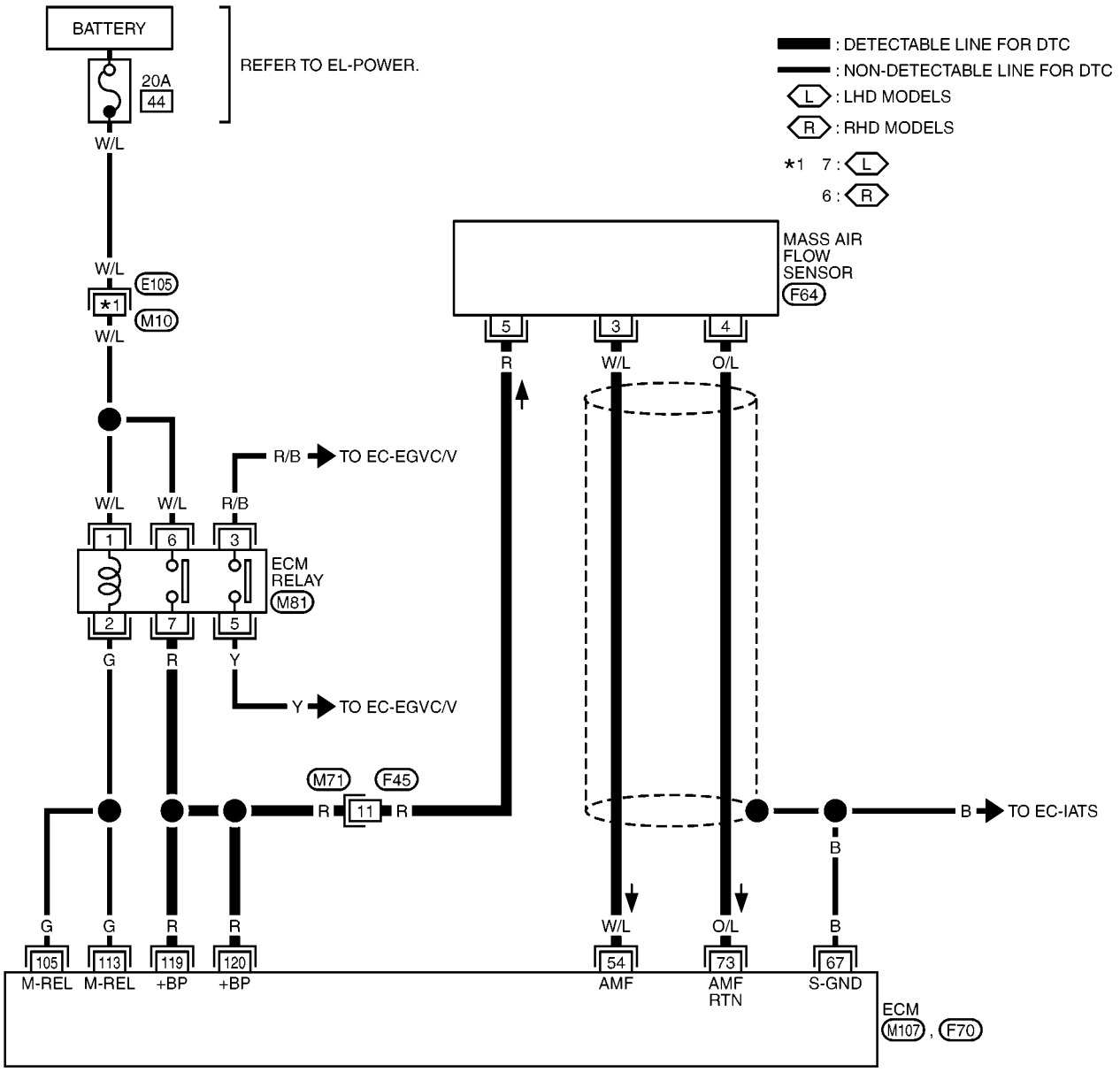
WITH GST

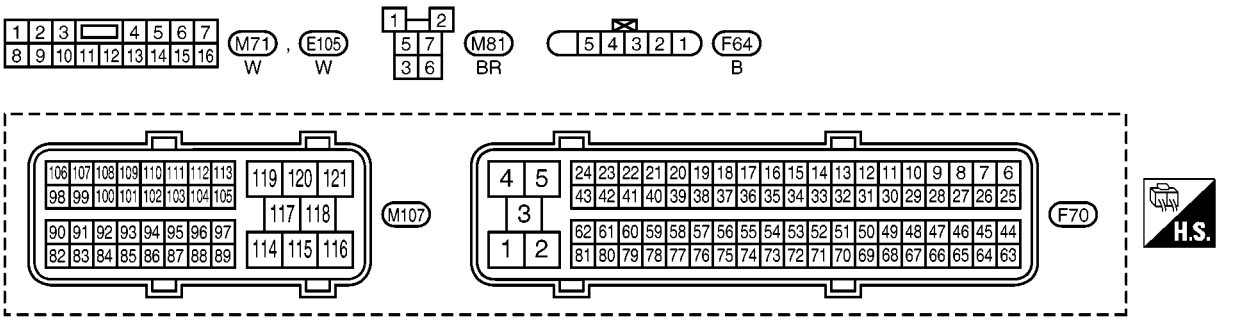
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS0139W

EC-MAFS-01





MBWA0651E

Diagnostic Procedure

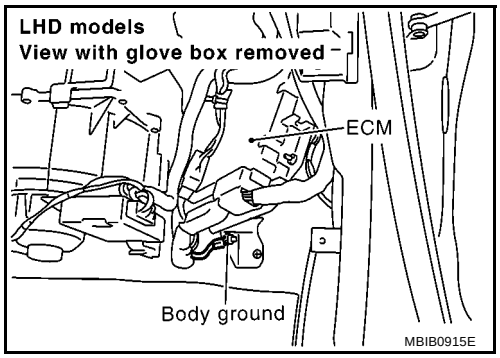
EBS0139X

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

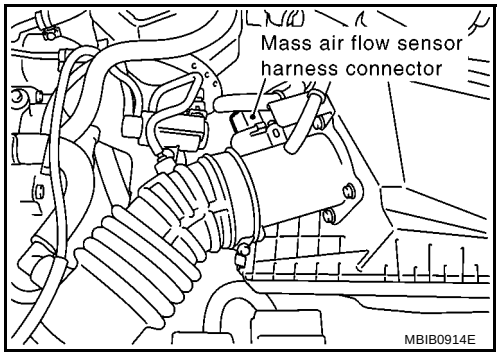
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.

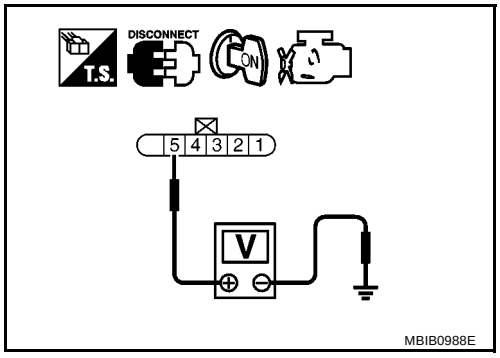


3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM

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

4. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1041, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

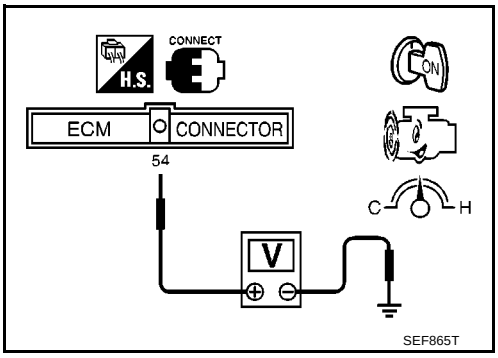
Component Inspection

EBS0139Y

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed up to normal operating temperature.)	1.8 - 2.3
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.5 - 3.0



4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

Removal and Installation

EBS0139Z

MASS AIR FLOW SENSOR

Refer to EM-119, "AIR CLEANER AND AIR DUCT" .

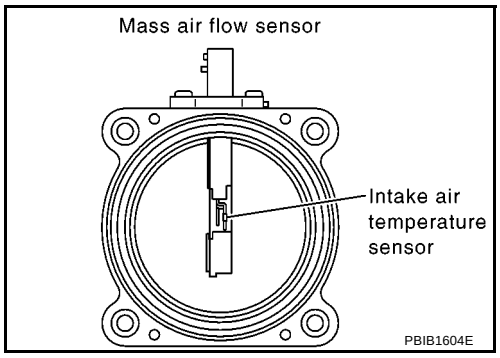
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

EBS013A0

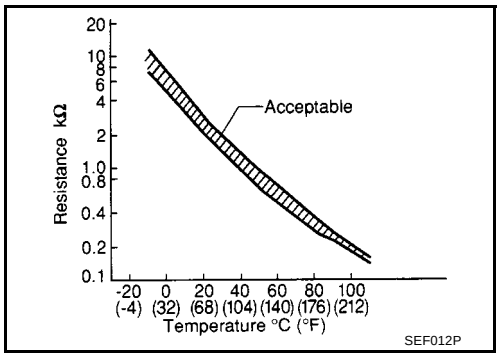
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.73	7.9 - 9.3
25 (77)	3.62	1.9 - 2.1
80 (176)	1.53	0.31 - 0.37

*: This data is reference value and is measured between ECM terminal 55 (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.

On Board Diagnosis Logic

EBS013A1

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.	

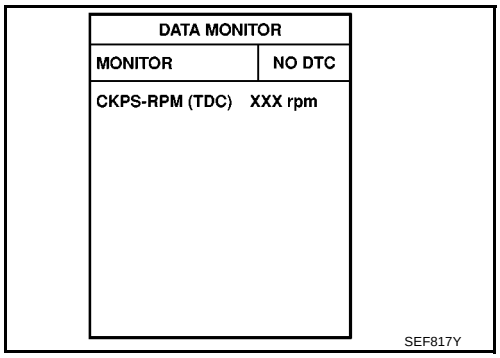
DTC Confirmation Procedure

EBS013A2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1044, "Diagnostic Procedure" .



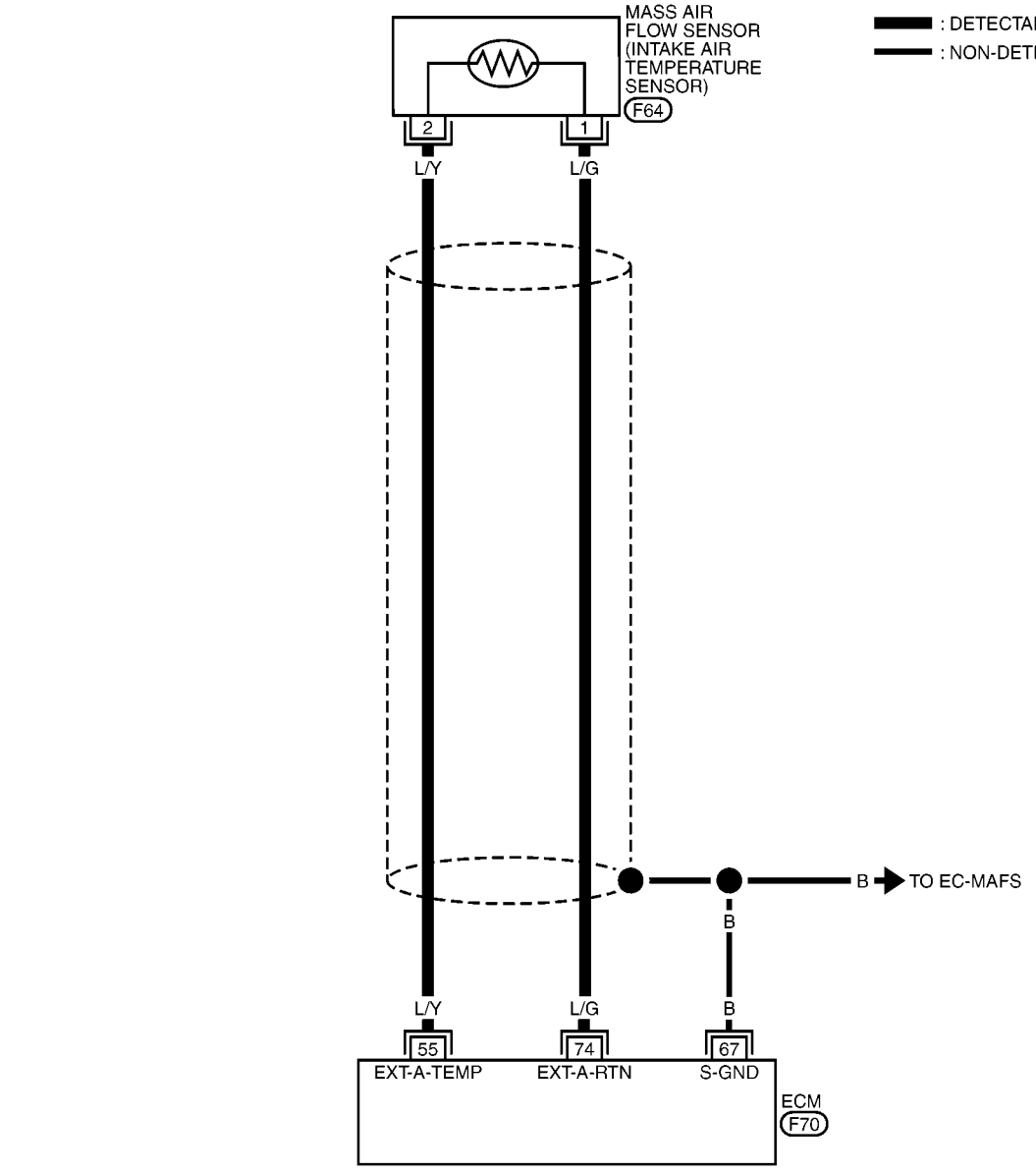
WITH GST

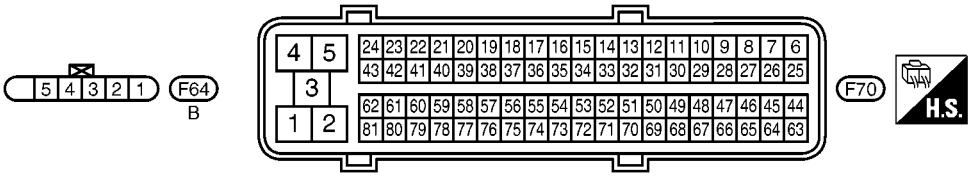
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013A3

EC-IATS-01





YEC497A

Diagnostic Procedure

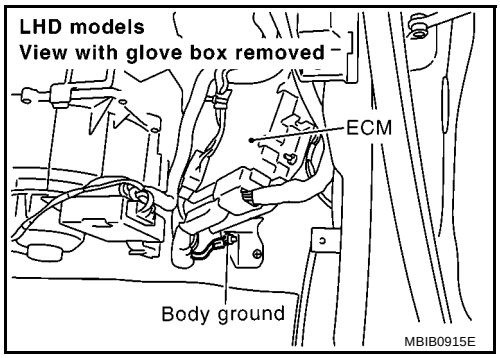
EBS013A4

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

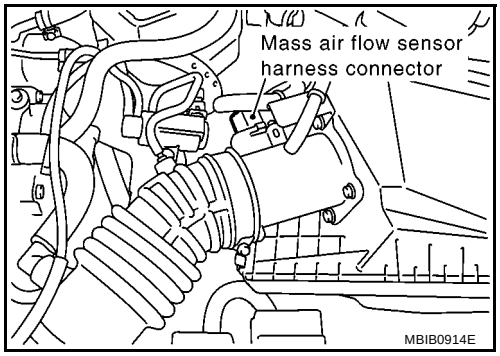
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.

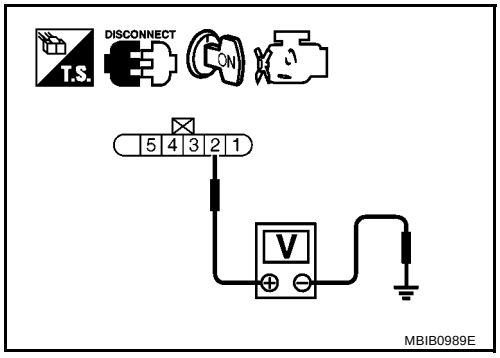


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between MAF sensor terminal 1 and ECM terminal 74. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

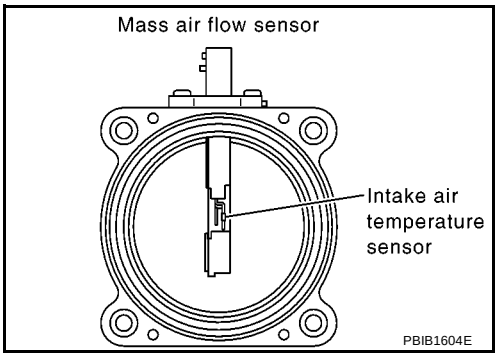
EBS013A5

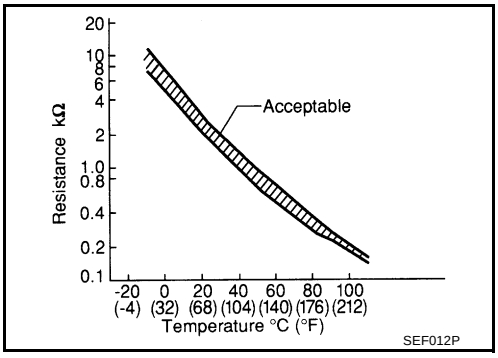
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

EBS013A6

MASS AIR FLOW SENSOR

Refer to EM-119, "AIR CLEANER AND AIR DUCT" .

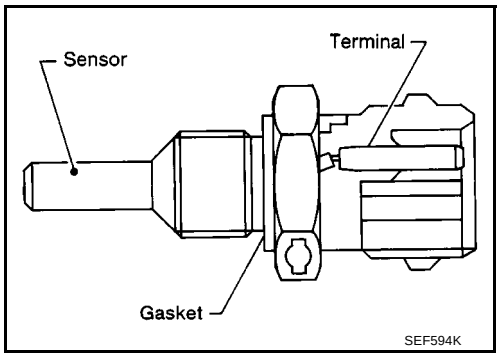
DTC P0117, P0118 ECT SENSOR

PFP:22630

Description

EBS013A7

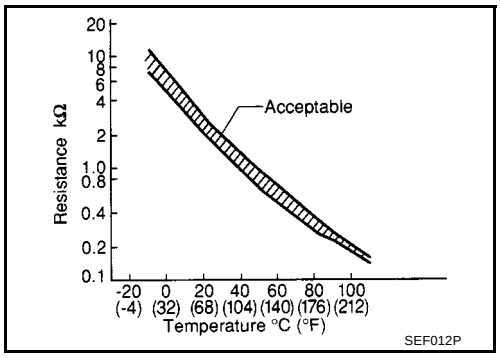
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 51 (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.

On Board Diagnosis Logic

EBS013A8

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

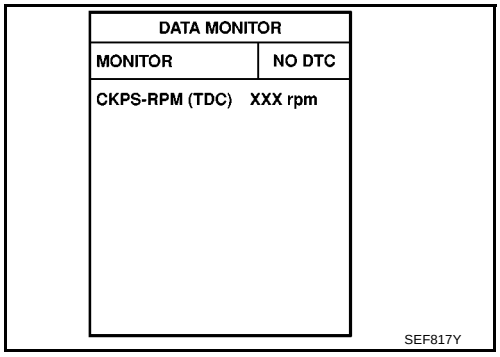
EBS013A9

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1048, "Diagnostic Procedure" .



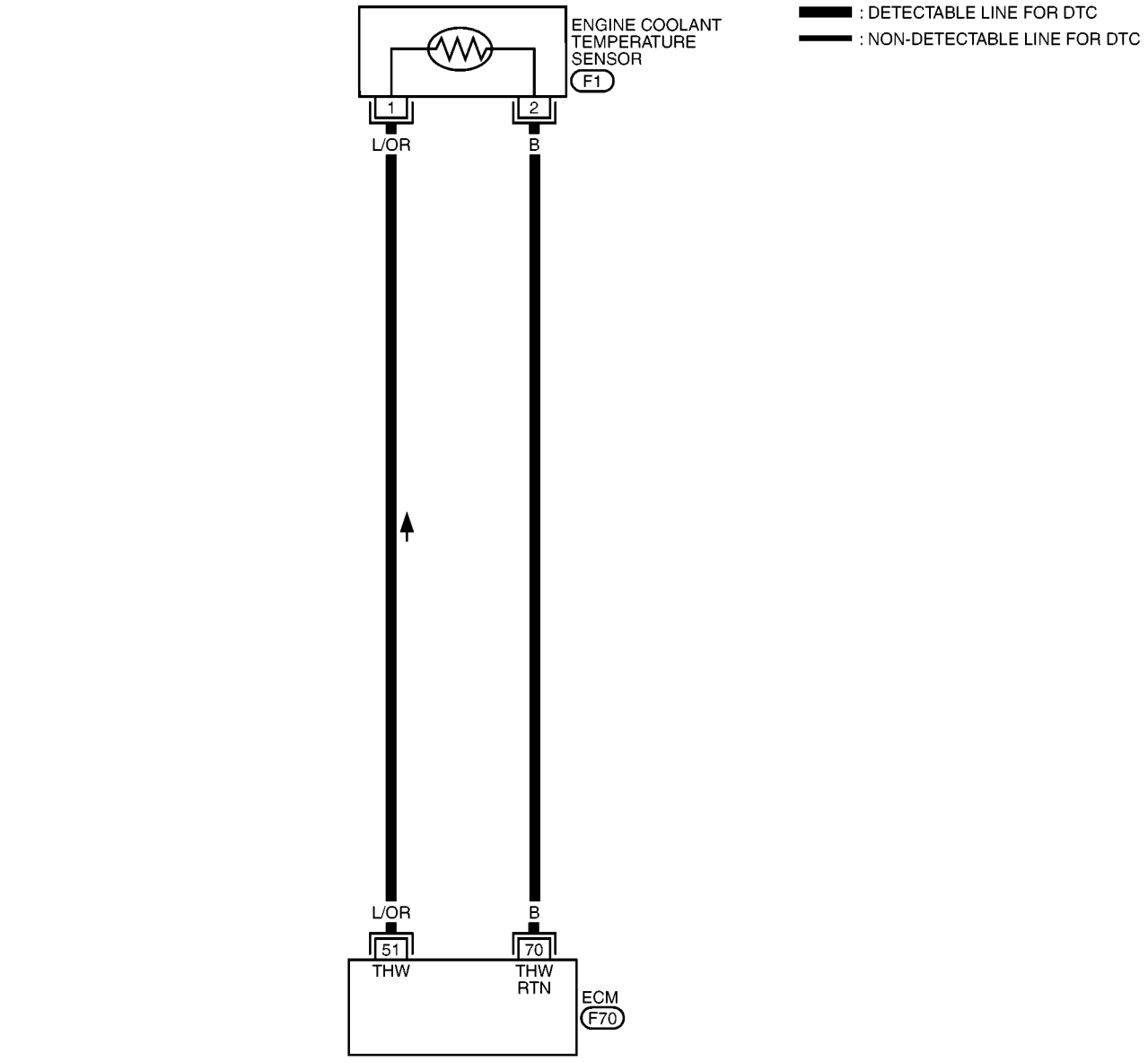
WITH GST

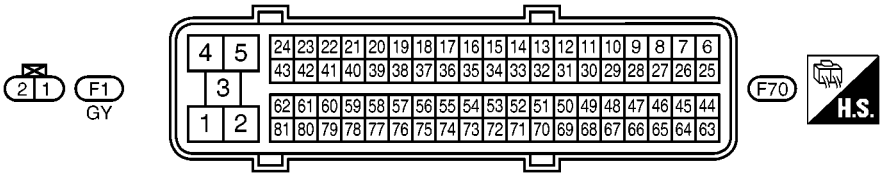
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013AA

EC-ECTS-01





YEC498A

Diagnostic Procedure

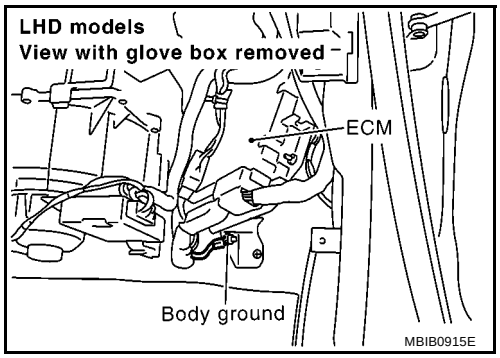
EBS013AB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

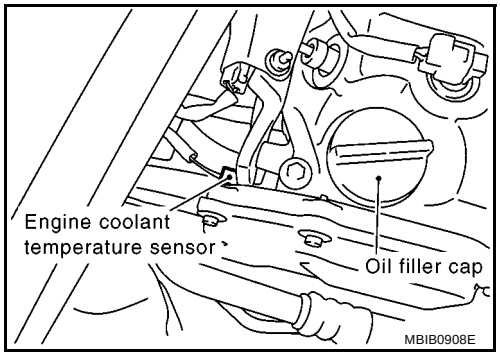
OK or NG

OK >> GO TO 2.
NG >> 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.

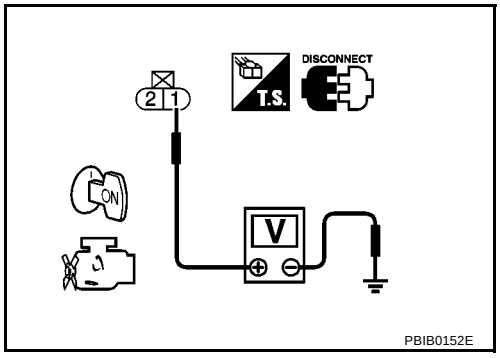


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between ECT sensor terminal 2 and ECM terminal 70. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1049, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

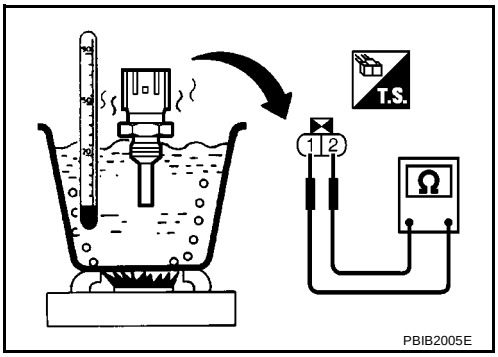
>> **INSPECTION END**

Component Inspection

EBS013AC

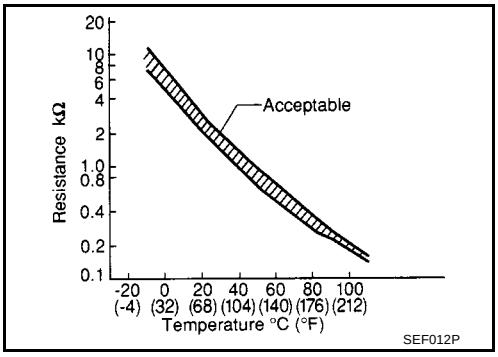
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS013AD

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-186, "CYLINDER HEAD" .

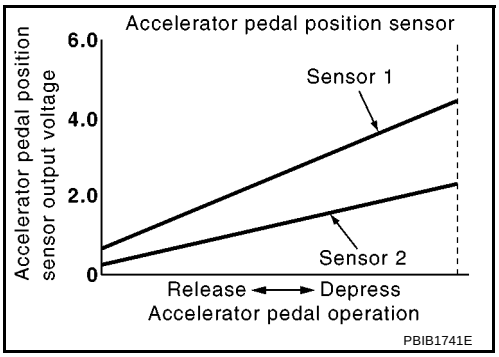
DTC P0122, P0123 APP SENSOR

PFP:18002

Description

EBS013AE

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

EBS013AF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.2 - 0.7V
		Accelerator pedal: fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.1 - 0.4V
		Accelerator pedal: fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS013AG

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013AH

These self-diagnoses have the one trip detection logic.
The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

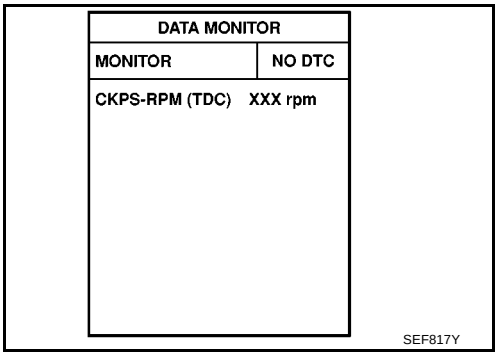
DTC Confirmation Procedure

EBS013AI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1053, "Diagnostic Procedure" .

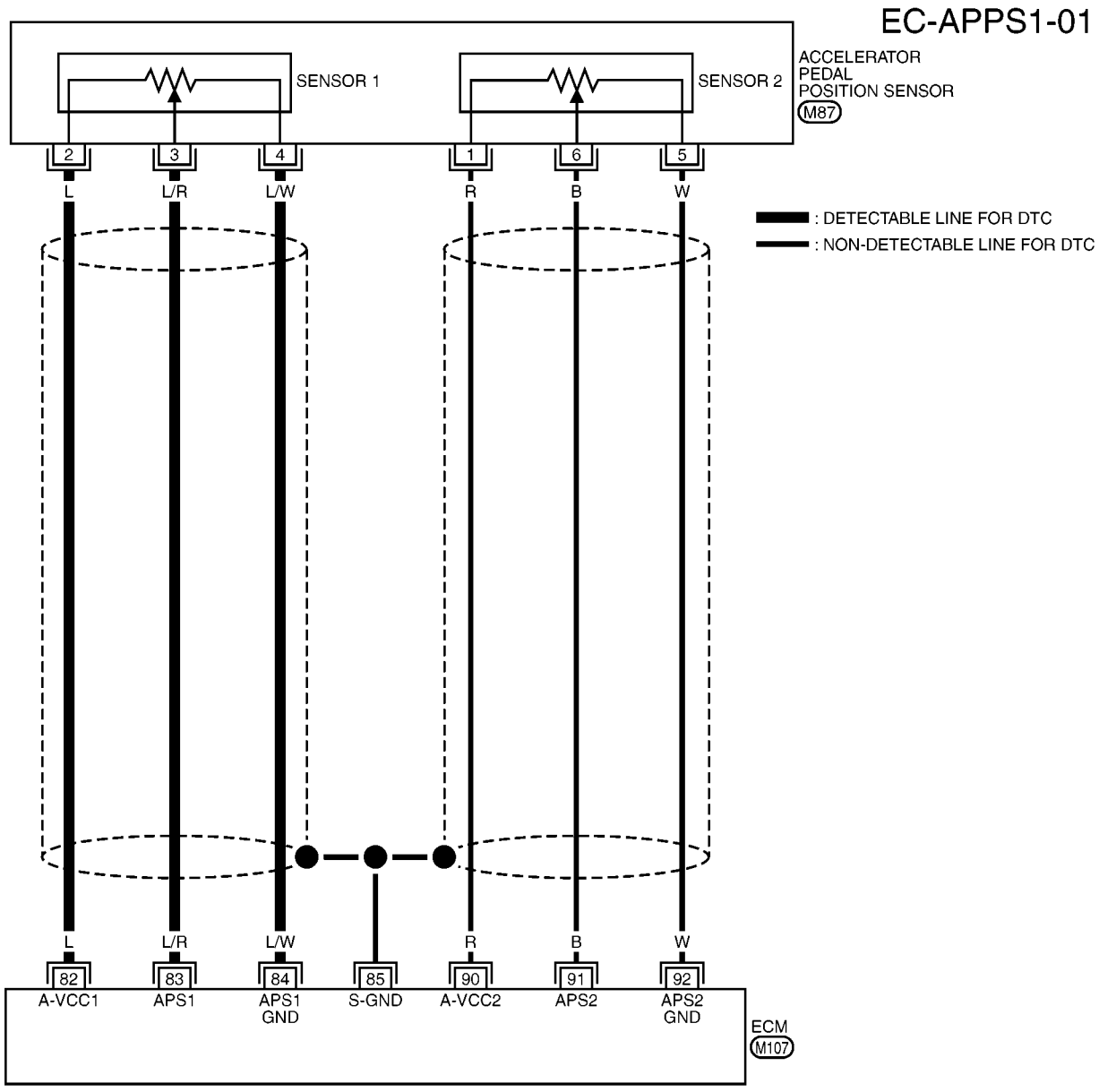


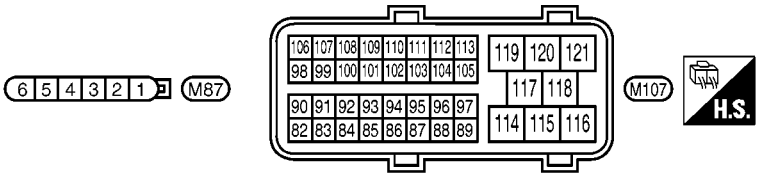
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013AJ





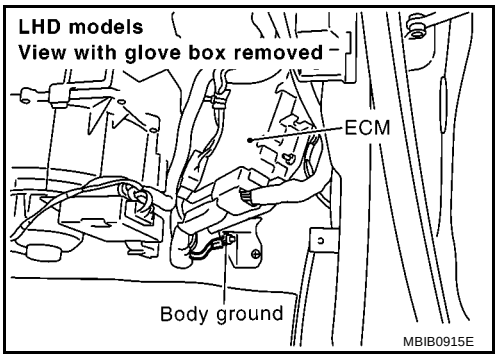
YEC499A

Diagnostic Procedure

EBS013AK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

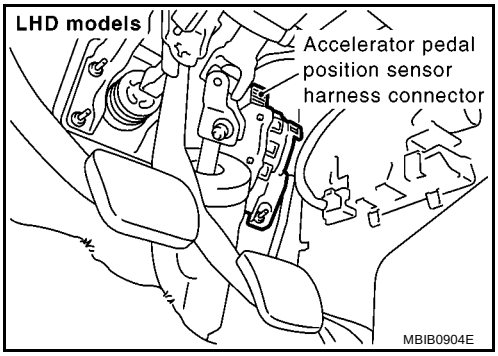


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.

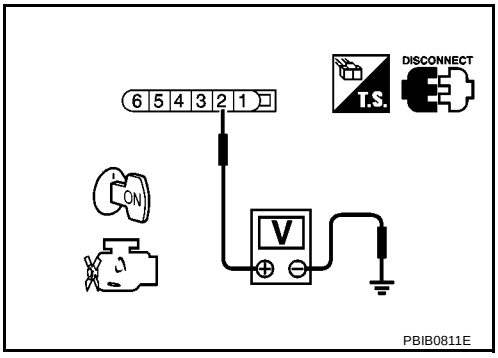
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between APP sensor terminal 4 and ECM terminal 84. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 83 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1054, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

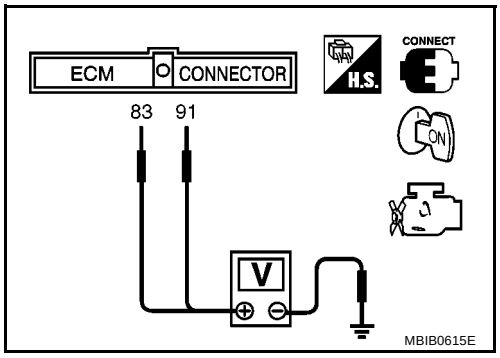
Component Inspection

EBS013AL

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS013AM

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

PFP:16700

Description

EBS013AN

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS013AO

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL TEMP SEN	● Engine: After warming up	More than 40°C (104°F)

ECM Terminals and Reference Value

EBS013AP

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013AQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel pump 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.) ● Fuel pump temperature sensor
P0183	Fuel pump temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

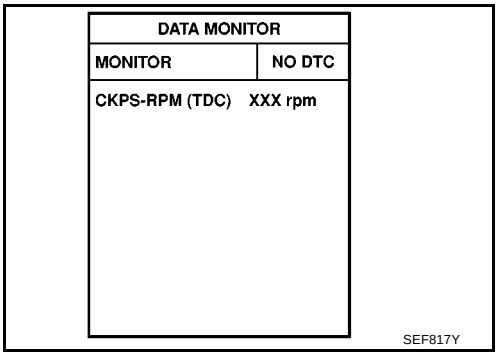
EBS013AR

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1057, "Diagnostic Procedure" .



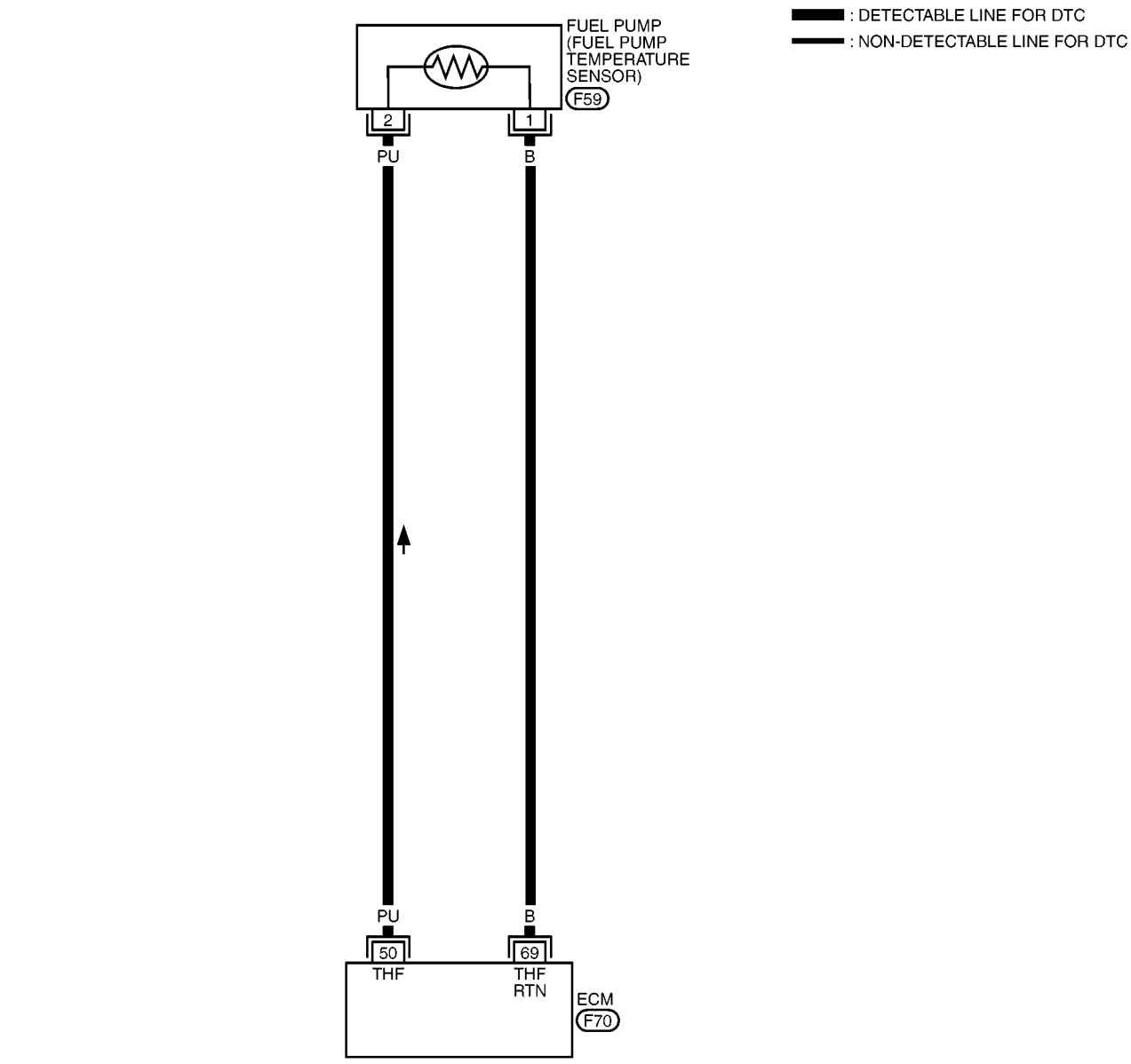
WITH GST

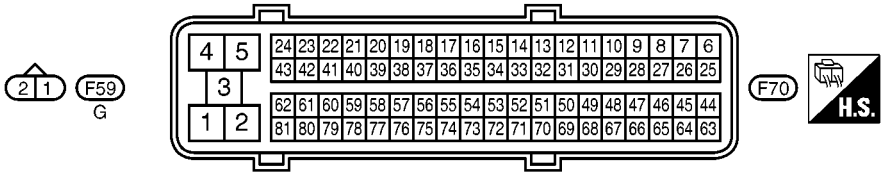
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013AS

EC-FTS-01





YEC506A

Diagnostic Procedure

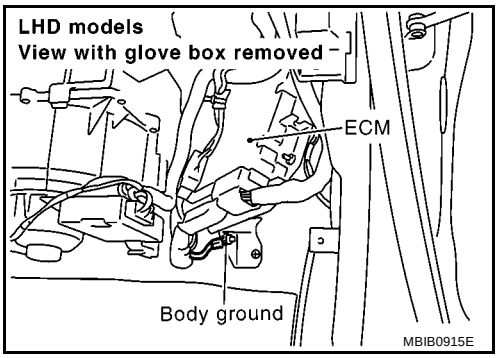
EBS013AT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

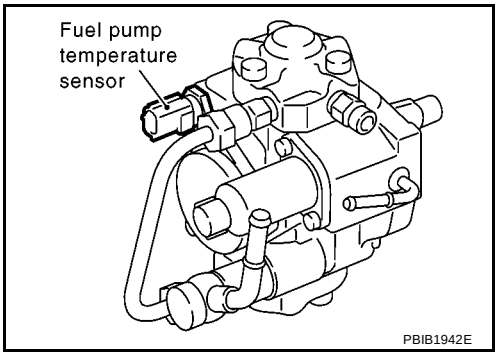
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.

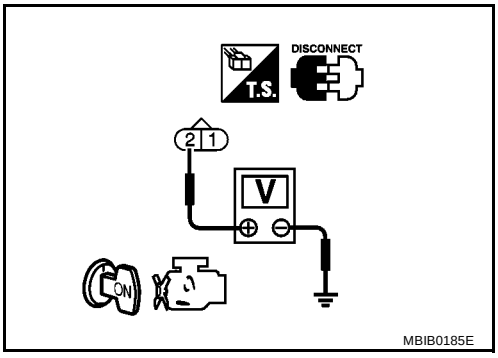


3. Check voltage between fuel pump temperature sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between fuel pump temperature sensor terminal 1 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Removal and Installation

EBS013AU

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0192, P0193 FRP SENSOR

PFP:16638

Description

EBS013AV

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 by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-II Reference Value in Data Monitor Mode

EBS013AW

Specification data are reference values.

MONITOR	CONDITION		SPECIFICATOIN
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa

ECM Terminals and Reference Value

EBS013AX

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48 49	R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.0 - 2.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013AY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0192	Fuel rail pressure 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.) ● Fuel rail pressure sensor
P0193	Fuel rail pressure sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

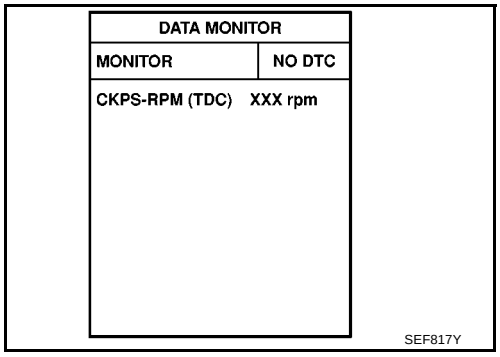
DTC Confirmation Procedure

EBS013AZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1062, "Diagnostic Procedure" .



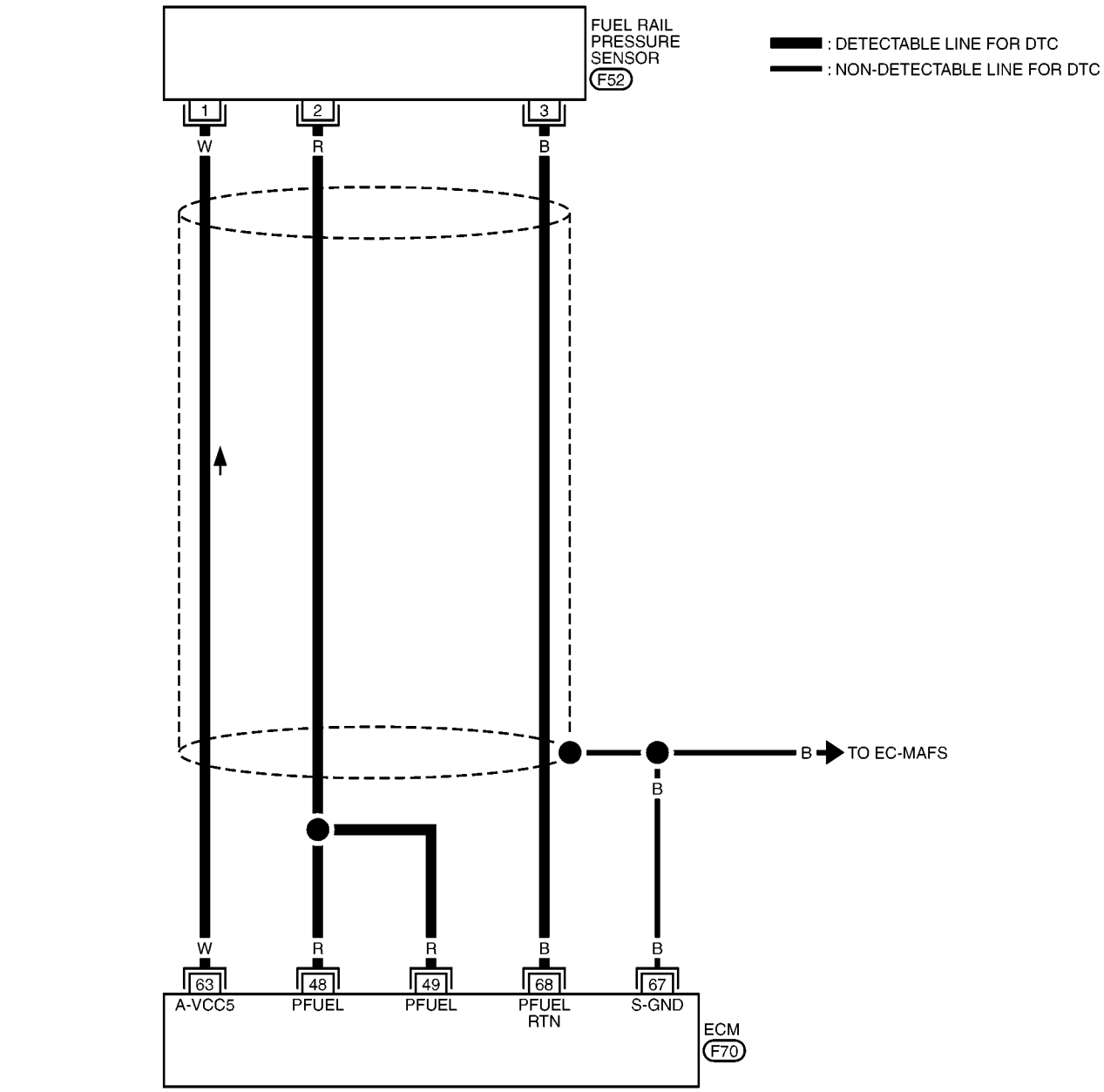
WITH GST

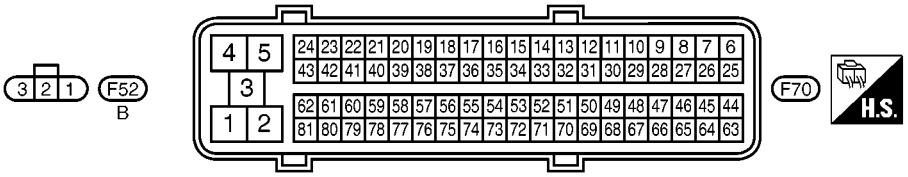
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013B0

EC-FRPS-01





YEC500A

Diagnostic Procedure

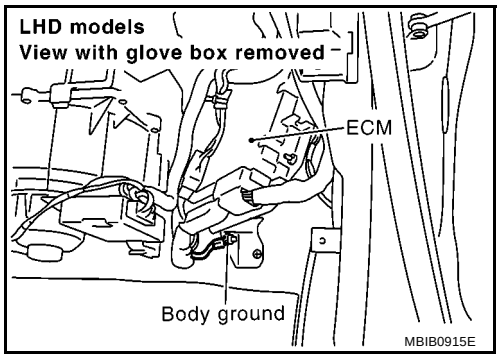
EBS013B1

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

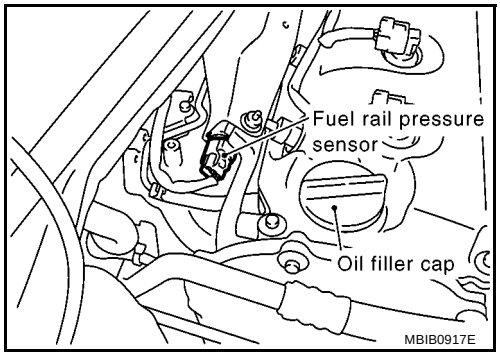
OK or NG

OK >> GO TO 2.
NG >> 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.

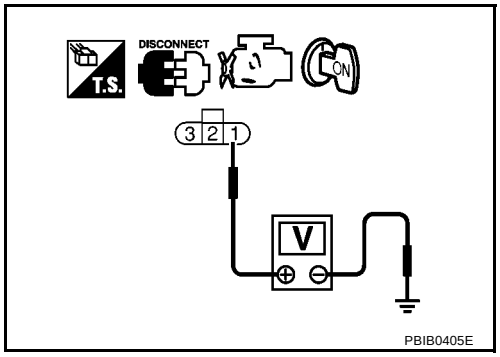


3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

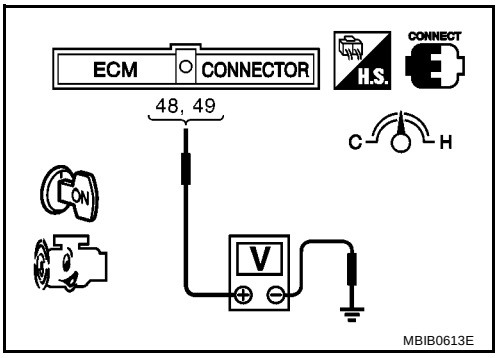
Component Inspection

EBS013B2

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminals 48, 49 (Fuel rail pressure sensor signal) and ground under the following conditions.

Condition	Voltage V
Idle	1.7 - 2.0
2,000 rpm	2.0 - 2.3



4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.
5. If NG, replace fuel rail.

Removal and Installation

EBS013B3

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0200 FUEL INJECTOR

PFP:16600

On Board Diagnosis Logic

EBS013B4

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0200	Fuel injector power supply circuit	ECM detects a voltage of power source for the fuel injector is excessively high or low.	● ECM

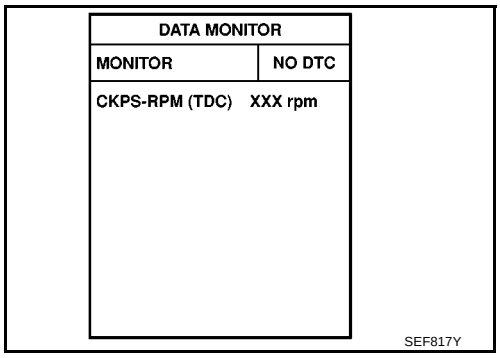
DTC Confirmation Procedure

EBS013B5

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1064, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013B6

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1064, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0200 displayed again?

With GST

1. Turn ignition switch ON.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. Perform EC-1064, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0200 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-962, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

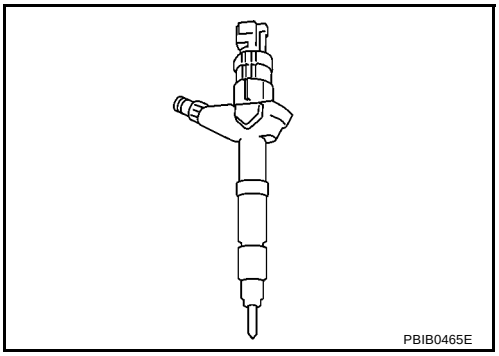
DTC P0201 - P0204 FUEL INJECTOR

PFP:16600

Component Description

EBS013B7

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS013B8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

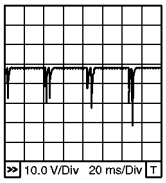
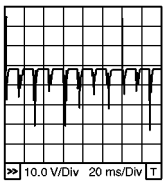
ECM Terminals and Reference Value

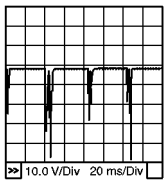
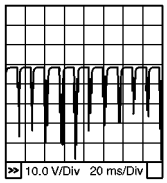
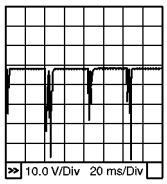
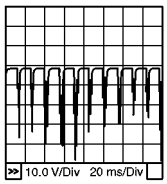
EBS013B9

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013BA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201	No. 1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.) ● Fuel injector
P0202	No. 2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203	No. 3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204	No. 4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC Confirmation Procedure

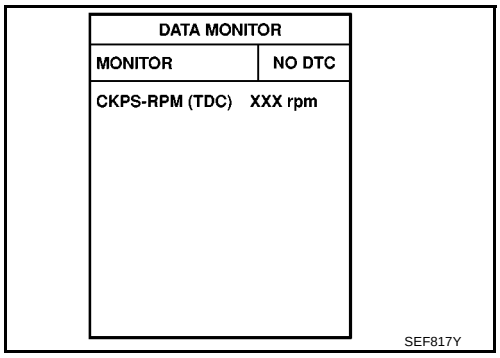
EBS013BB

NOTE:
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 the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1070, "Diagnostic Procedure" .



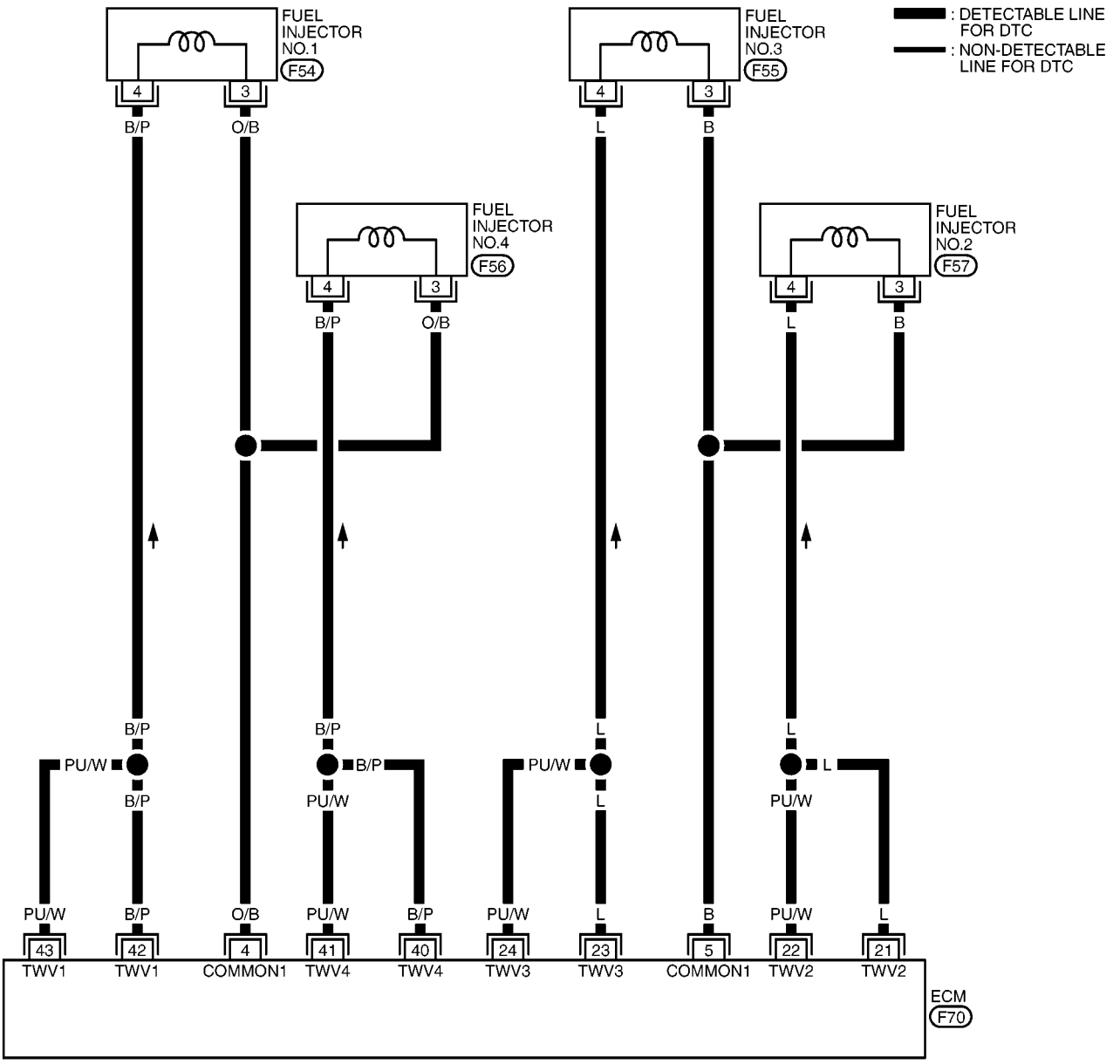
WITH GST

Follow the procedure “WITH CONSULT-II” above.

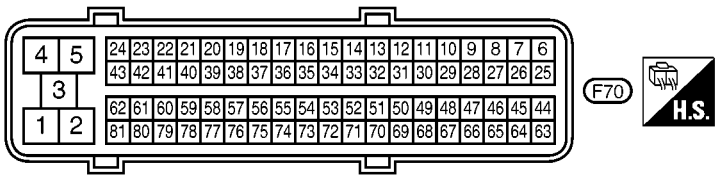
Wiring Diagram

EBS013BC

EC-INJECT-01







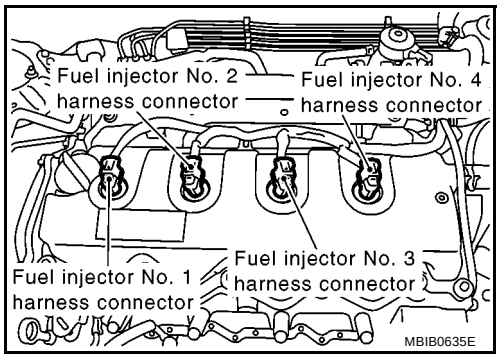
MBWA0633E

Diagnostic Procedure

EBS013BD

1. CHECK FUEL INJECTOR POWER SUPPLY FOR OPEN AND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	4	3	No.1
P0202	5	3	No.2
P0203	5	3	No.3
P0204	4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	42, 43	4	No.1
P0202	21, 22	4	No.2
P0203	23, 24	4	No.3
P0204	40, 41	4	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1071, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select “SELF DIAG RESULTS” mode with CONSULT-II.
6. Touch “ERASE”.
7. Perform EC-1068, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

With GST

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select MODE4 with GST.
6. Touch “ERASE”.
7. Perform EC-1068, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

Yes or No

Yes >> Replace fuel injector of malfunctioning cylinder.
No >> GO TO 5.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

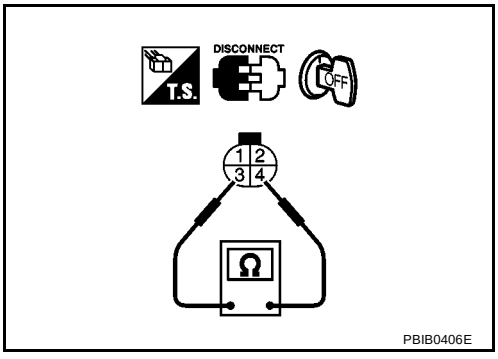
EBS013BE

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS013BF

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0217 ENGINE OVER TEMPERATURE

PFP:21481

System Description

EBS013BG

NOTE:
If DTC P0217 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1011, "DTC U1000 CAN COMMUNICATION LINE" .

COOLING FAN CONTROL

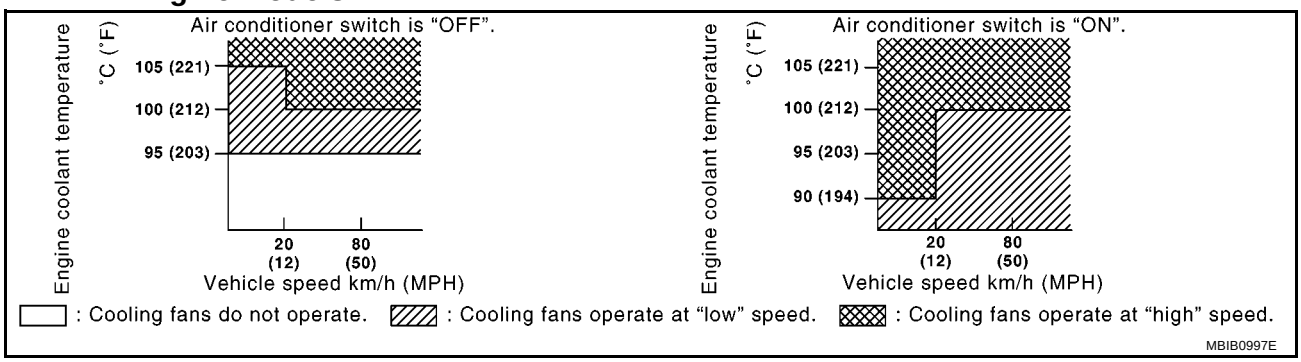
Sensor	Input signal to ECM	ECM function	Actuator
Vehicle speed sensor*1	Vehicle speed	Cooling fan control	Cooling fan relay *2
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch*1	Air conditioner ON signal		

*1: This input signal is sent to the ECM through CAN communication line.
*2: This output signal is sent from the ECM through CAN communication line.

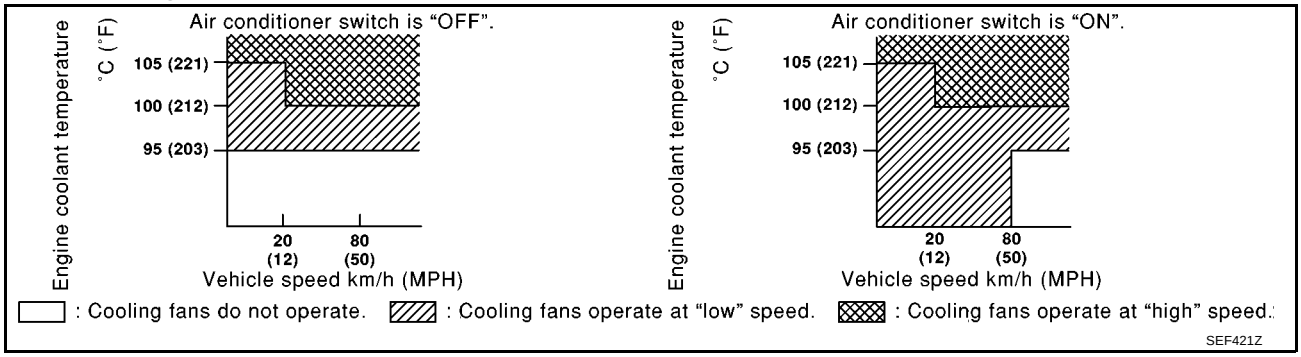
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

YD22DDTi Engine Models



YD22DDT Engine Models



CONSULT-II Reference Value in Data Monitor Mode

EBS013BH

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	● When cooling fan is stopped.	OFF
	● When cooling fans operate at low speed.	LOW
	● When cooling fans operate at high speed.	HI

On Board Diagnosis Logic

EBS013BJ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217	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.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1086, "Main 12 Causes of Overheating" .

Overall Function Check

EBS013BK

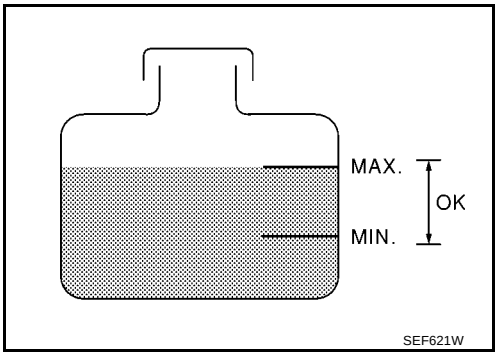
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

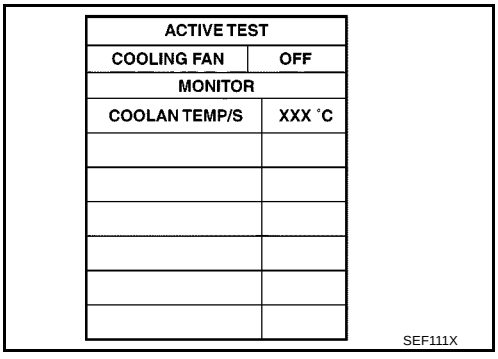
- **Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.**
- **Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1077, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1077, "Diagnostic Procedure" .
3. Turn ignition switch ON.

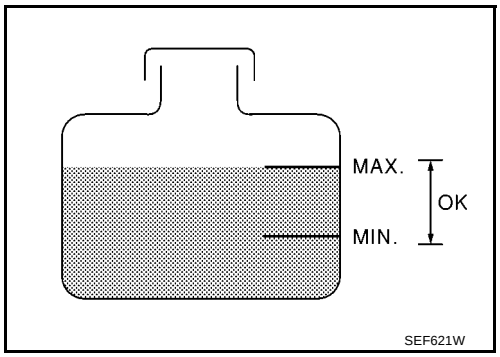


4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1077, "Diagnostic Procedure" .

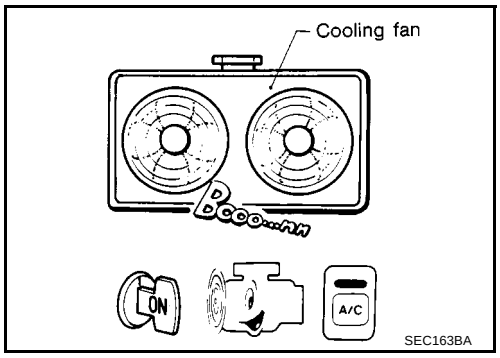


WITHOUT CONSULT-II

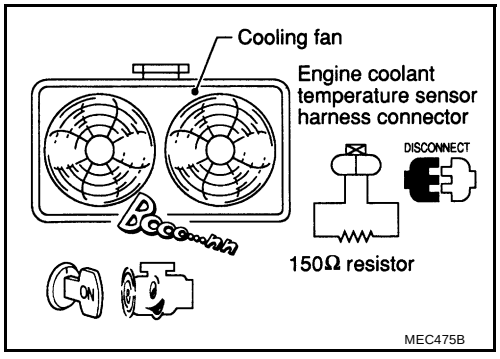
1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1077, "Diagnostic Procedure" .



2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1077, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
   If NG, go to EC-1077, "Diagnostic Procedure" .
   If OK, go to the following step.



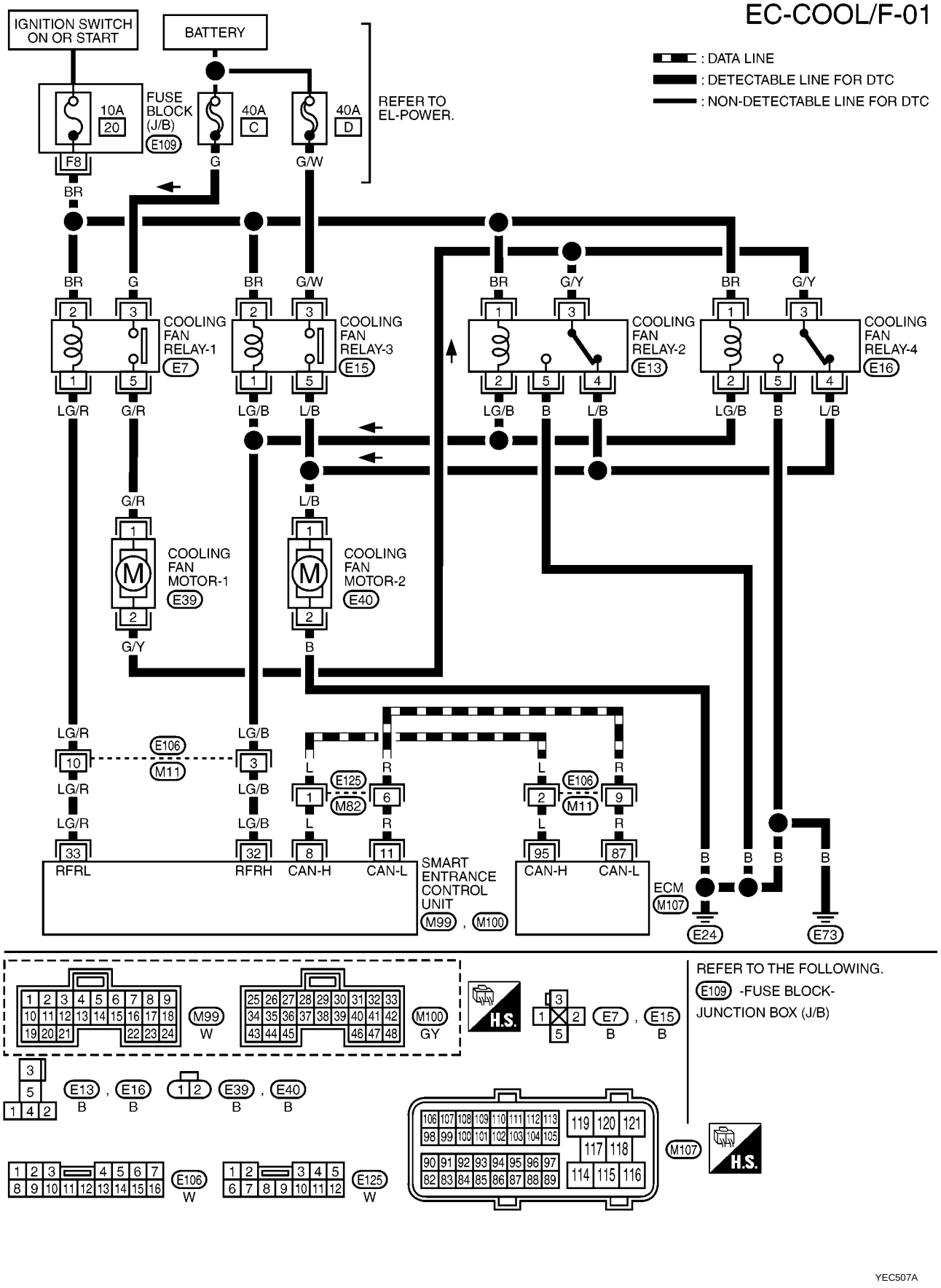
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
14. If NG, go to EC-1077, "Diagnostic Procedure" .

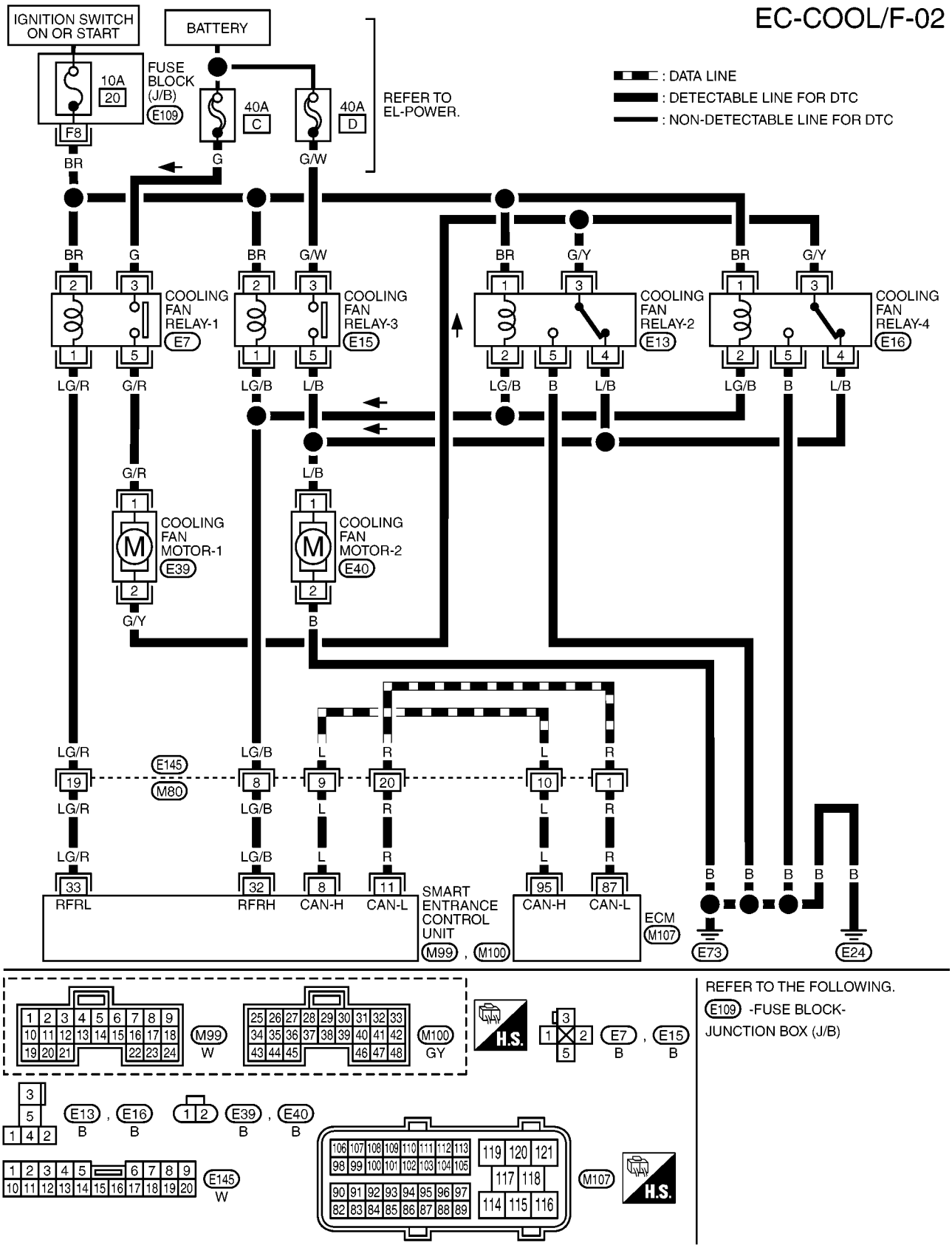
Wiring Diagram
LHD MODELS

EBS013BL



YEC507A

RHD MODELS



YEC508A

Diagnostic Procedure

EBS014GQ

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 5.

2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-1080, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

3. CHECK COOLING FAN HIGH SPEED OPERATION-I

With CONSULT-II

1. Touch “HIGH” on the CONSULT-II screen.
2. Make sure that cooling fan-1 operates at higher speed than low speed.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan high speed control circuit-1. (Go to EC-1082, "PROCEDURE B" .)

ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

4. CHECK COOLING FAN HIGH SPEED OPERATION-II

With CONSULT-II

Make sure that cooling fan-2 operates at higher speed than low speed.

OK or NG

OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit-2. (Go to EC-1084, "PROCEDURE C" .)

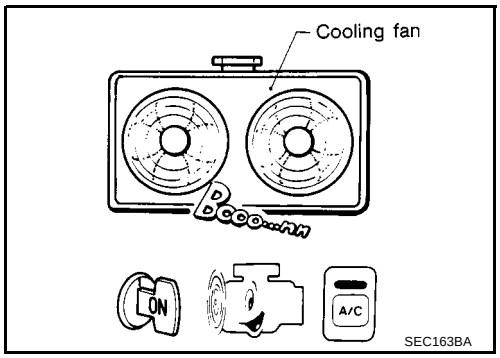
5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan low speed control circuit. (Go to EC-1080, "PROCEDURE A" .)



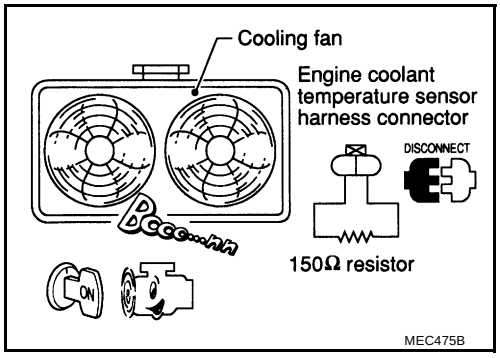
6. CHECK COOLING FAN HIGH SPEED OPERATION-I

Without CONSULT-II

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-1 operates at higher speed than low speed.

OK or NG

OK >> GO TO 7.
NG >> Check cooling fan high speed control circuit-1. (Go to EC-1082, "PROCEDURE B" .)



7. CHECK COOLING FAN HIGH SPEED OPERATION-II

Without CONSULT-II

Make sure that cooling fan-2 operates higher speed than lower speed.

OK or NG

OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit-2. (Go to EC-1084, "PROCEDURE C" .)

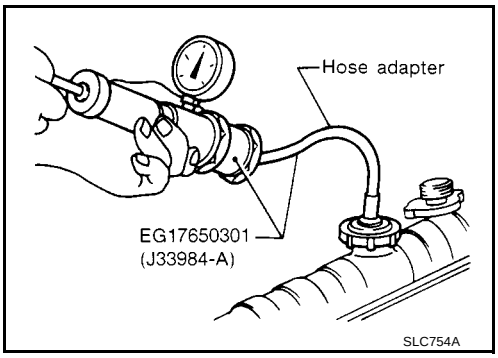
8. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to LC-35, “Water Pump”.)

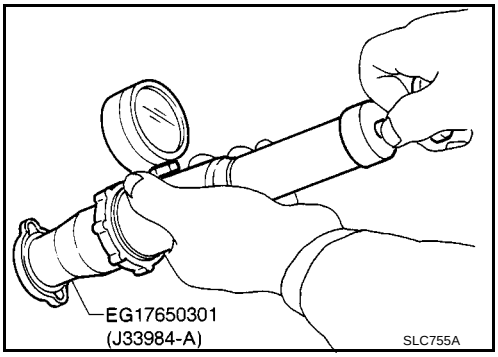
>> Repair or replace.

10. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 11.
NG >> Replace radiator cap.

11. CHECK THERMOSTAT

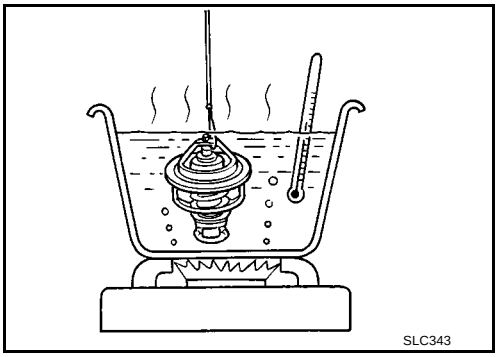
1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

Valve lift:

More than 8 mm/95 °C (0.31 in/203 °F)



4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-37, “Thermostat”.

OK or NG

OK >> GO TO 12.
NG >> Replace thermostat.

12. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1049, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace engine coolant temperature sensor.

13. CHECK MAIN 12 CAUSES

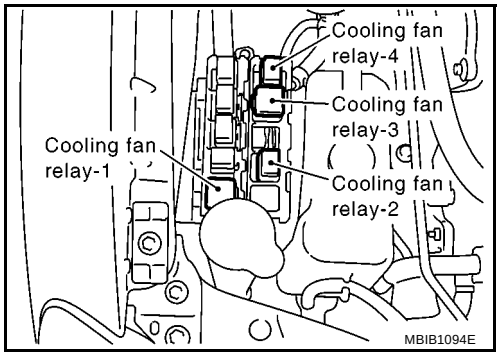
If the cause cannot be isolated, go to EC-1086, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

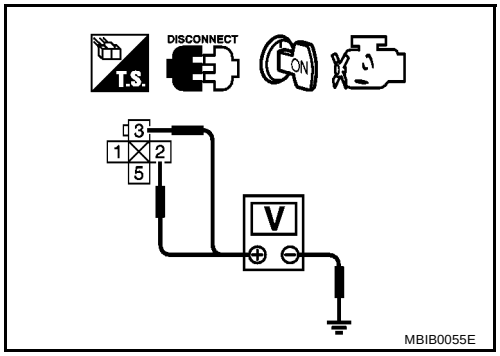
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-1 terminals 2, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

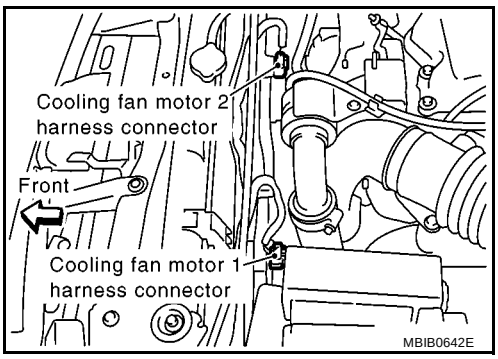
- Fuse block (J/B) connector E109
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Disconnect cooling fan relay-2 and cooling fan relay-4.
4. Check harness continuity between the following.

- Cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1
- Cooling fan motor-1 terminal 2 and cooling fan relay-2 terminal 3
- Cooling fan motor-1 terminal 2 and cooling fan relay-4 terminal 3
- Cooling fan relay-2 terminal 4 and cooling fan motor-2 terminal 1
- Cooling fan relay-4 terminal 4 and cooling fan motor-2 terminal 1
- Cooling fan motor-2 terminal 2 and body ground
  Refer to Wiring Diagram.



Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

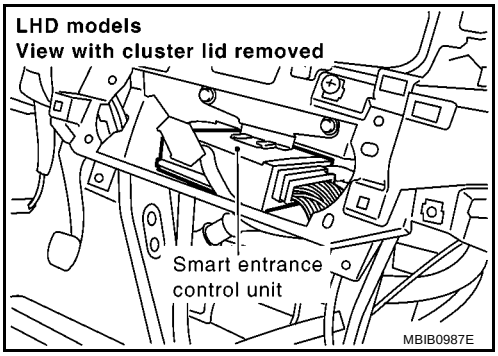
1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 1 and smart entrance control unit terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-1 and smart entrance control unit

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

6. CHECK COOLING FAN RELAYS-1, -2 AND 4

Refer to EC-1087, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1087, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motor.

8. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 9.
NG >> Replace smart entrance control unit.

9. CHECK INTERMITTENT INCIDENT

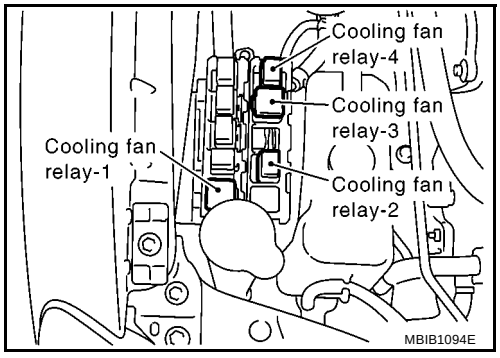
Perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

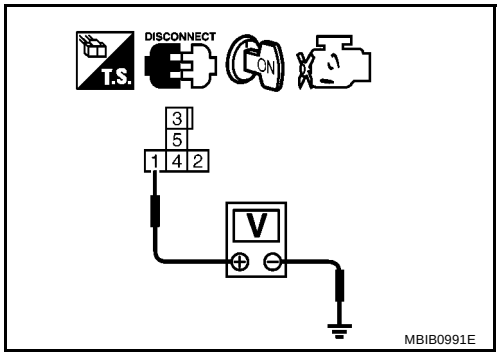
1. CHECK COOLING FAN RELAYS-2 AND -4 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2 and -4.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relays-2, -4 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- Harness for open or short between cooling fan relays-2, -4 and fuse

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

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between cooling fan relay-2 terminal 5 and body ground, cooling fan relay-4 terminal 5 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

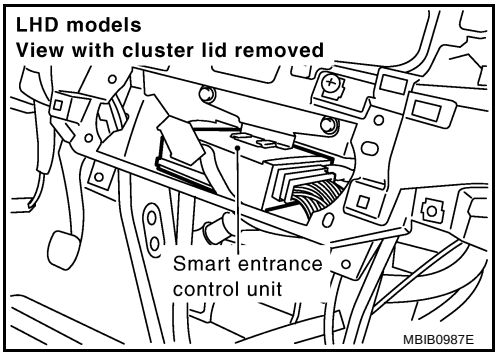
OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-2 terminal 2 and smart entrance control unit terminal 32, cooling fan relay-4 terminal 2 and smart entrance control unit terminal 32.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-2 and smart entrance control unit
- Harness for open or short between cooling fan relay-4 and smart entrance control unit

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

6. CHECK COOLING FAN RELAYS-2 AND -4

Refer to EC-1087, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 8.
NG >> Replace smart entrance control unit.

8. CHECK INTERMITTENT INCIDENT

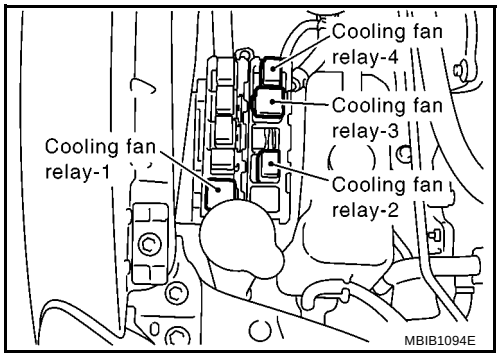
Perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE C

1. CHECK COOLING FAN MOTOR-2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.

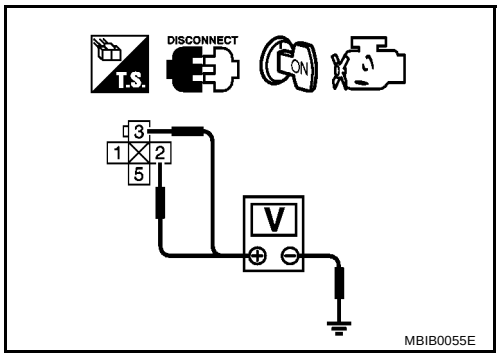


4. Check voltage between cooling fan relay-3 terminals 2, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- 40A fusible link
- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

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

3. CHECK COOLING FAN MOTOR CONTROL CIRCUIT FOR OPEN AND SHORT

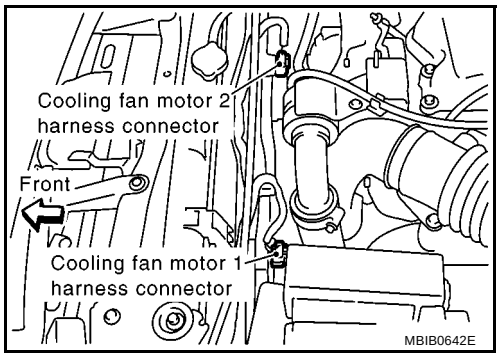
1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground short to power in harness or connectors.



4. CHECK COOLING FAN MOTOR CONTROL CIRCUIT FOR SHORT TO GROUND

Check harness continuity between cooling fan relay-3 terminal 5 or cooling fan motor-2 terminal 1 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Cooling fan relays-2 and -4 (Refer to EC-1087, "Component Inspection")
- Harness for short to ground between cooling fan relay-2 and cooling fan motor-2
- Harness for short to ground between cooling fan relay-3 and cooling fan motor-2
- Harness for short to ground between cooling fan relay-4 and cooling fan motor-2

>> Repair or replace.

6. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

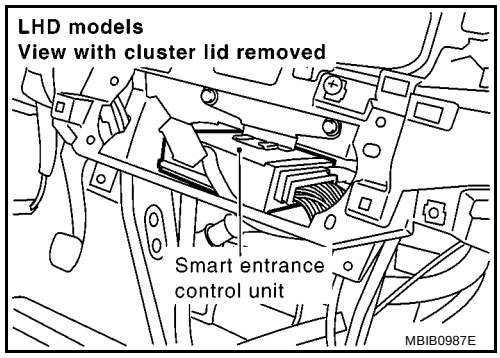
1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 1 and smart entrance control unit terminal 32. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-3 and smart entrance control unit

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

8. CHECK COOLING FAN RELAY-3

Refer to EC-1087, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace cooling fan relay.

9. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 10.
NG >> Replace smart entrance control unit.

10. CHECK INTERMITTENT INCIDENT

Perform EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

EBS013BN

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	See MA-22, “Engine Coolant Mixture Ratio”.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See LC-41, “Changing Engine Coolant”.
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See LC-34, “CHECKING RADIATOR CAP”.
ON*2	5	● Coolant leaks	● Visual	No leaks	See LC-35, “CHECKING TRADIATOR SYSTEM FOR LEAKS”.
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-37, “Thermostat”, and LC-39, “Radiator”.
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1072).
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	See LC-35, “CHECKING TRADIATOR SYSTEM FOR LEAKS”.
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See LC-41, “Changing Engine Coolant”.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	SeeEM-186, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-201, "CYLINDER BLOCK" .

*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 LC-42, “Overheating Cause Analysis”.

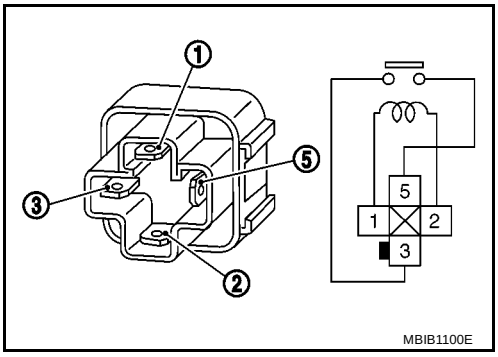
Component Inspection

EBS014GR

COOLING FAN RELAYS-1 AND -3

Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

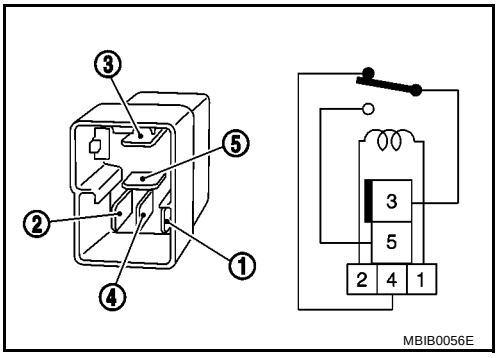


MBIB1100E

COOLING FAN RELAYS-2 AND -4

Check continuity between terminals 3 and 4, 3 and 5 under the following conditions.

Conditions	Terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	No
	3 and 5	Yes
No current supply	3 and 4	Yes
	3 and 5	No

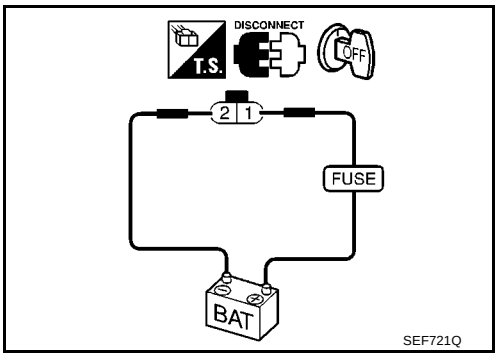


MBIB0056E

COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2



SEF721Q

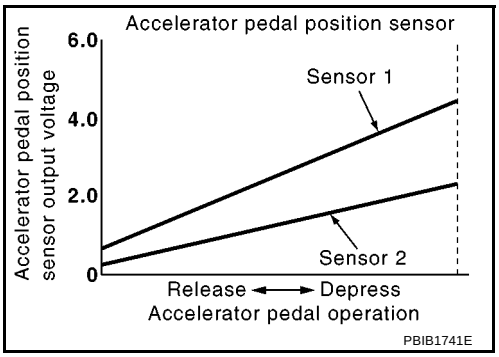
DTC P0222, P0223 APP SENSOR

PFP:18002

Description

EBS013BP

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS013BQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.2 - 0.7V
		Accelerator pedal: fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.1 - 0.4V
		Accelerator pedal: fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS013BR

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013BS

These self-diagnoses have the one trip detection logic.
The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

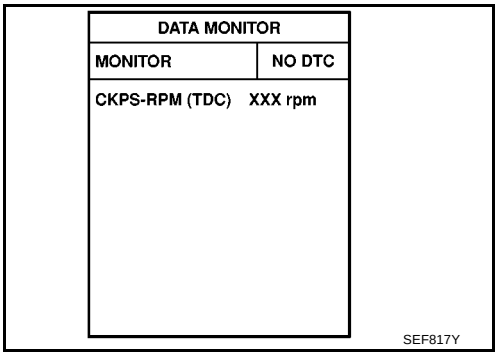
DTC Confirmation Procedure

EBS013BT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1091, "Diagnostic Procedure" .

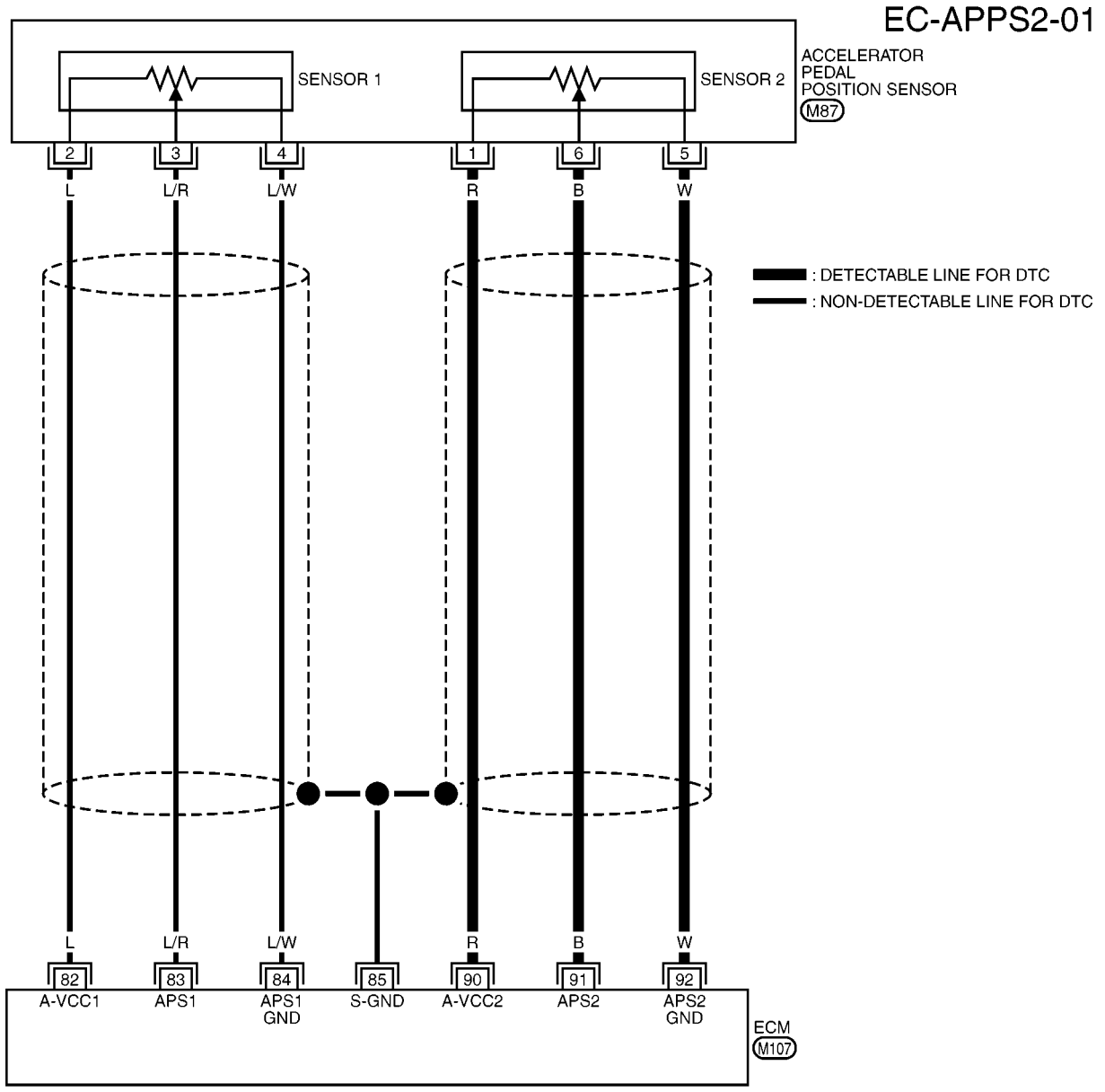


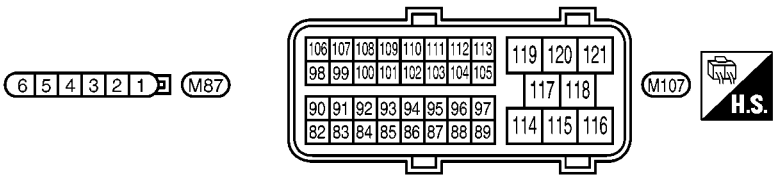
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013BU





YEC520A

Diagnostic Procedure

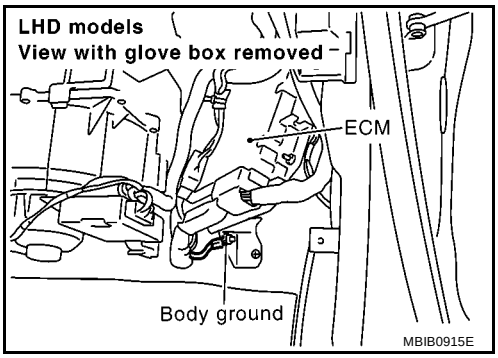
EBS013BV

1. CHCEK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

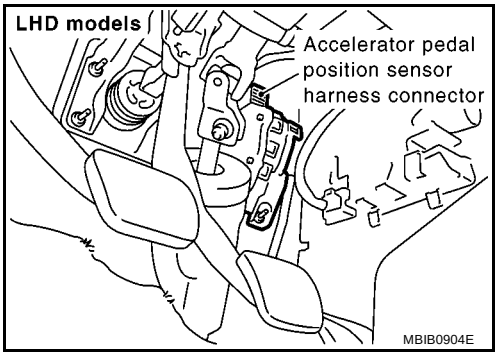
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

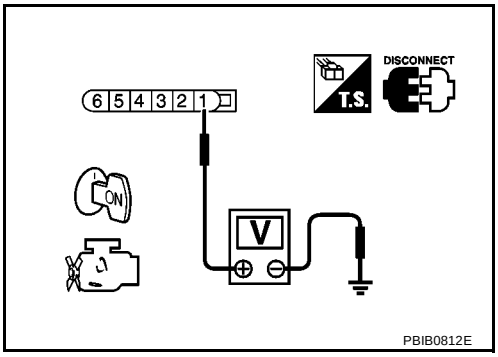


3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 92. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1092, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

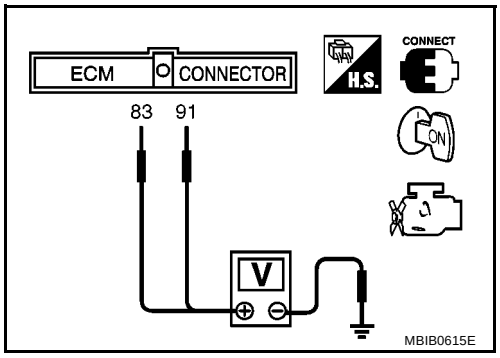
Component Inspection

EBS013BW

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.3V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS013BX

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

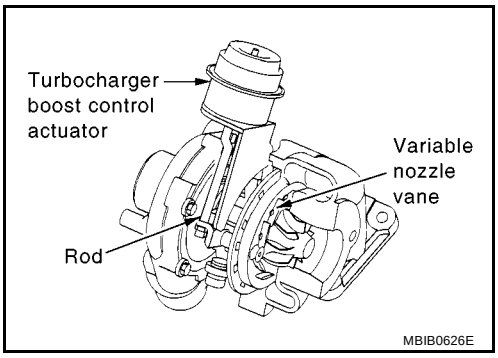
DTC P0234 TC SYSTEM

PFP:14411

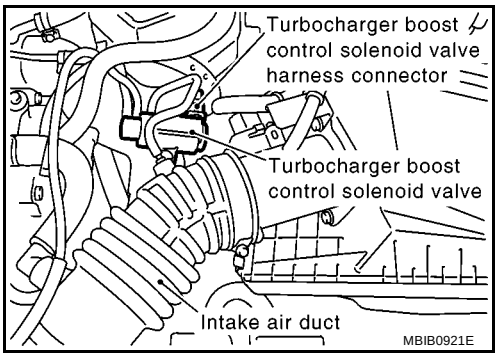
Description(YD22DDTi Engine Models)

EBS013BY

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



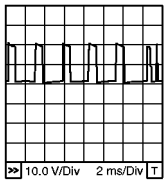
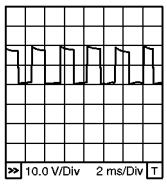
ECM Terminals and Reference Value(YD22DDTi Engine Models)

EBS013BZ

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve*	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: For YD22DDTi engine models

On Board Diagnosis Logic

EBS014GT

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

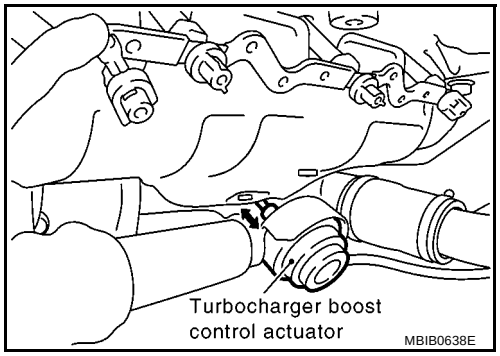
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0234	Turbocharger overboost condition	● ECM detects turbocharger boost pressure is excessively high. (YD22DDTi engine models) ● ECM detects intake air flow volume is excessively high. (YD22DDT engine models)	● Turbocharger ● Vacuum pump ● Turbocharger boost sensor (YD22DDTi engine models) ● Turbocharger boost control solenoid valve (YD22DDTi engine models) ● MAF sensor (YD22DDT engine models)

Overall Function Check(YD22DDTi Engine Models)

EBS014GU

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.
3. If NG, go to EC-1096, "Diagnostic Procedure(YD22DDTi Engine Models)" .



Overall Function Check(YD22DDT Engine Models)

EBS016LG

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

1. Connect the handy pump to the actuator, and check that the rod strokes smoothly in compliance with the following pressure.
   Pressure to be applied at actuator part to move rod end as follows:

   Standard (Pressure/rod stroke amount):

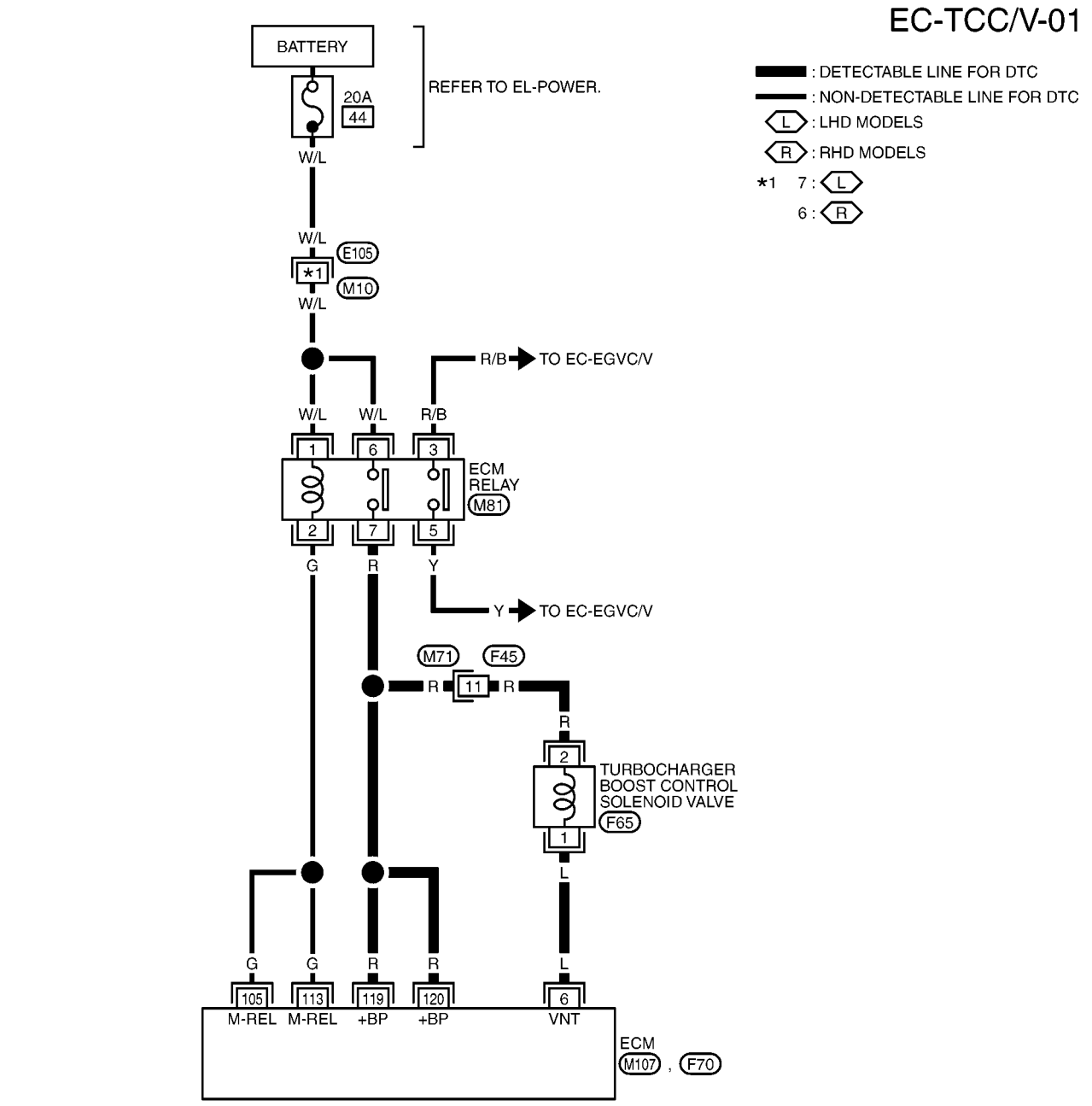
   131.24 - 136.56 kPa (1,312 - 1,366 mbar, 984.4 - 1024.3 mmHg, 38.7 - 40.3 inHg)/ 0.38 mm (0.0150 in)

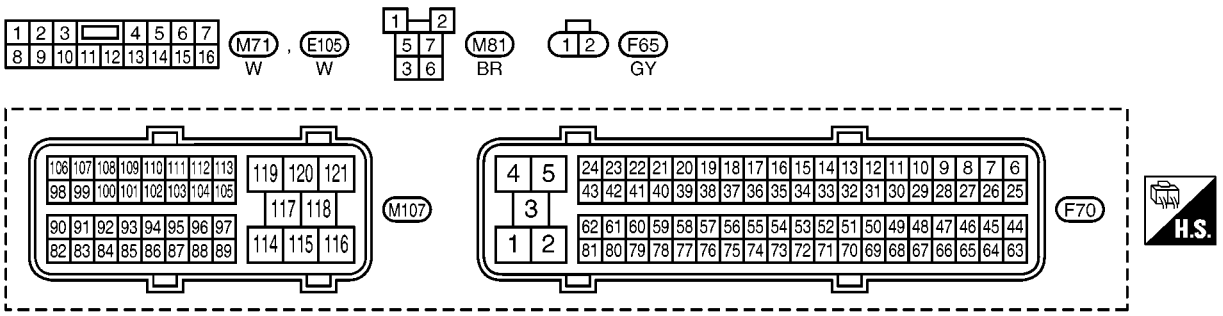
   155.44 - 164.76 kPa (1,554 - 1,648 mbar, 1,166 - 1,236 mmHg, 45.9 - 48.7 inHg)/4.0 mm (0.157 in)

2. If NG, go to EC-1096, "Diagnostic Procedure(YD22DDTi Engine Models)" .

Wiring Diagram(YD22DDTi Engine models)

EBS013C2





MBWA0623E

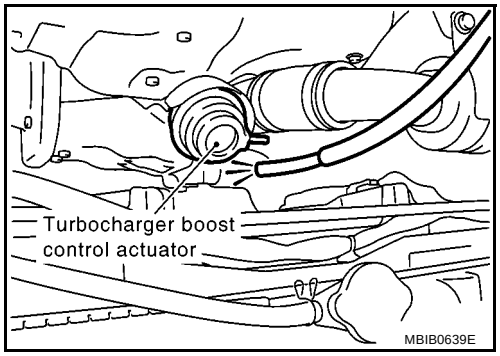
Diagnostic Procedure(YD22DDTi Engine Models)

EBS014GV

1. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to turbocharger control actuator.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum should exist.

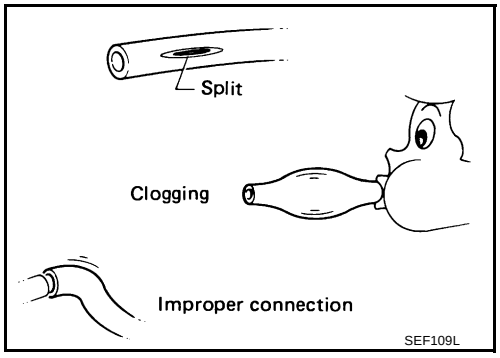


OK or NG

OK >> GO TO 8.
NG >> GO TO 2.

2. CHECK 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-949, "Vacuum Hose Drawing(YD22DDTi Engine Models)" .

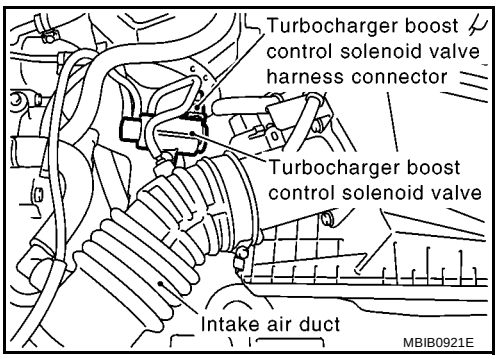


OK or NG

OK >> GO TO 3.
NG >> Repair or replace vacuum hoses and vacuum gallery.

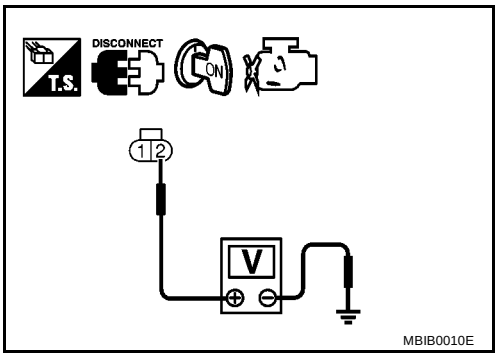
3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between turbocharger boost control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay 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 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TURBOCHARGE BOOST CONTROL SOLENOID VALVE

Refer to EC-1100, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace turbocharger boost control solenoid valve.

7. CHECK VACUUM PUMP

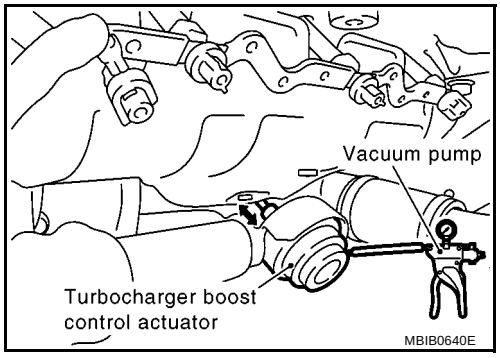
Refer to EM-143, "VACUUM PUMP" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum pump assembly.

8. CHECK TURBOCHARGER BOOST CONTROL ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump to turbocharger boost control actuator.
3. Make sure that the turbocharger boost control actuator rod moves smoothly when applying vacuum of -53.3kPa (-533mbar, -400mmHg, -15.75inHg) and releasing it.



OK or NG

OK >> GO TO 9.
NG >> Replace turbocharger assembly.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1105, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

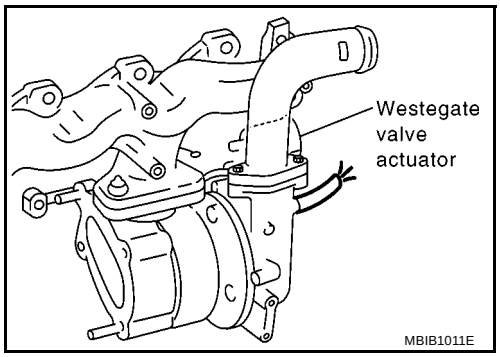
Diagnostic Procedure(YD22DDT Engine Models)

EBS016LH

1. CHECK HOSE AIR LEAKAGE

1. Turn ignition switch OFF.
2. Disconnect hose connected to wastegate valve actuator.
3. Start engine and lit it idle.
4. Check hose for air breathed out

Air should be breathed out.

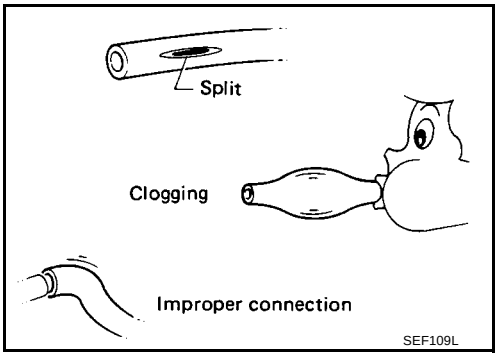


OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK HOSE

1. Turn ignition switch OFF.
2. Check hose clogging, cracks or improper connection.



OK or NG

OK >> GO TO 3.
NG >> Replace turbocharger assembly.

3. CHECK MAF SENSOR

Refer to EC-1036, "Component Inspection" .

OK or NG

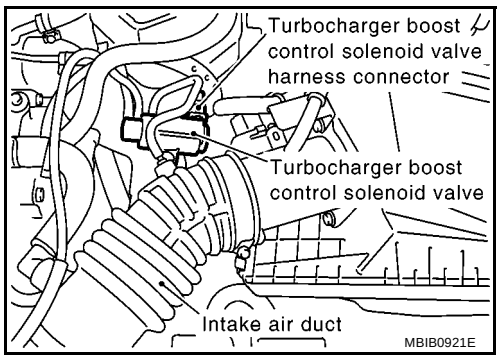
OK >> **INSPECTION END**
NG >> Replace MAF sensor.

Component Inspection

EBS014GW

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.

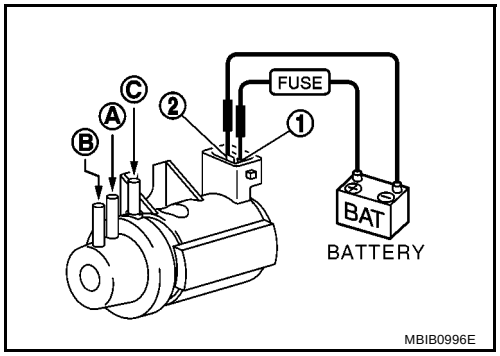


2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.
3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals **1** and **2**	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



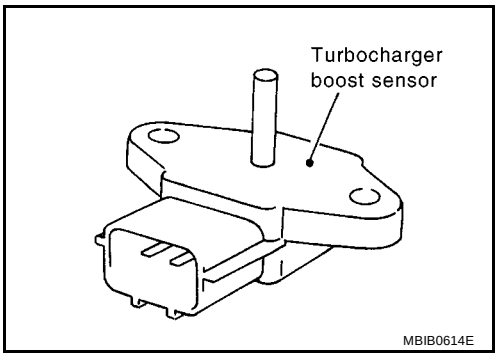
DTC P0237, P0238 TC BOOST SENSOR

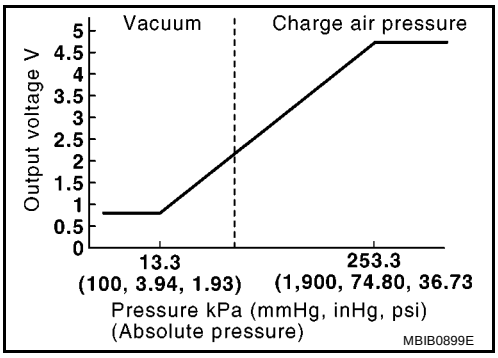
PFP:22365

Component Description

EBS013C5

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS013C6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/M PRES SE [kPa]*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa

*: For YD22DDTi engine models

ECM Terminals and Reference Value

EBS013C7

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	Y	Turbocharger boost sensor*	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 2.8V
64	W	Turbocharger boost sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
71	B	Turbocharger boost sensor ground	**[Ignition switch ON]**	Approximately 0.3V

*: For YD22DDTi engine models

On Board Diagnosis Logic

EBS013C8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237	Turbocharger boost 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.) ● Turbocharger boost sensor
P0238	Turbocharger boost sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

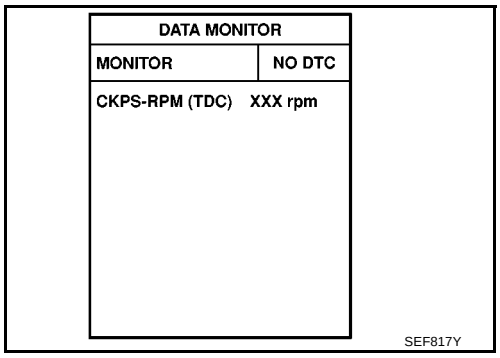
DTC Confirmation Procedure

EBS013C9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1104, "Diagnostic Procedure" .



WITH GST

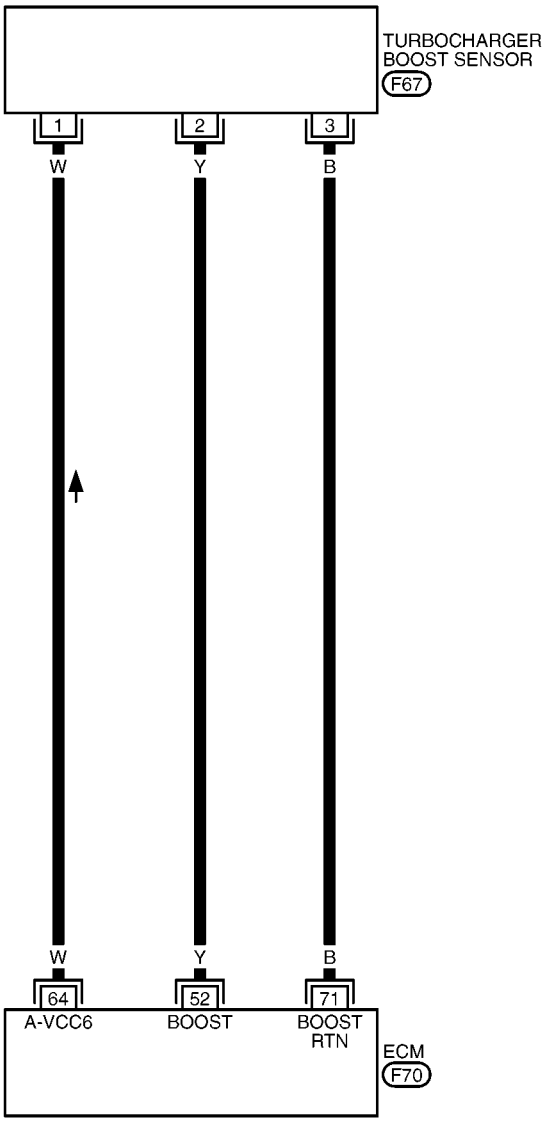
Follow the procedure “WITH CONSULT-II” above.

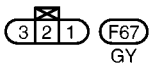
Wiring Diagram

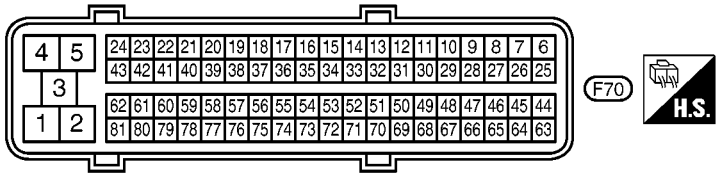
EBS013CA

EC-BOOST-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







YEC503A

Diagnostic Procedure

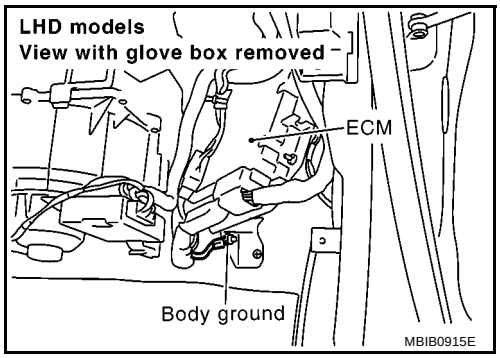
EBS013CB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

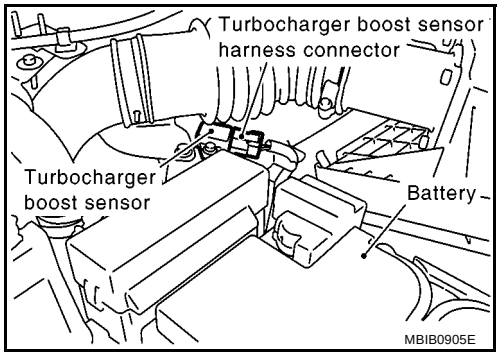
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharge boost sensor harness connector.
2. Turn ignition switch ON.

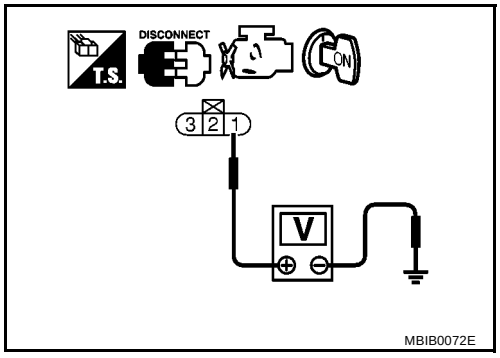


3. Check voltage between turbocharge boost sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK TURBOCHAGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHAGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 52 and turbocharger boost sensor terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1105, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

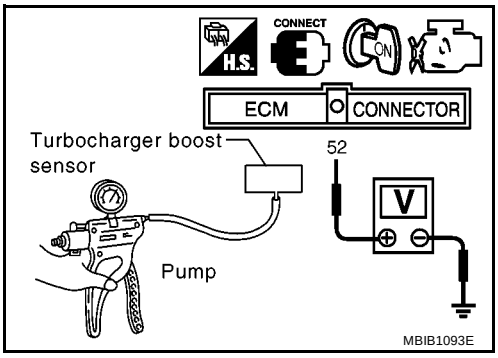
Component Inspection

EBS013CC

TURBOCHARGER BOOST SENSOR

1. Remove turbocharger boost sensor with its harness connector connected.
2. Turn ignition switch ON.
3. Use pump to apply pressure to turbocharger boost sensor as shown in the figure.

   CAUTION:
   - **Always calibrate the pressure pump gauge when using it.**
   - **Inspection should be done at room temperature [10-30°C (50-86°F)].**
4. Check the output voltage between turbocharger boost sensor terminal 2 and body ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approximately 2.3V
+40 kPa (400 mbar, 300mmHg, 11.81 inHg)	Approximately 2.9V

Removal and Installation

EBS013CD

TURBOCHARGER BOOST SENSOR

Refer to EM-121, "CHARGE AIR COOLER" .

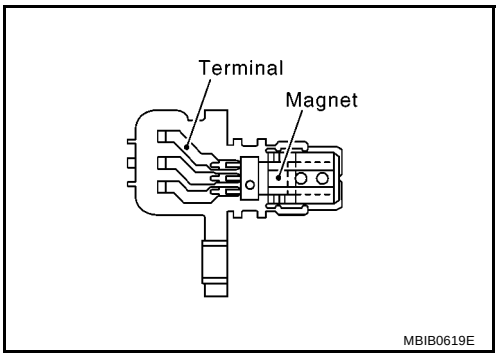
DTC P0335 CKP SENSOR

PFP:23731

Description

EBS013CE

The crankshaft position sensor monitors engine speed by means of signals from the sensing plate (with 56 protrusions) installed to the fly wheel. The datum signal output is detected 6° signal and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.



MBIB0619E

CONSULT-II Reference Value in Data Monitor Mode

EBS013CF

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (TDC)	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication

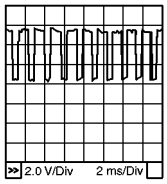
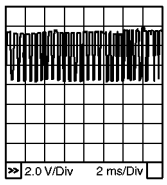
ECM Terminals and Reference Value

EBS013CG

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

On Board Diagnosis Logic

EBS013CH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor

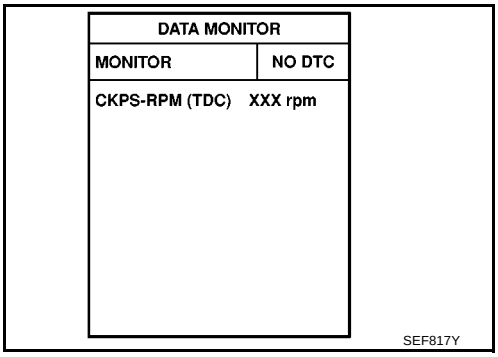
DTC Confirmation Procedure

EBS013CI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1109, "Diagnostic Procedure" .

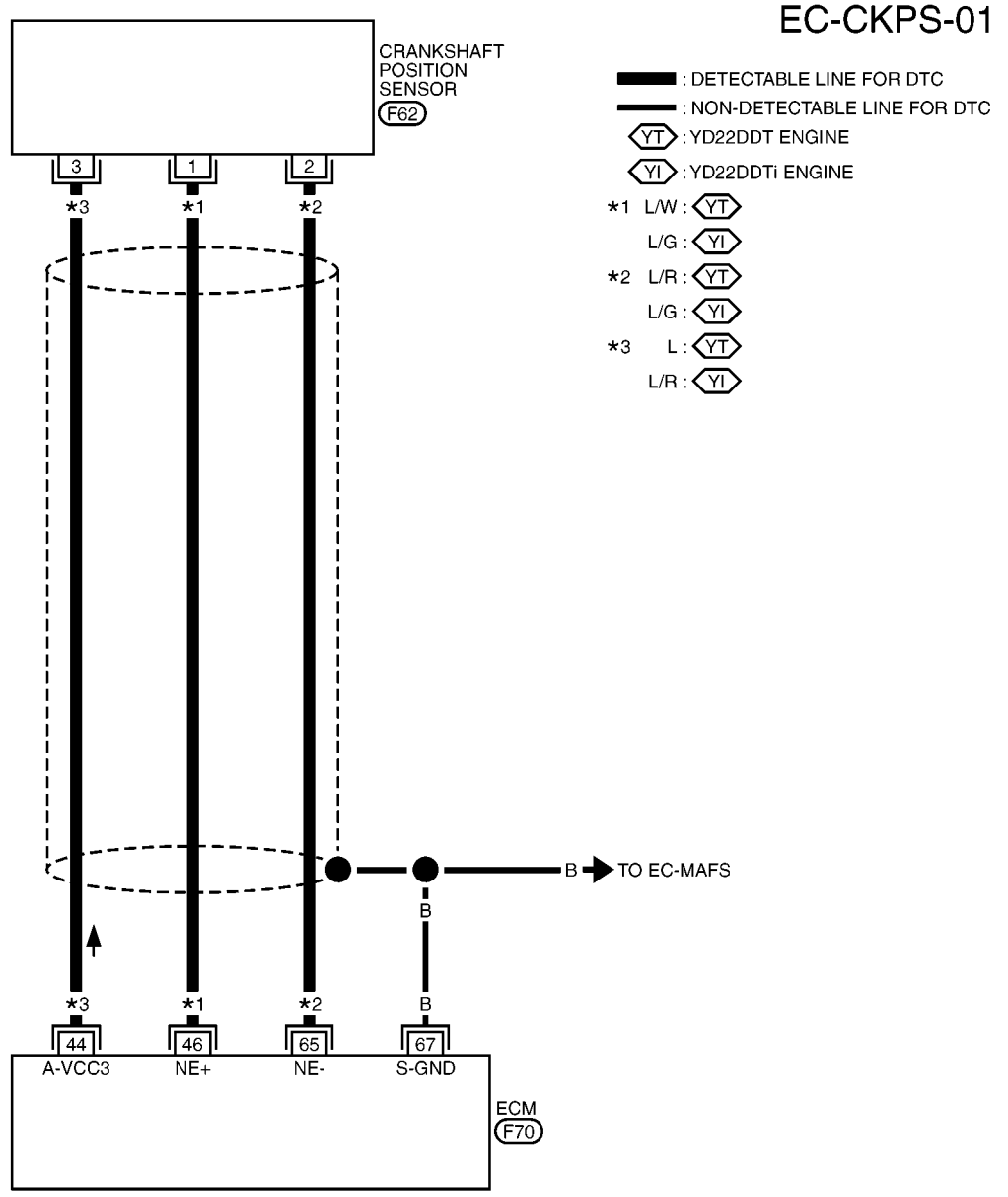


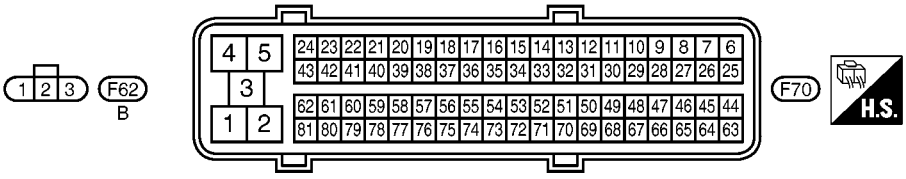
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013CJ





YEC504A

Diagnostic Procedure

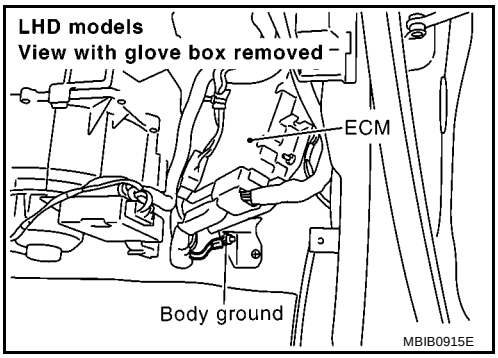
EBS013CK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

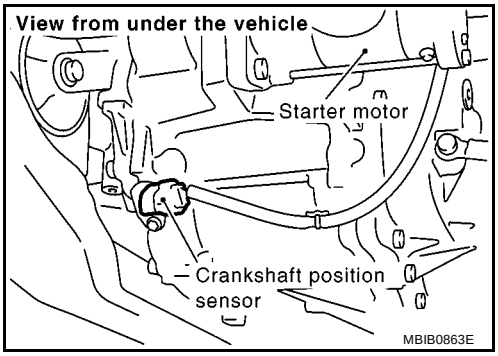
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor harness connector.
2. Turn ignition switch ON.

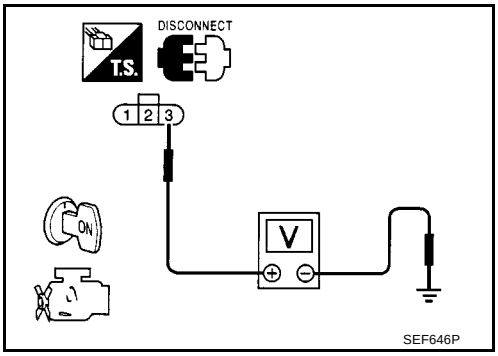


3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1110, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

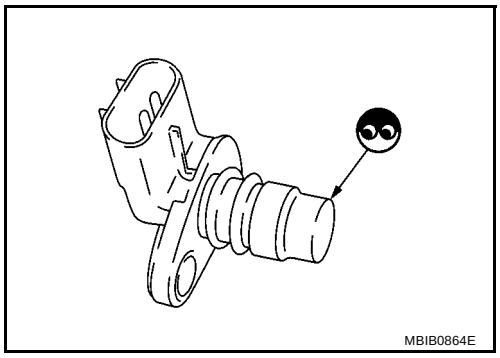
>> **INSPECTION END**

Component Inspection

EBS013CL

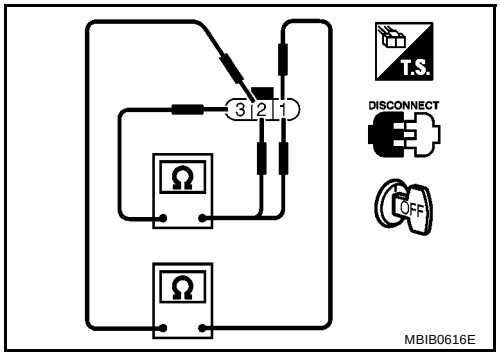
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	Except 0 or ∞
2 (+) - 1 (-)	Except 0



MBIB0616E

6. If NG, replace crankshaft position sensor.

Removal and Installation

EBS013CM

CRANKSHAFT POSITION SENSOR

Refer to EM-137, "OIL PAN AND OIL STRAINER" .

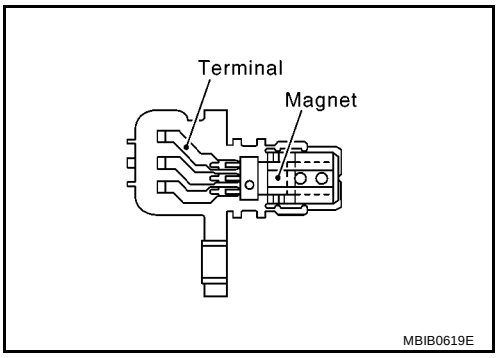
DTC P0336 CKP SENSOR

PFP:23731

Description

EBS013CN

The crankshaft position sensor monitors engine speed by means of signals from the sensing plate (with 56 protrusions) installed to the fly wheel. The datum signal output is detected 6° signal and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.



MBIB0619E

CONSULT-II Reference Value in Data Monitor Mode

EBS013CO

Specification data are reference values.

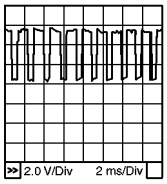
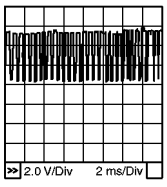
MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

ECM Terminals and Reference Value

EBS013CP

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

On Board Diagnosis Logic

EBS013CQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor ● Signal plate

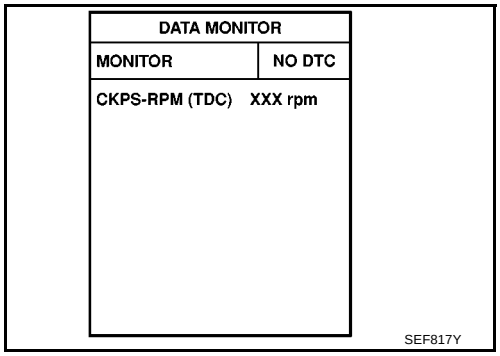
DTC Confirmation Procedure

EBS013CR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1114, "Diagnostic Procedure" .

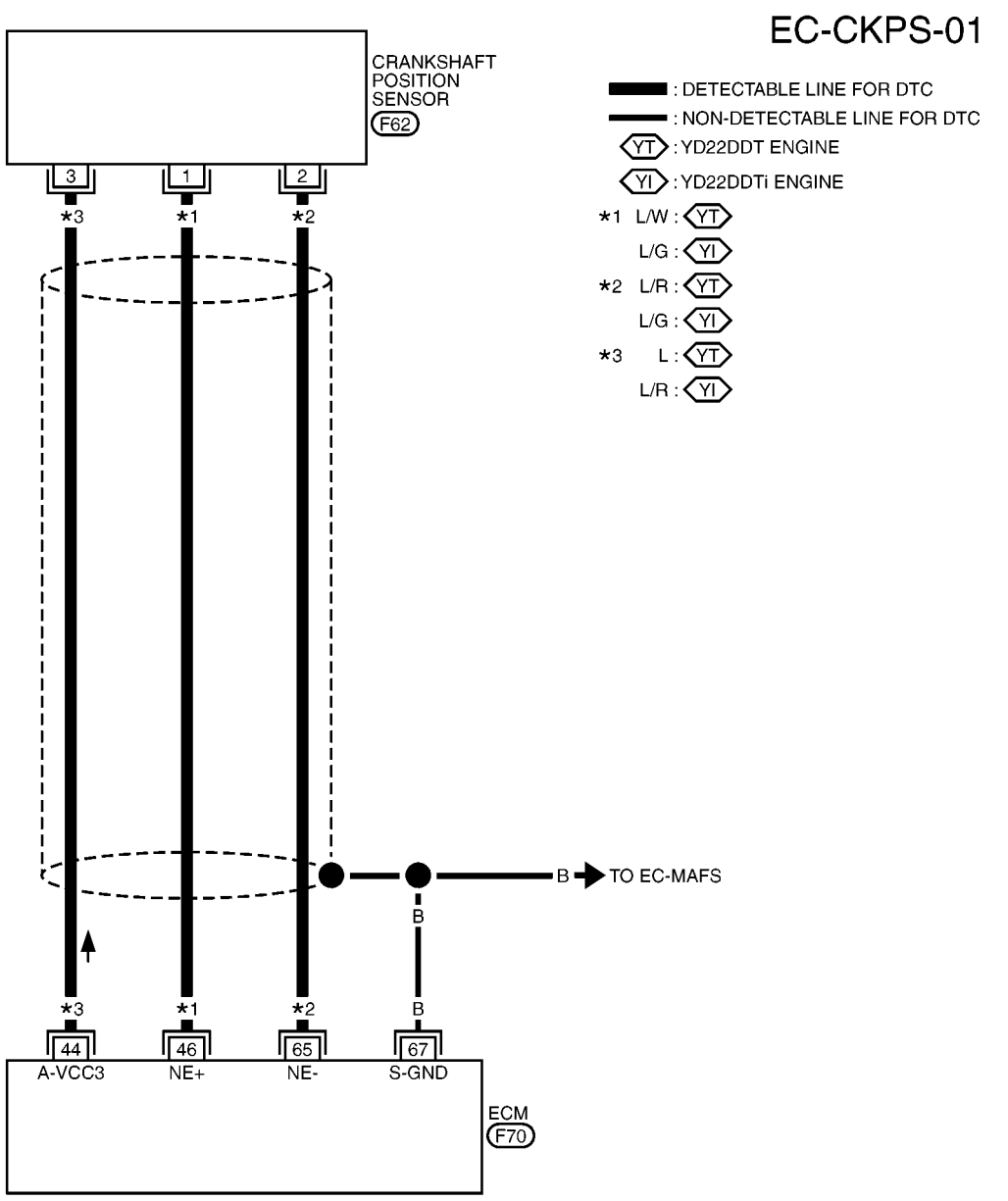


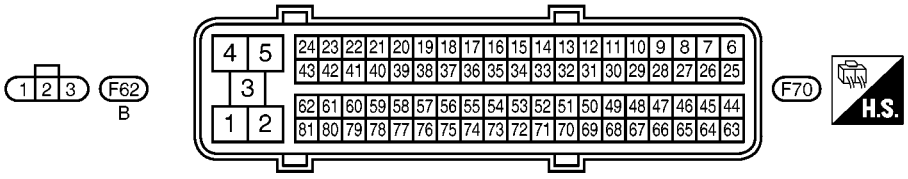
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013CS





YEC504A

Diagnostic Procedure

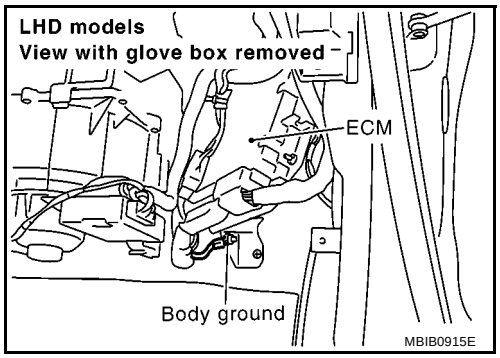
EBS013CT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

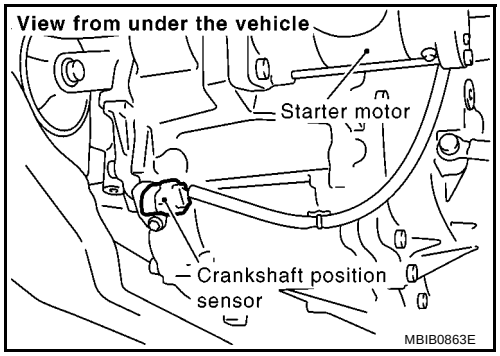
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor harness connector.
2. Turn ignition switch ON.



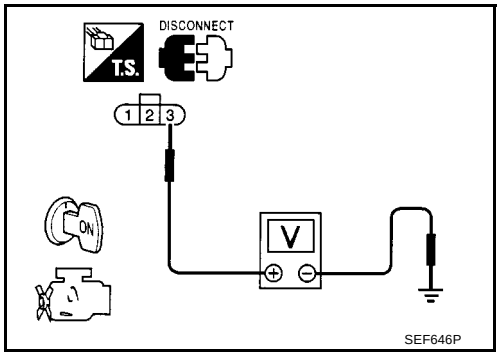
3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1115, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 7.
NG >> Replace the signal plate.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

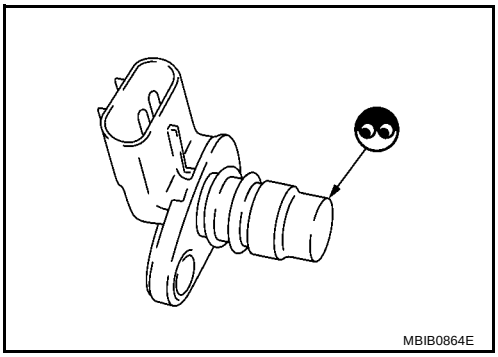
>> **INSPECTION END**

Component Inspection

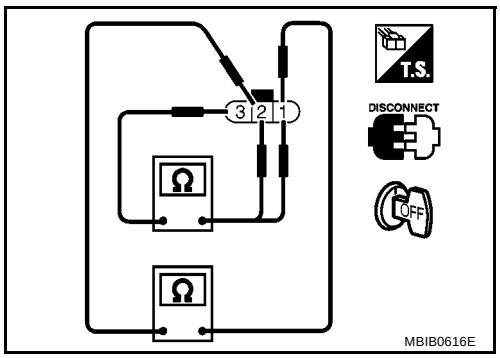
EBS013CU

CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	Except 0 or ∞
2 (+) - 1 (-)	Except 0

6. If NG, replace crankshaft position sensor.

Removal and Installation

EBS013CV

CRANKSHAFT POSITION SENSOR

Refer to EM-137, "OIL PAN AND OIL STRAINER" .

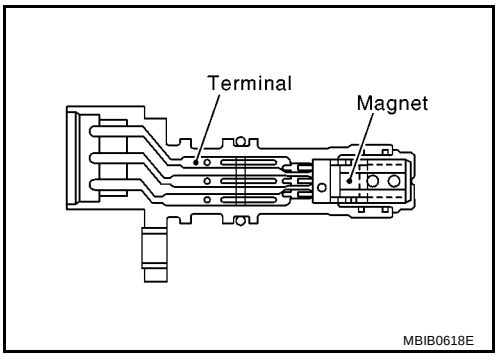
DTC P0340 CMP SENSOR

PFP:23731

Description

EBS013CW

The camshaft position sensor identifies a particular cylinder by means of signals from the sensing plate (with five protrusions) installed to the camshaft. The datum signal output is detected 90° signal and sent to the ECM.

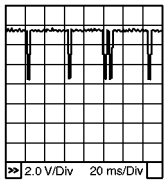
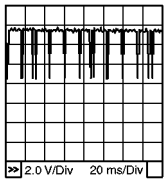


ECM Terminals and Reference Value

EBS013CX

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013CY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor

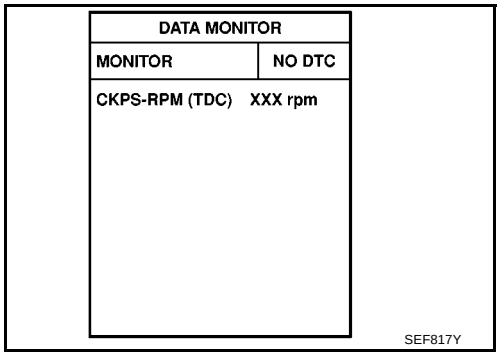
DTC Confirmation Procedure

EBS013CZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1120, "Diagnostic Procedure" .

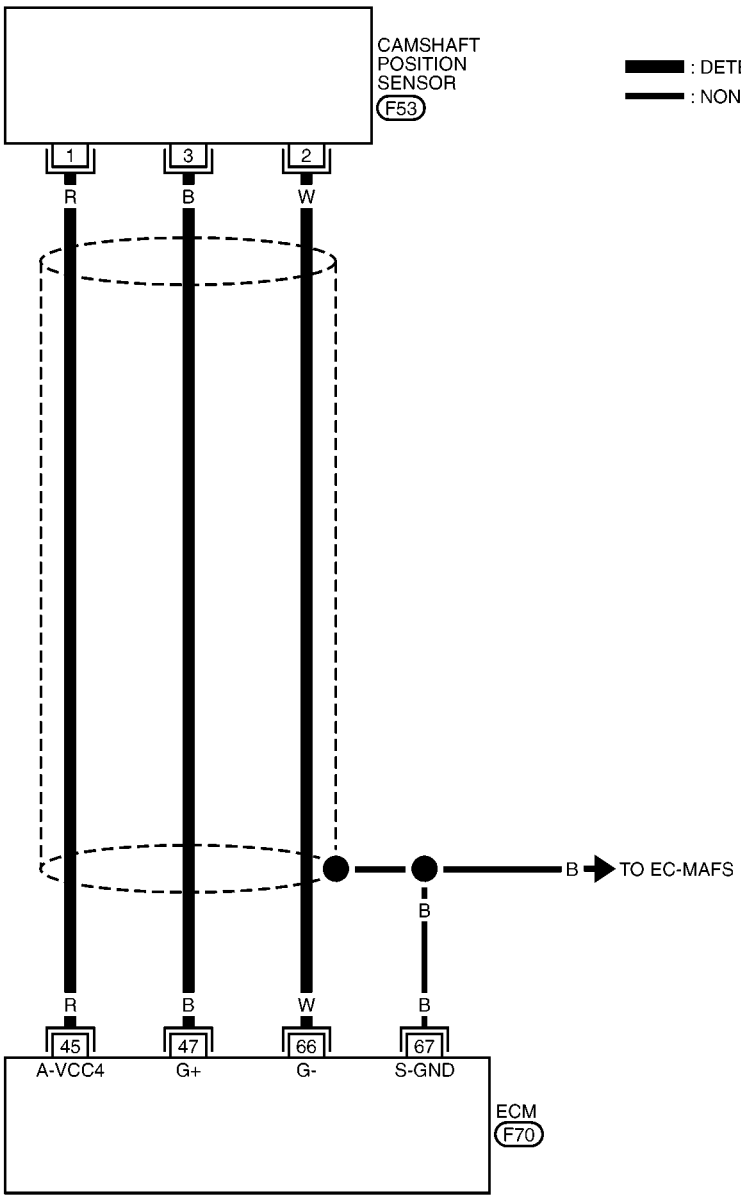


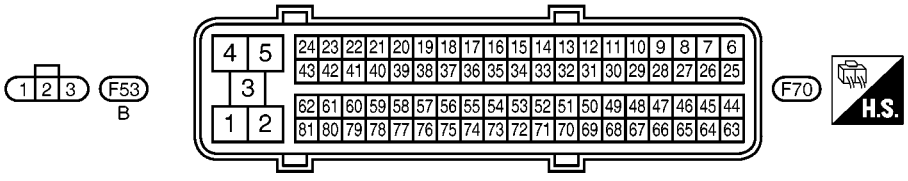
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013D0





YEC505A

Diagnostic Procedure

EBS013D1

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

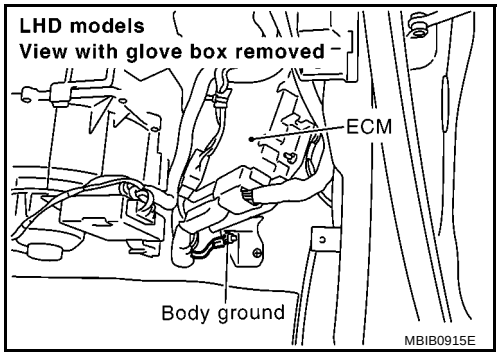
Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-13, “STARTING SYSTEM”.)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

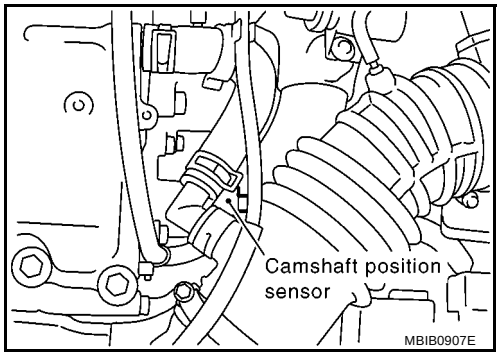
OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connection.



3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

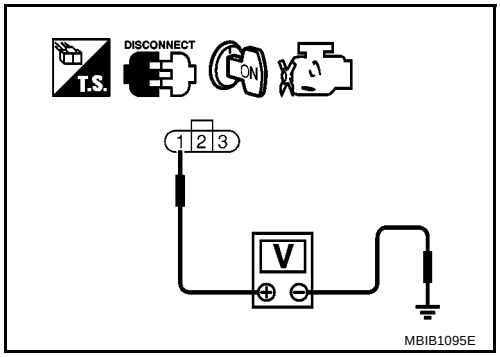


3. Check voltage between CMP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 66 and CMP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal 47 and CMP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1121, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

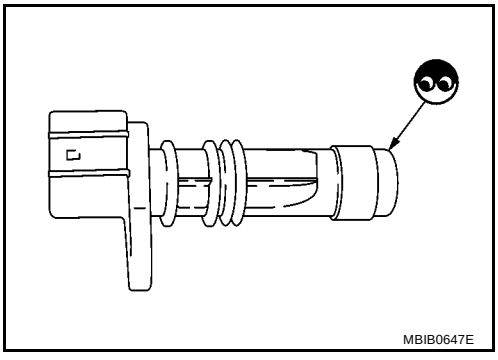
>> **INSPECTION END**

Component Inspection

EBS013D2

CAMSHAFT POSITION SENSOR

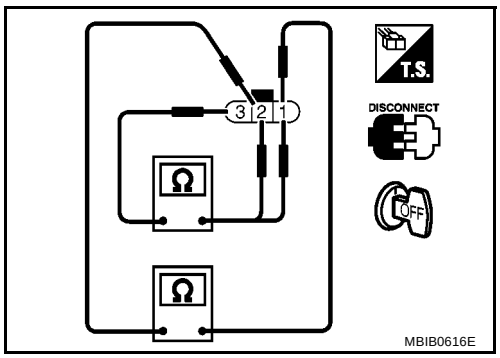
1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) -2 (-)	
2 (+) - 1 (-)	Except 0 or ∞

6. If NG, replace camshaft position sensor.



Removal and Installation

EBS013D3

CAMSHAFT POSITION SENSOR

Refer to EM-143, "VACUUM PUMP" .

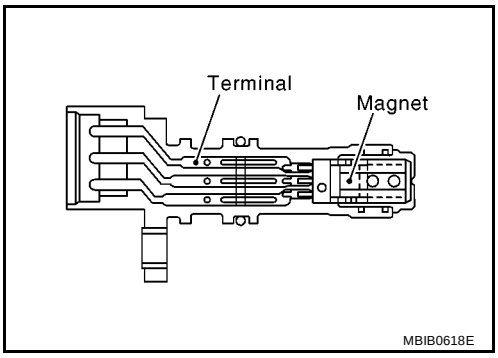
DTC P0341 CMP SENSOR

PFP:23731

Description

EBS013D4

The camshaft position sensor identifies a particular cylinder by means of signals from the sensing plate (with five protrusions) installed to the camshaft. The datum signal output is detected 90° signal and sent to the ECM.

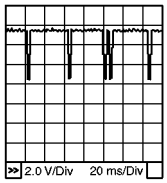
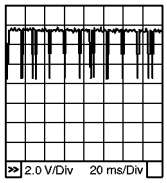


ECM Terminals and Reference Value

EBS013D5

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013D6

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	● Harness connectors (The sensor circuit is opener shorted.) ● Camshaft position sensor ● Signal plate

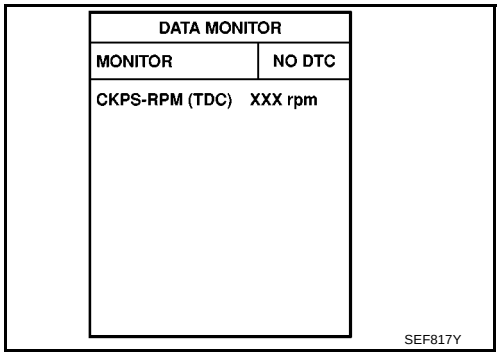
DTC Confirmation Procedure

EBS013D7

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1126, "Diagnostic Procedure" .

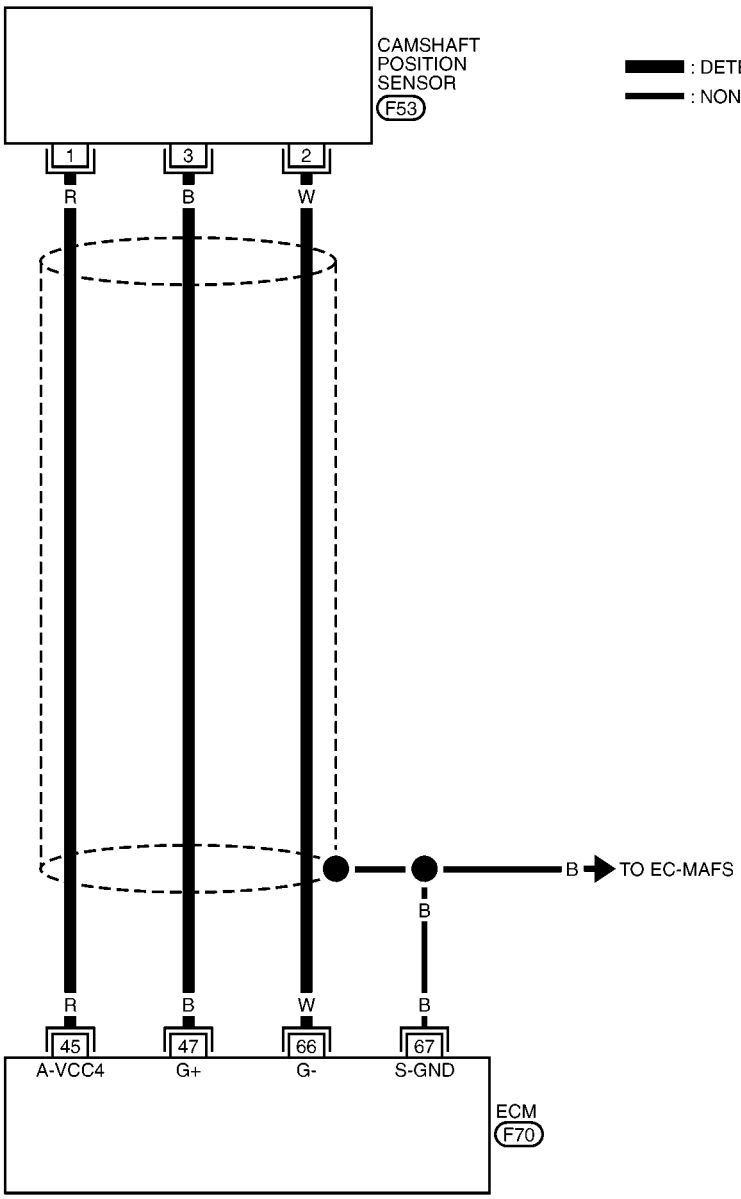


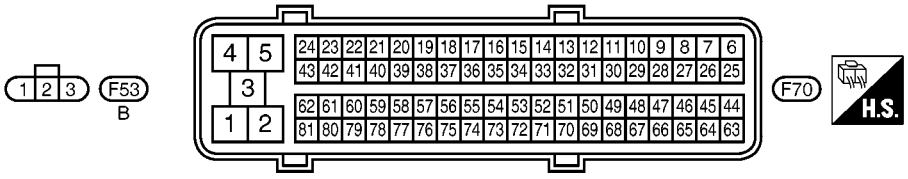
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013D8





YEC505A

Diagnostic Procedure

EBS013D9

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

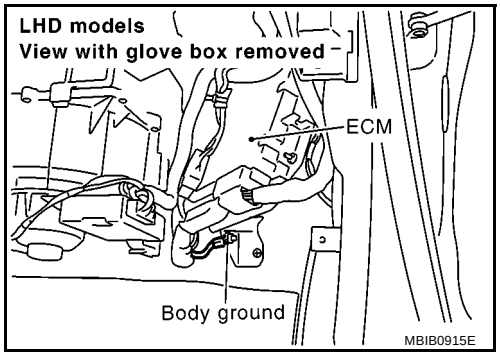
Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-13, “STARTING SYSTEM”.)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

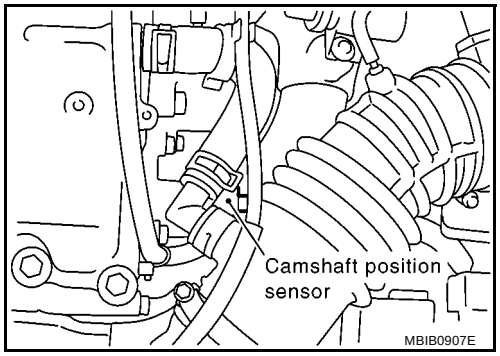
OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connection.



3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

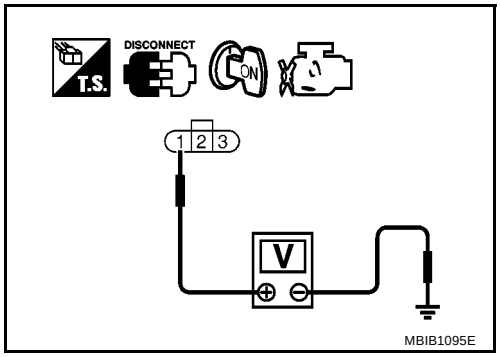


3. Check voltage between CMP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 66 and CMP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal 47 and CMP sensor terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1128, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

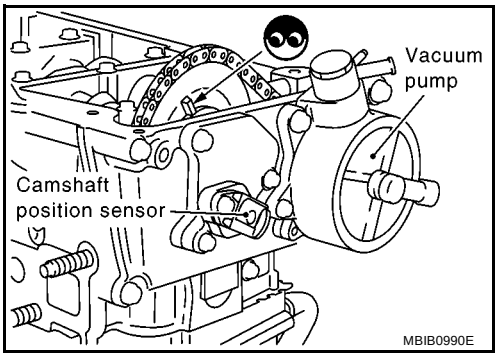
7. CHECK CAMSHAFT (EXHAUST)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

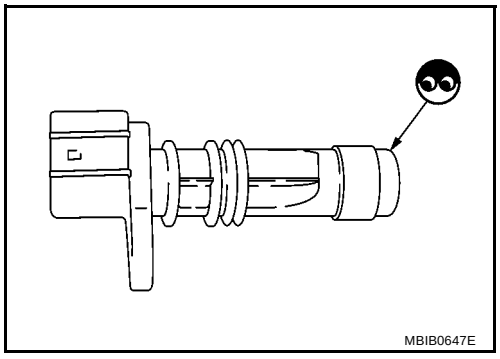
>> **INSPECTION END**

Component Inspection

EBS013DA

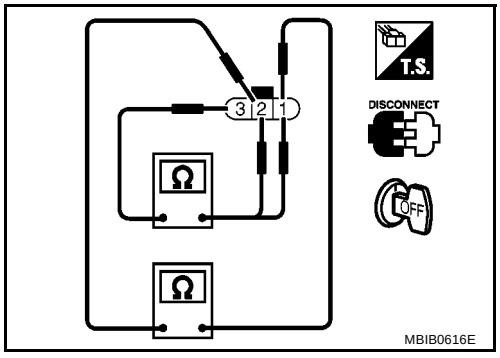
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	
2 (+) - 1 (-)	Except 0 or ∞



6. If NG, replace camshaft position sensor.

Removal and Installation

EBS013DB

CAMSHAFT POSITION SENSOR

Refer to EM-143, "VACUUM PUMP" .

DTC P0380 GLOW RELAY

PFP:25230

On Board Diagnosis Logic

EBS013DC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0380	Glow relay circuit	An excessively low voltage is sent to ECM through glow relay.	● Harness or connectors (The glow relay circuit is open or shorted.) ● Glow relay
		An excessively low voltage is sent to ECM through glow relay.	● Harness or connectors (The glow relay circuit is shorted.) ● Glow relay

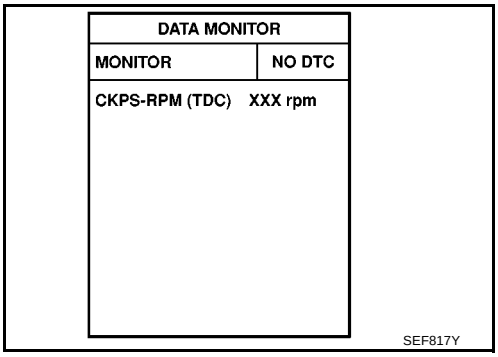
DTC Confirmation Procedure

EBS013DD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1131, "Diagnostic Procedure" .

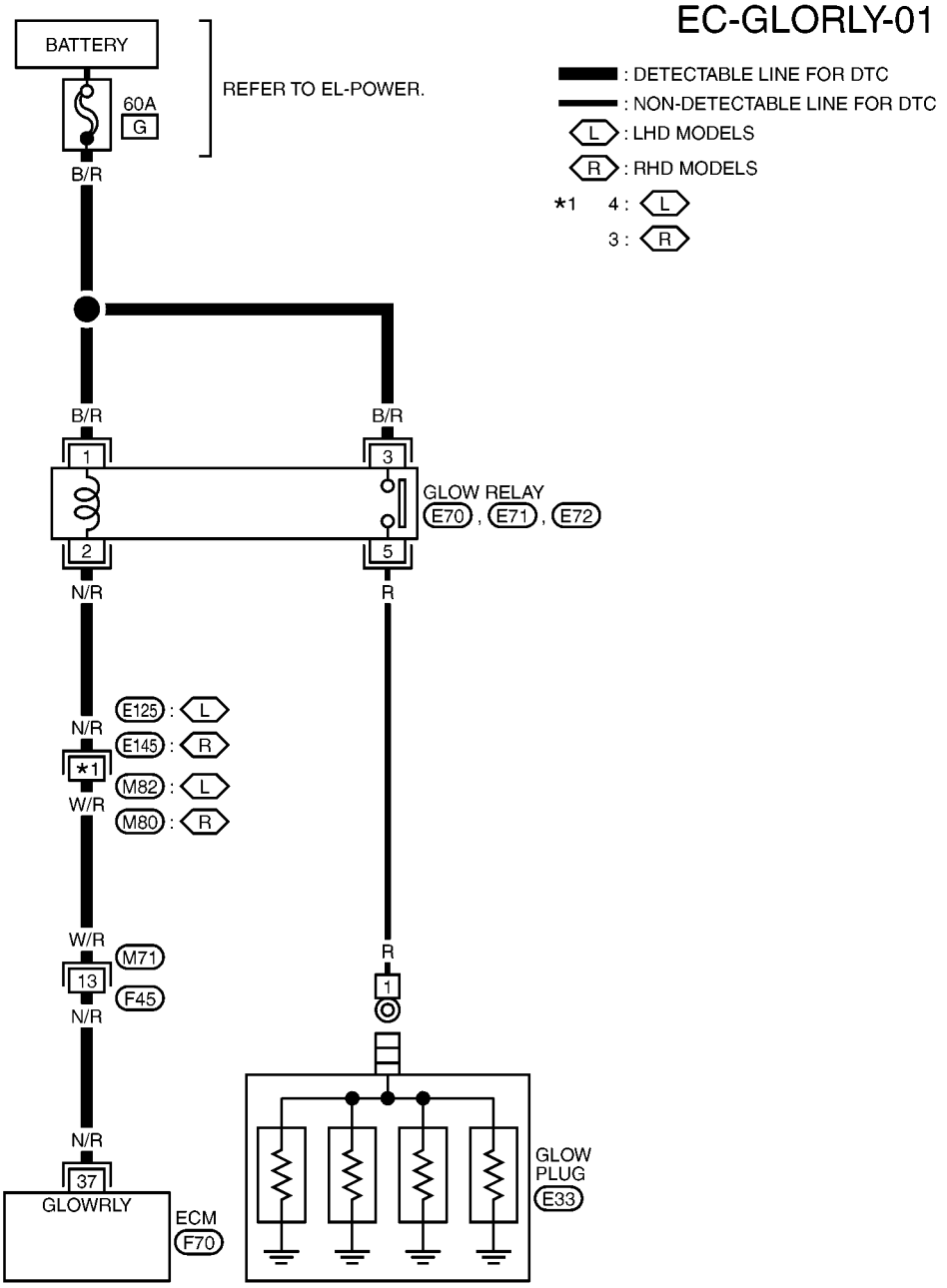


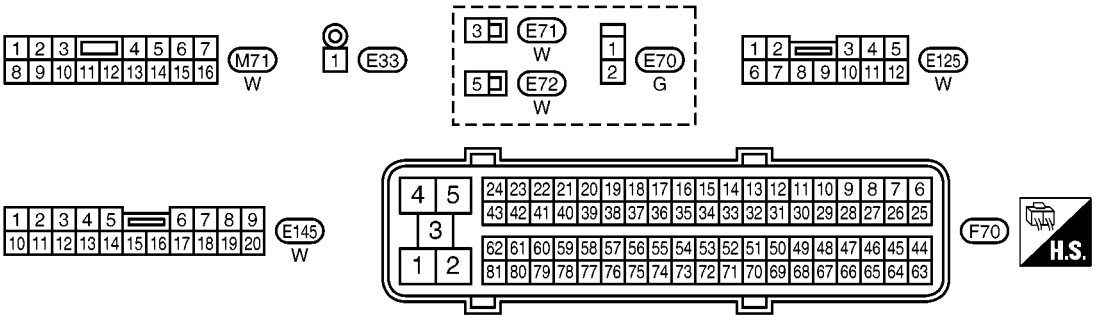
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013DE





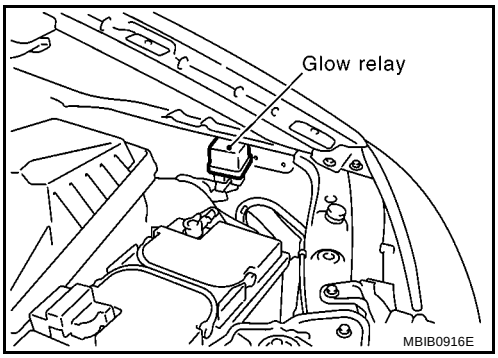
MBWA0620E

Diagnostic Procedure

EBS013DF

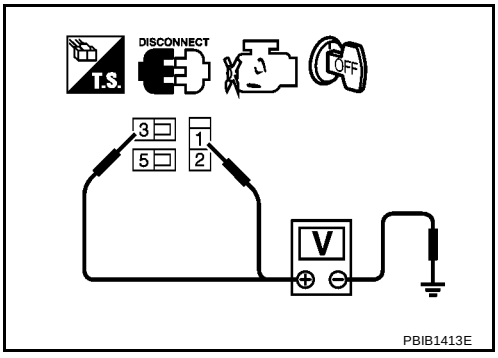
1. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.



3. Check voltage between ECM relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- 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 OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open and short between glow relay and ECM

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

5. CHECK GLOW RELAY

Refer to EC-1132, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace glow relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

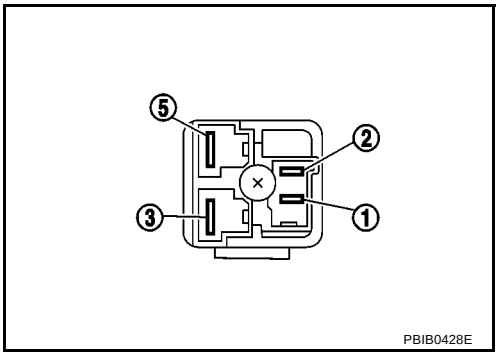
EBS013DG

GLOW RELAY

Check continuity between glow relay terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

Operation takes less than 1 second.



DTC P0401 EGR FUNCTION

PFP:14710

Description

EBS013DH

SYSTEM DESCRIPTION

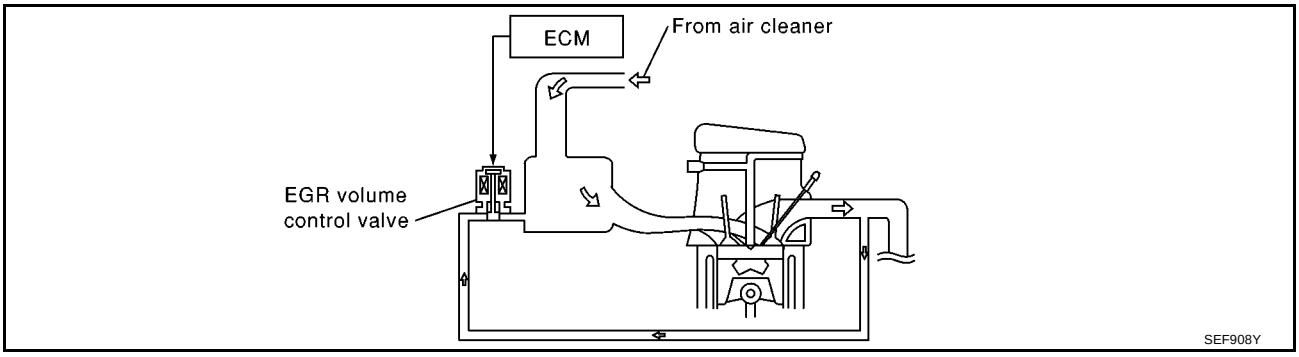
Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor*	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch*	Air conditioner operation		

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

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

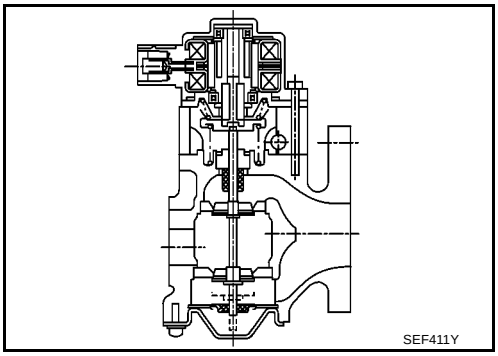
- Engine stopped
- Engine starting
- Low engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

EBS013DI

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

ECM Terminals and Reference Value

EBS013DJ

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

On Board Diagnosis Logic

EBS013DK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0401	Exhaust gas recirculation flow insufficient detected	The exhaust gas recirculation flow is insufficient.	● Harness or connectors (The EGR volume control valve circuit is open or shorted.) ● EGR volume control valve stuck closed ● EGR passage clogged

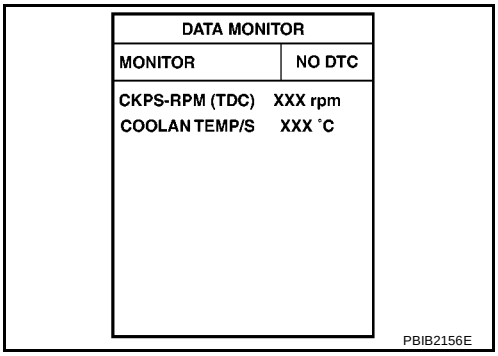
DTC Confirmation Procedure

EBS013DL

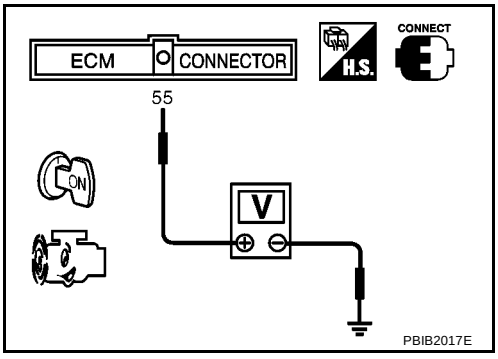
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine.
3. Maintain the following conditions for at least 40 consecutive seconds.



COOLAN TEMP/S	50 - 89 °C (122 - 192 °F)
Voltage between ECM terminal 55 (Intake air temperature sensor) and ground	1.7 - 2.6V



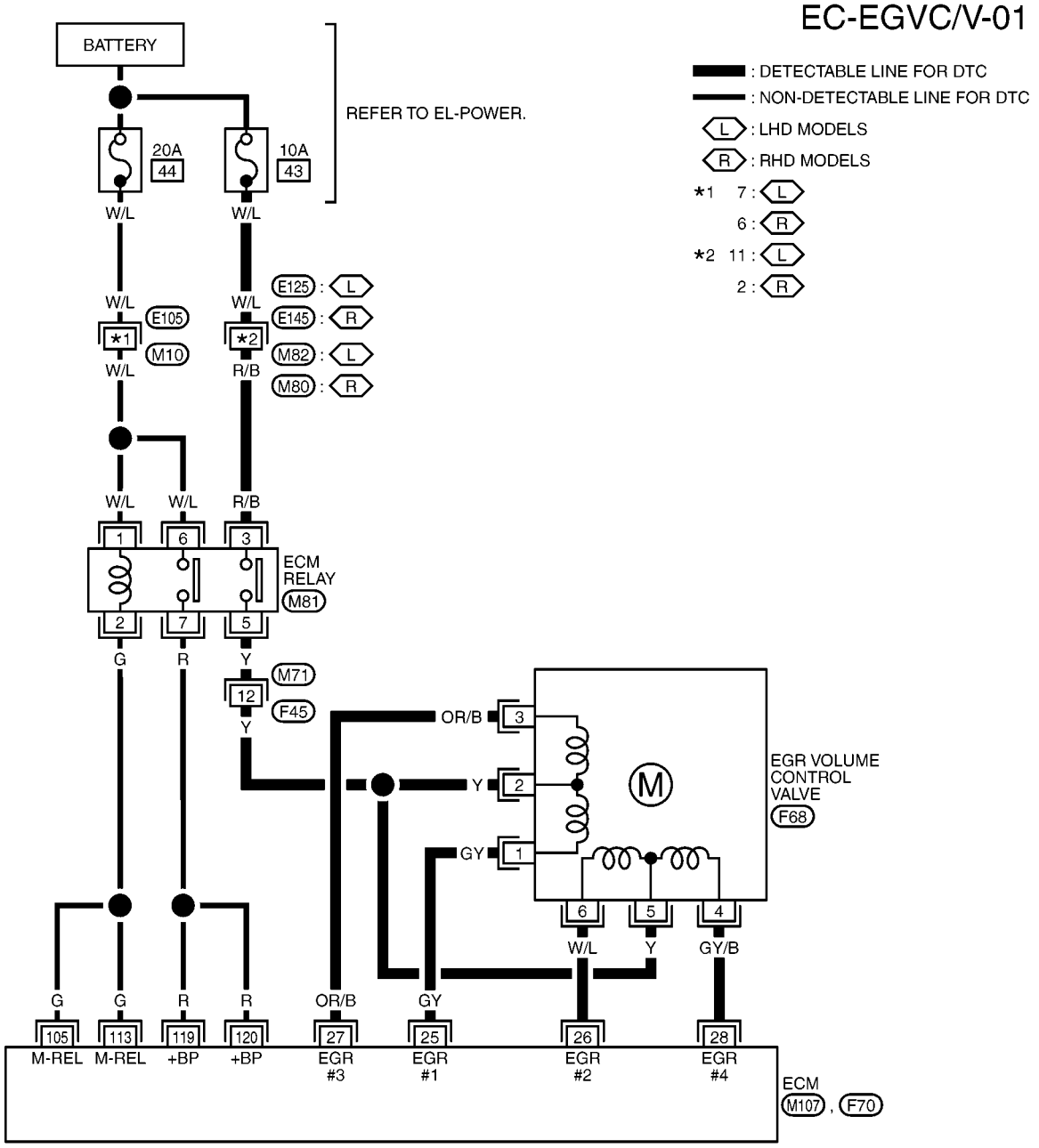
4. If 1st trip DTC is detected, go to EC-1137, "Diagnostic Procedure" .

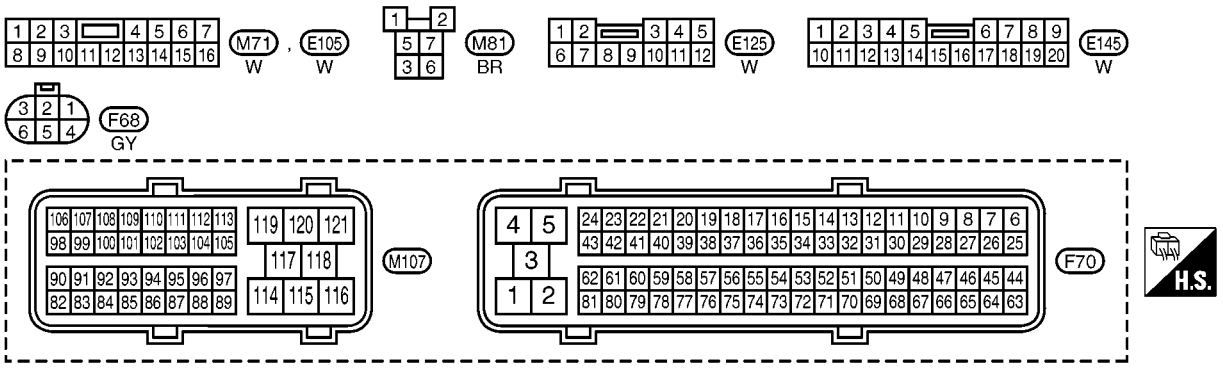
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013DM





MBWA0621E

Diagnostic Procedure

EBS013DN

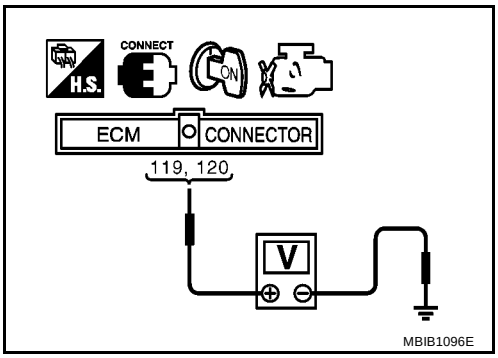
1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

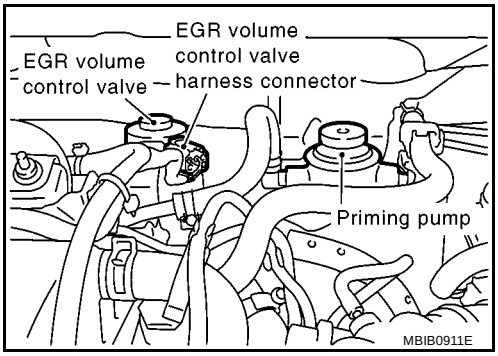
OK or NG

OK >> GO TO 2.
NG >> Go to EC-1003, "MAIN POWER SUPPLY AND GROUND CIRCUIT" .



2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.

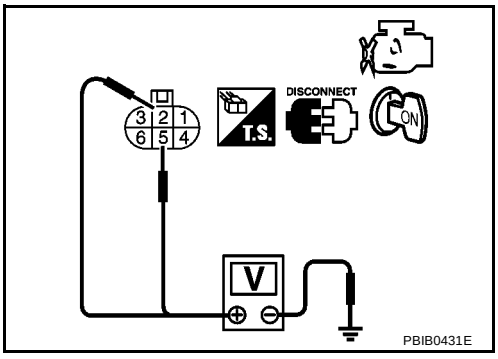


4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

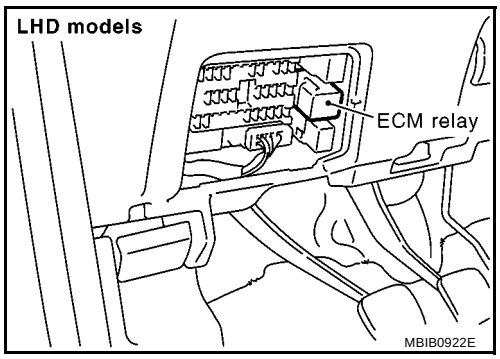
OK or NG

OK >> GO TO 8.
NG >> GO TO 3.



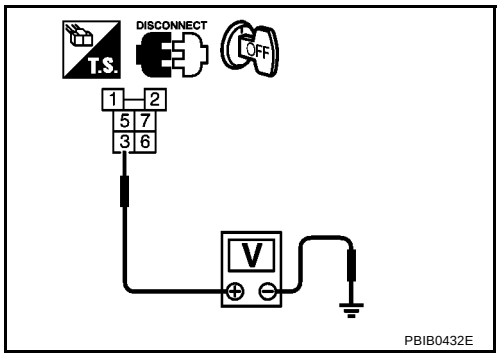
3. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



3. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- Harness for open or short between ECM relay and battery

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

5. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM relay terminal 5 and EGR volume control valve terminals 2, 5. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay and EGR volume control valve

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

7. CHECK ECM RELAY

Refer to EC-1174, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ECM relay.

8. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1140, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EGR volume control valve.

10. CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose

OK or NG

OK >> GO TO 11.
NG >> Repair or replace EGR passage.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS013DO

EGR VOLUME CONTROL VALVE

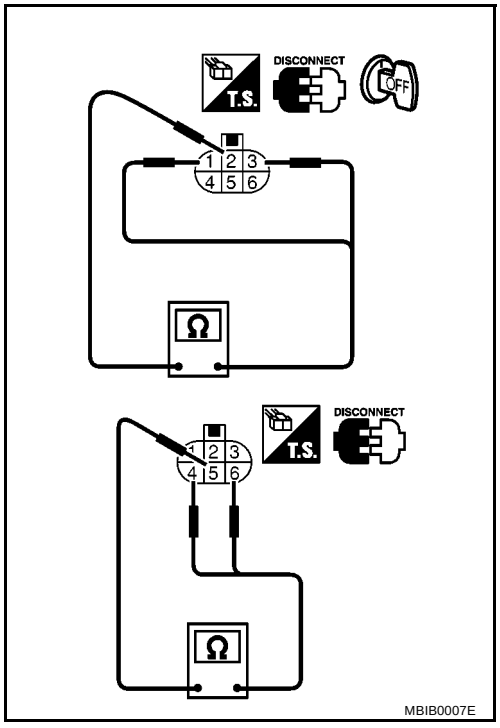
With CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

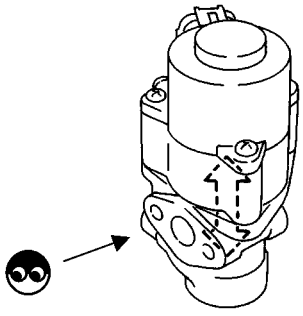
If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.



6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



If NG, replace the EGR volume control valve.

NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

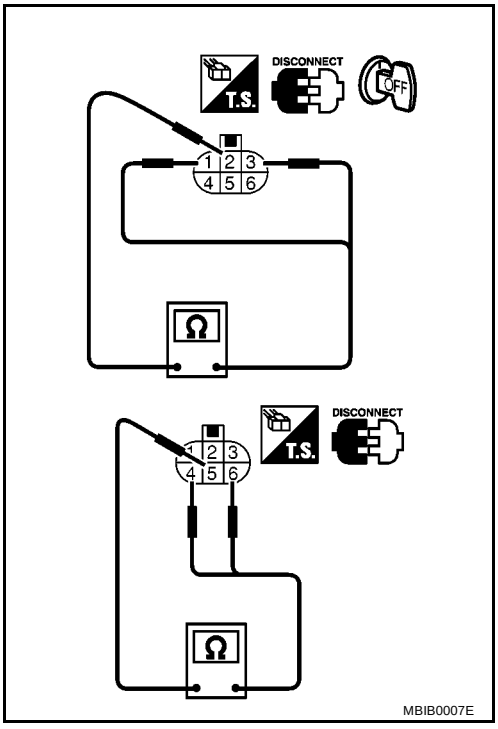
Without CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

If NG, replace EGR volume control valve.
If OK, go to next step.

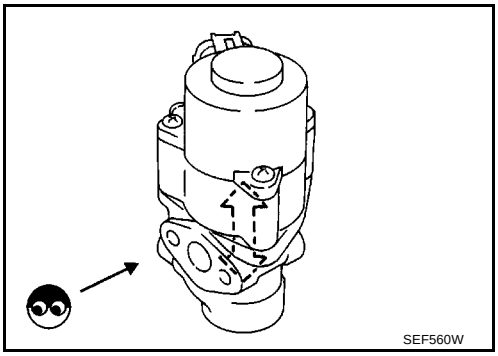
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF.



MBIB0007E

6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.


SEF560W

EBS013DP

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-123, "INTAKE MANIFOLD" .

DTC P0404 EGR VOLUME CONTROL VALVE

PFP:14710

Description

EBS013DQ

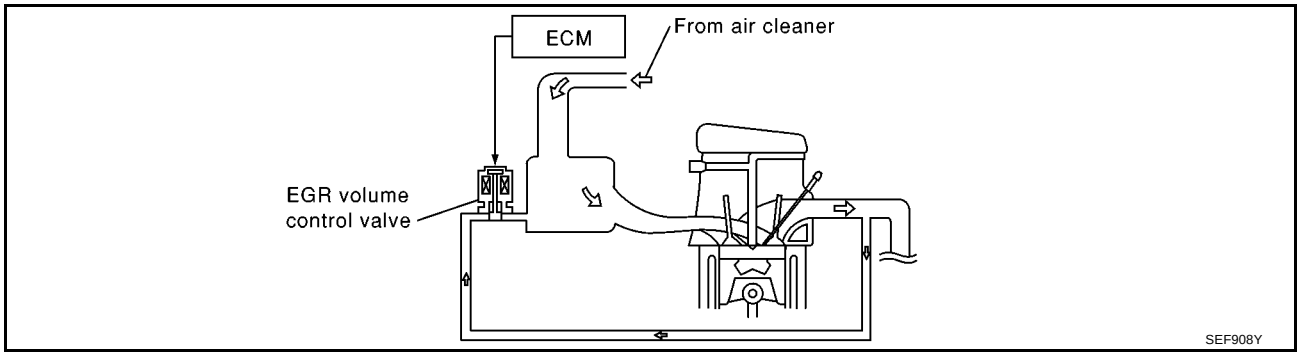
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor*	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch*	Air conditioner operation		

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

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.
The EGR volume control valve remains close under the following conditions.

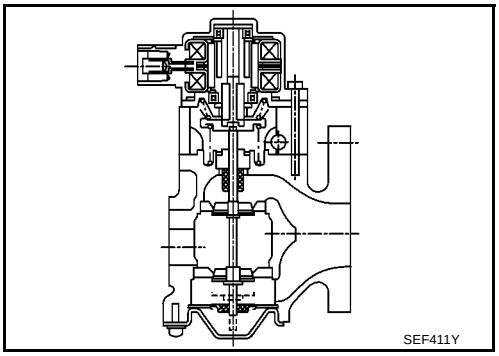
- Engine stopped
- Engine starting
- Low engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

EBS013DR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

ECM Terminals and Reference Value

EBS013DS

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

On Board Diagnosis Logic

EBS013DT

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0404	Exhaust gas recirculation control circuit range/performance	An improper voltage signal is sent to ECM through EGR volume control valve.	● Harness or connectors (The EGR volume control valve circuit is open or shorted.) ● EGR volume control valve stuck closed

DTC Confirmation Procedure

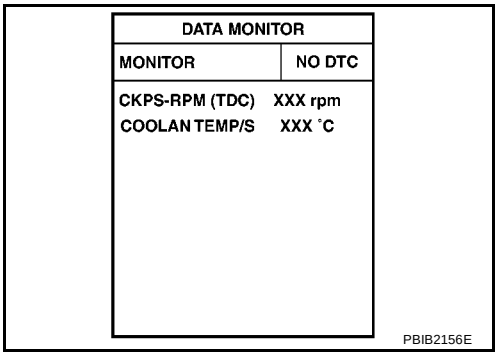
EBS013DU

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

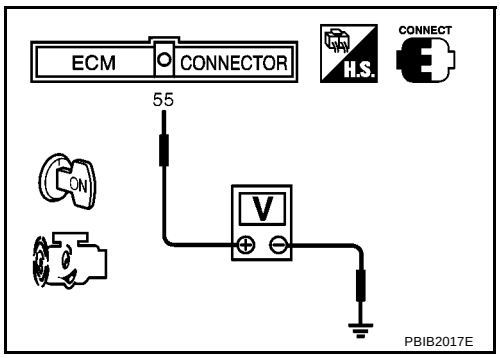
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine.



3. Maintain the following conditions for at least 20 consecutive seconds.

COOLAN TEMP/S	22 - 87 °C (72 - 189 °F)
Voltage between ECM terminal 55 (Intake air temperature sensor) and ground	0.9 - 4.0V

4. If 1st trip DTC is detected, go to EC-1146, "Diagnostic Procedure" .

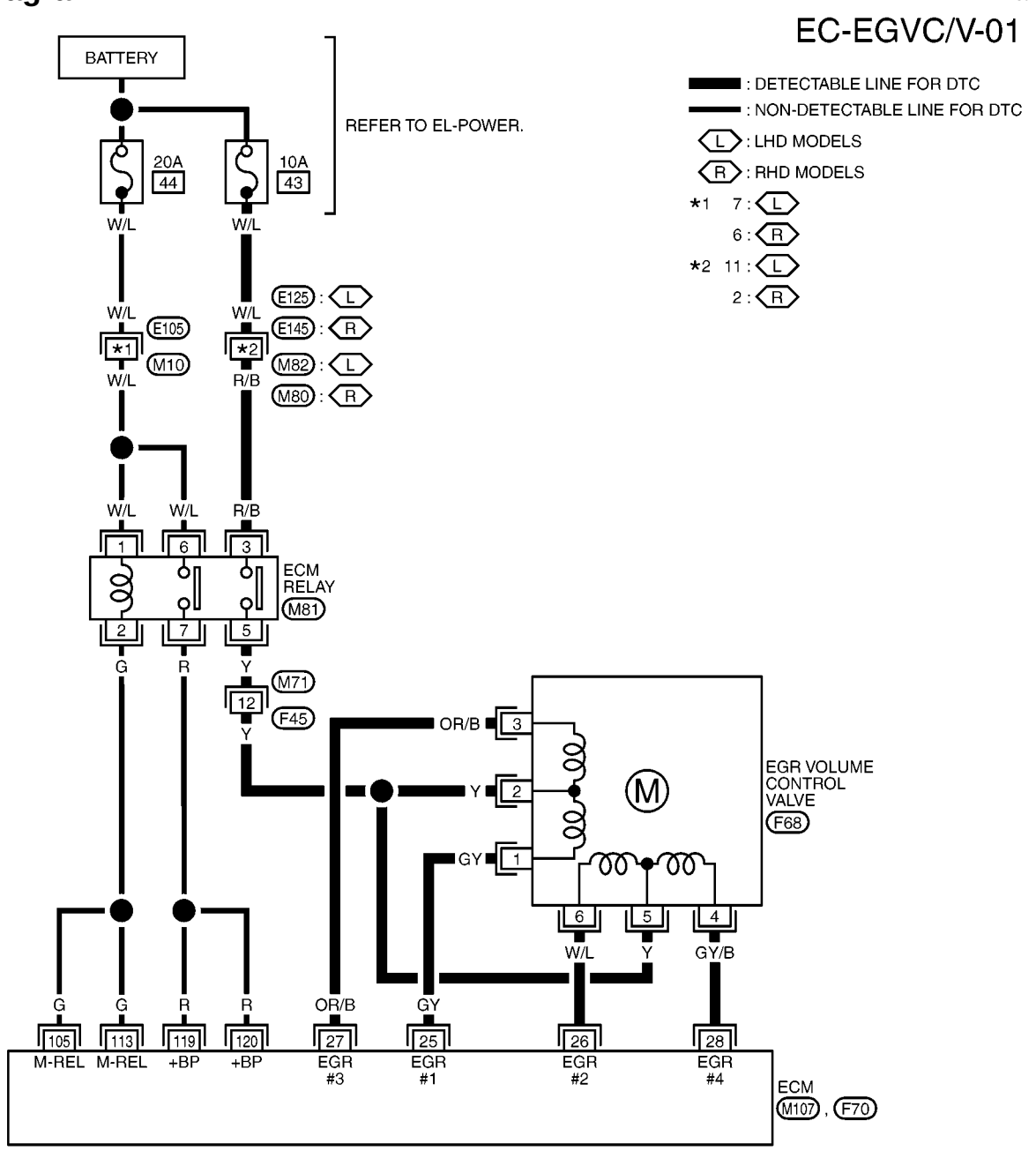


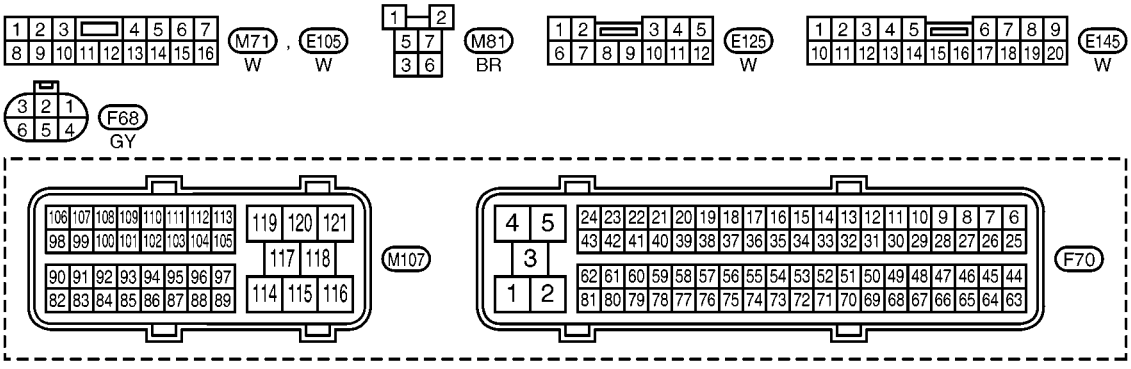
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013DV





MBWA0621E

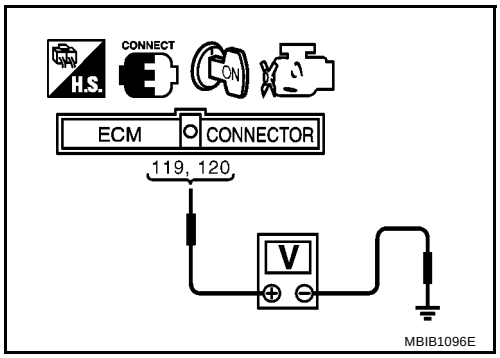
Diagnostic Procedure

EBS013DW

1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

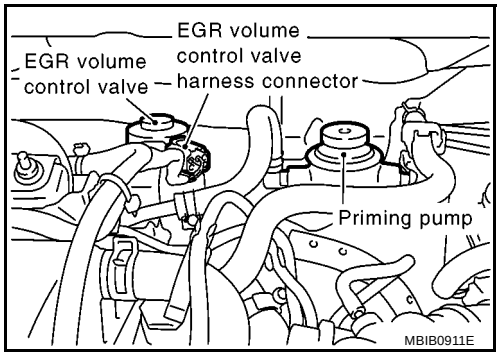


OK or NG

OK >> GO TO 2.
NG >> Go to EC-1003, "MAIN POWER SUPPLY AND GROUND CIRCUIT" .

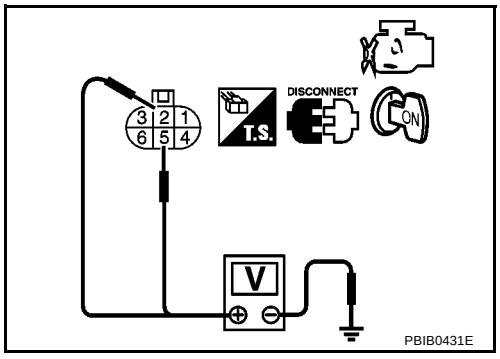
2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

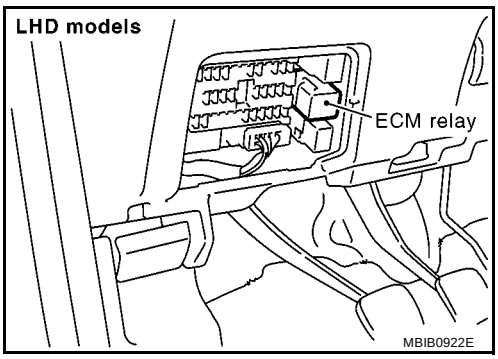


OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

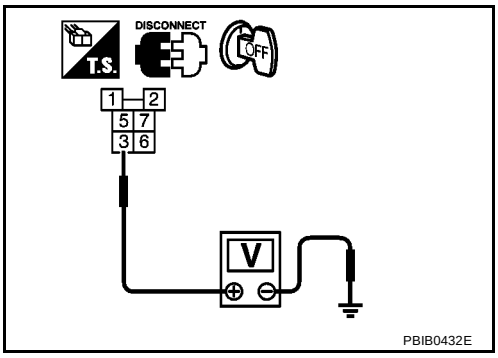
3. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



3. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- Harness for open or short between ECM relay and battery

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

5. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM relay terminal 5 and EGR volume control valve terminals 2, 5. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay and EGR volume control valve

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

7. CHECK ECM RELAY

Refer to EC-1174, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ECM relay.

8. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1149, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EGR volume control valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

EBS013DX

EGR VOLUME CONTROL VALVE

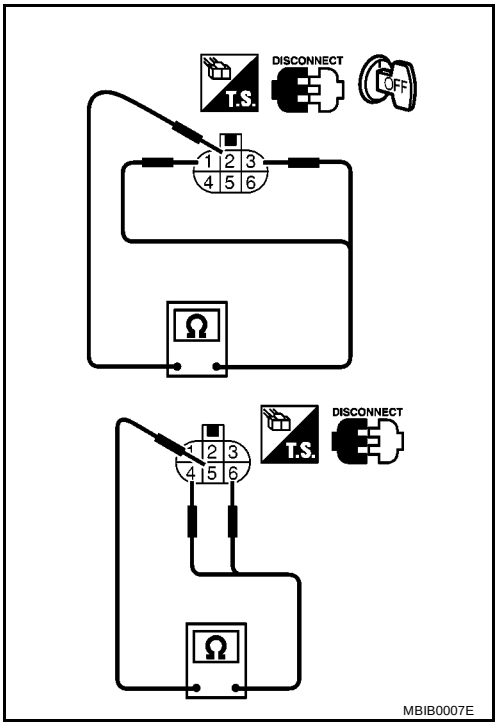
With CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

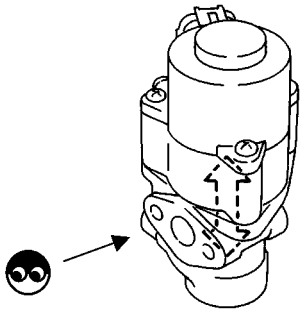
If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.



6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



If NG, replace the EGR volume control valve.

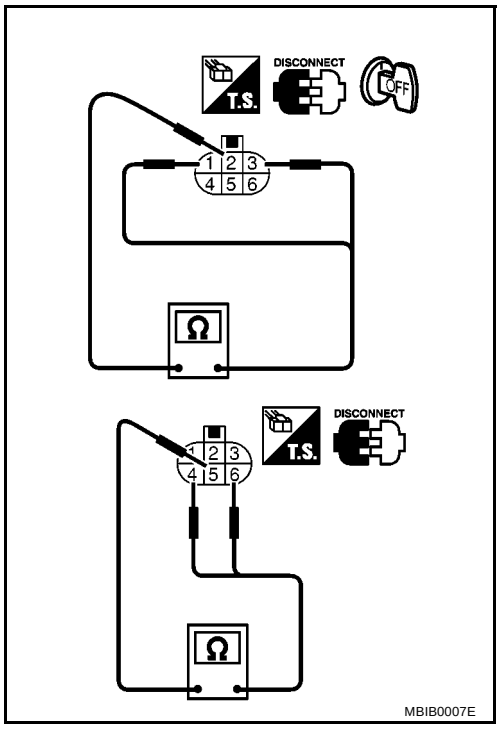
NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

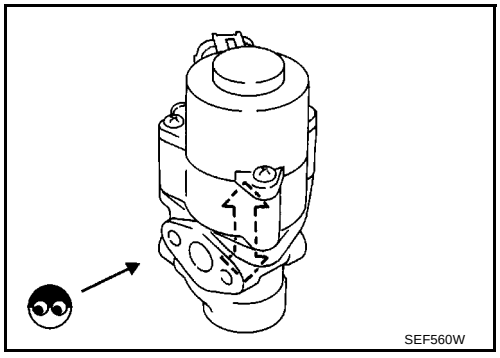
Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

   If NG, replace EGR volume control valve.
   If OK, go to next step.
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF.



6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.



Removal and Installation

EBS013DY

EGR VOLUME CONTROL VALVE

Refer to EM-123, "INTAKE MANIFOLD" .

DTC P0563 BATTERY VOLTAGE

PFP:24410

On Board Diagnosis Logic

EBS013DZ

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563	Battery voltage high	An excessively high voltage from the battery is sent to ECM.	● Battery ● Battery terminal ● Alternator

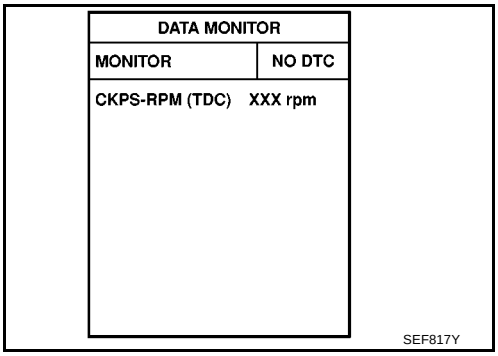
DTC Confirmation Procedure

EBS013E0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 35 seconds.
4. If DTC is detected, go to EC-1151, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013E1

1. INSPECTION START

Are jumper cables connected for the jump starting?

Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK BATTERY AND ALTERNATOR

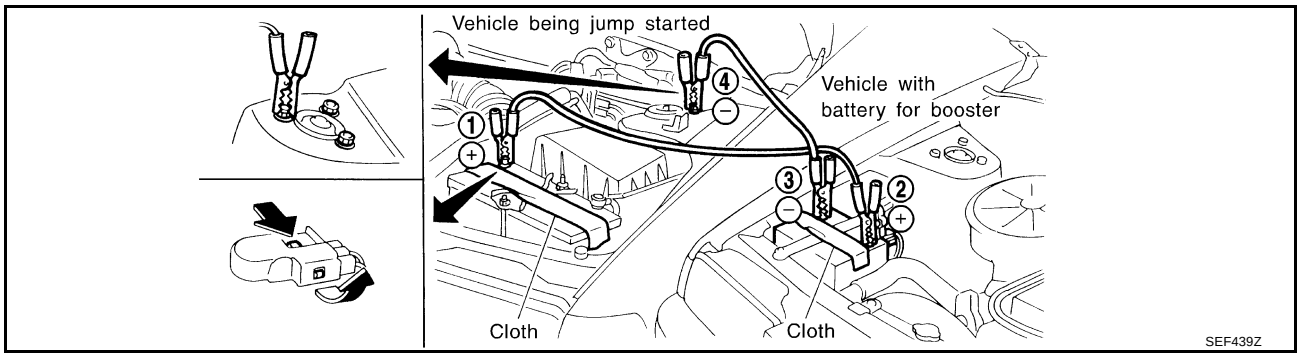
Check that the proper type of battery and alternator is installed.
Refer to SC-3, “BATTERY” and SC-24, “CHARGING SYSTEM”.

OK or NG

OK >> GO TO 5.
NG >> Replace with a proper one.

3. CHECK JUMPER CABLES INSTALLATION

Check that the jumper cables are connected in the correct sequence.



OK or NG

OK >> GO TO 4.
NG >> Reconnect jumper cables properly.

4. CHECK BATTERY FOR BOOSTER

Check that the battery for the booster is a 12V battery.

OK or NG

OK >> GO TO 5.
NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

Perform EC-1151, "DTC Confirmation Procedure" , again.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-962, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.

- Wiring harness and harness connectors for burn
- Fuses for short

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace malfunctioning part.

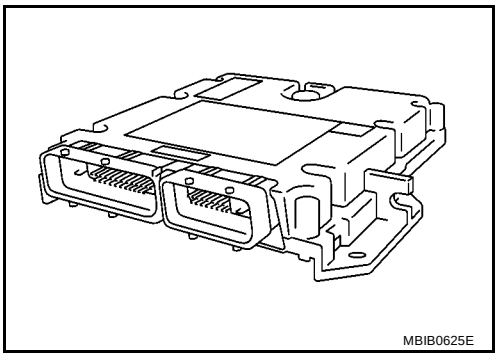
DTC P0605 ECM

PFP:23710

Description

EBS013E2

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

EBS013E3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

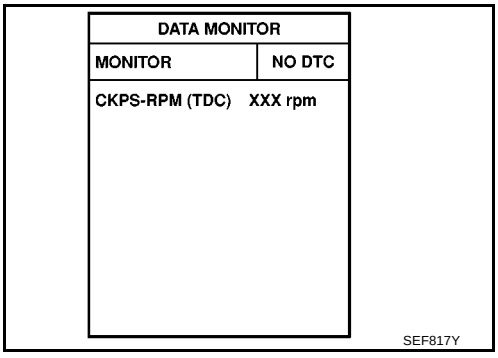
DTC Confirmation Procedure

EBS013E4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1154, "Diagnostic Procedure" .



SEF817Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013E5

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1153, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select MODE4 with GST.
3. Touch “ERASE”.
4. Perform EC-1153, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-962, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

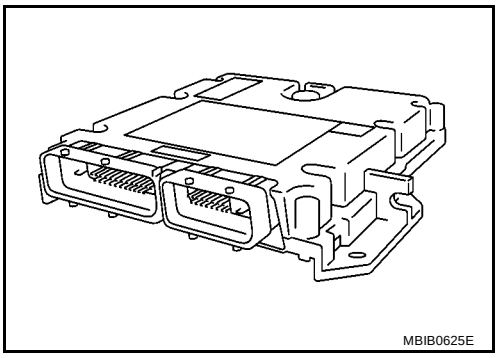
DTC P0606 ECM

PFP:23710

Description

EBS013E6

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

EBS013E7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0606	Engine control module (Processor)	ECM calculation function is malfunctioning.	● ECM

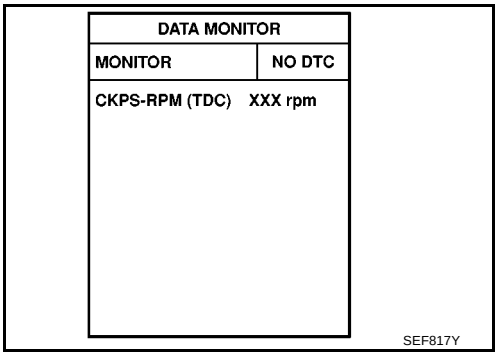
DTC Confirmation Procedure

EBS013E8

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1156, "Diagnostic Procedure" .



SEF817Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013E9

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1155, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0606 displayed again?

With GST

1. Turn ignition switch ON.
2. Select MODE4 with GST.
3. Touch “ERASE”.
4. Perform EC-1155, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0606 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-962, "NATS (Nissan Anti-theft System)" .
3. Perform “Fuel Pump Learning Value Clearing”. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

DTC P0628, P0629 FUEL PUMP

PFP:16700

Description

EBS013EA

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS013EB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

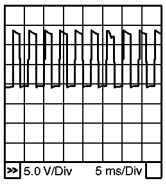
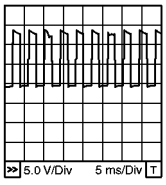
ECM Terminals and Reference Value

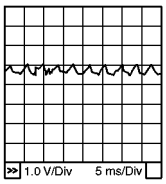
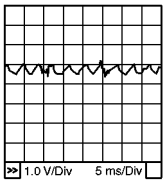
EBS013EC

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013ED

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0628	Fuel pump control circuit low input	ECM detects a control circuit for the fuel pump is open or short to ground.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump
P0629	Fuel pump control circuit high output	ECM detects a control circuit for the fuel pump is short to power.	

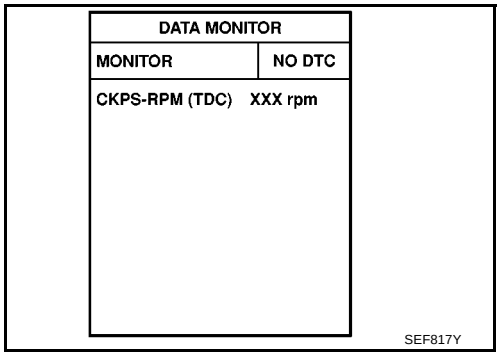
DTC Confirmation Procedure

EBS013EE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1160, "Diagnostic Procedure" .



SEF817Y

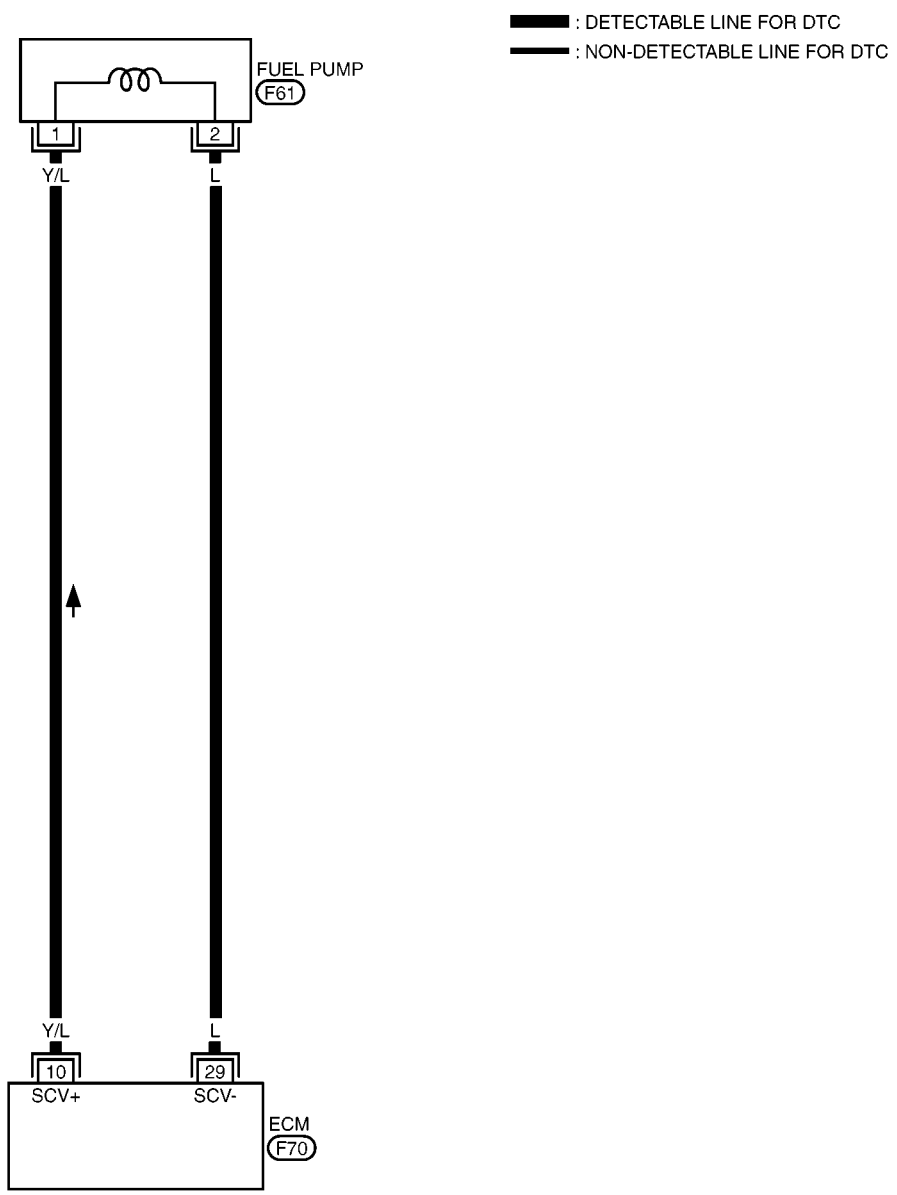
WITH GST

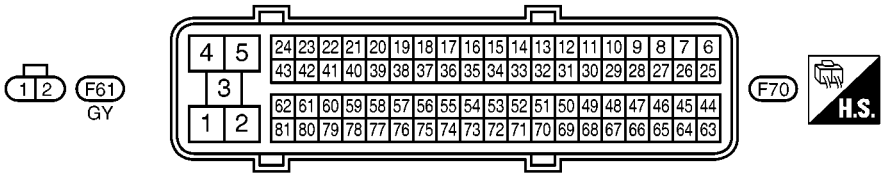
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013EF

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

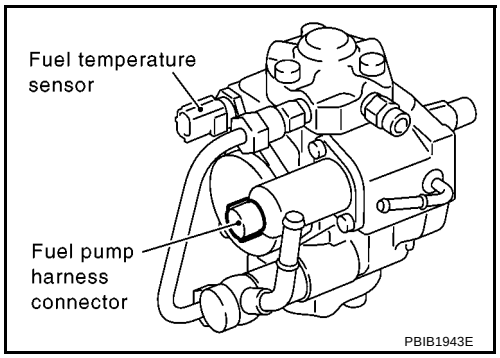
EBS013EG

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP

Refer toEC-1161, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

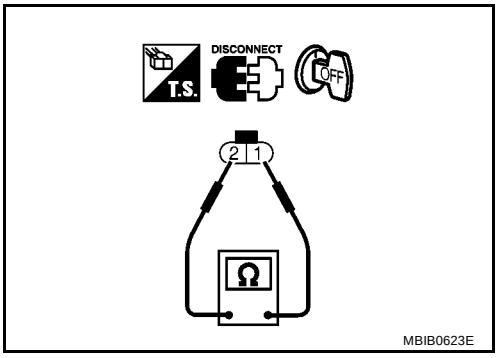
EBS013EH

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS013EI

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

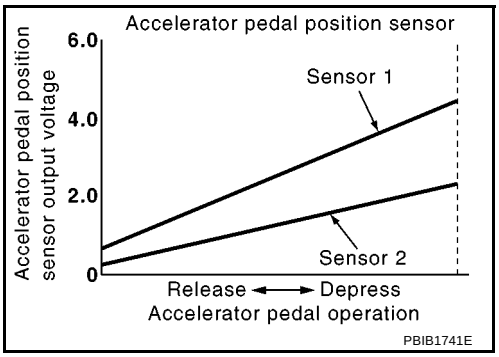
DTC P0642, P0643 SENSOR POWER SUPPLY

PFP:18002

Description

EBS013EJ

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS013EK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.2 - 0.7V
		Accelerator pedal: fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.1 - 0.4V
		Accelerator pedal: fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS013EL

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013EM

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0642	Accelerator pedal position sensor 1 power supply circuit low	ECM detects a voltage of power source for the APP sensor 1 is excessively low.	● Harness or connectors (The APP sensor 1 power supply circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0643	Accelerator pedal position sensor 1 power supply circuit high	ECM detects a voltage of power source for the APP sensor 1 is excessively high.	

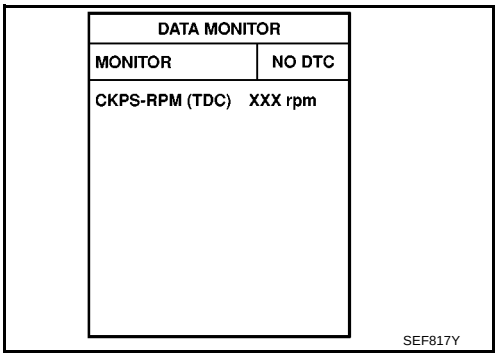
DTC Confirmation Procedure

EBS013EN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1165, "Diagnostic Procedure" .

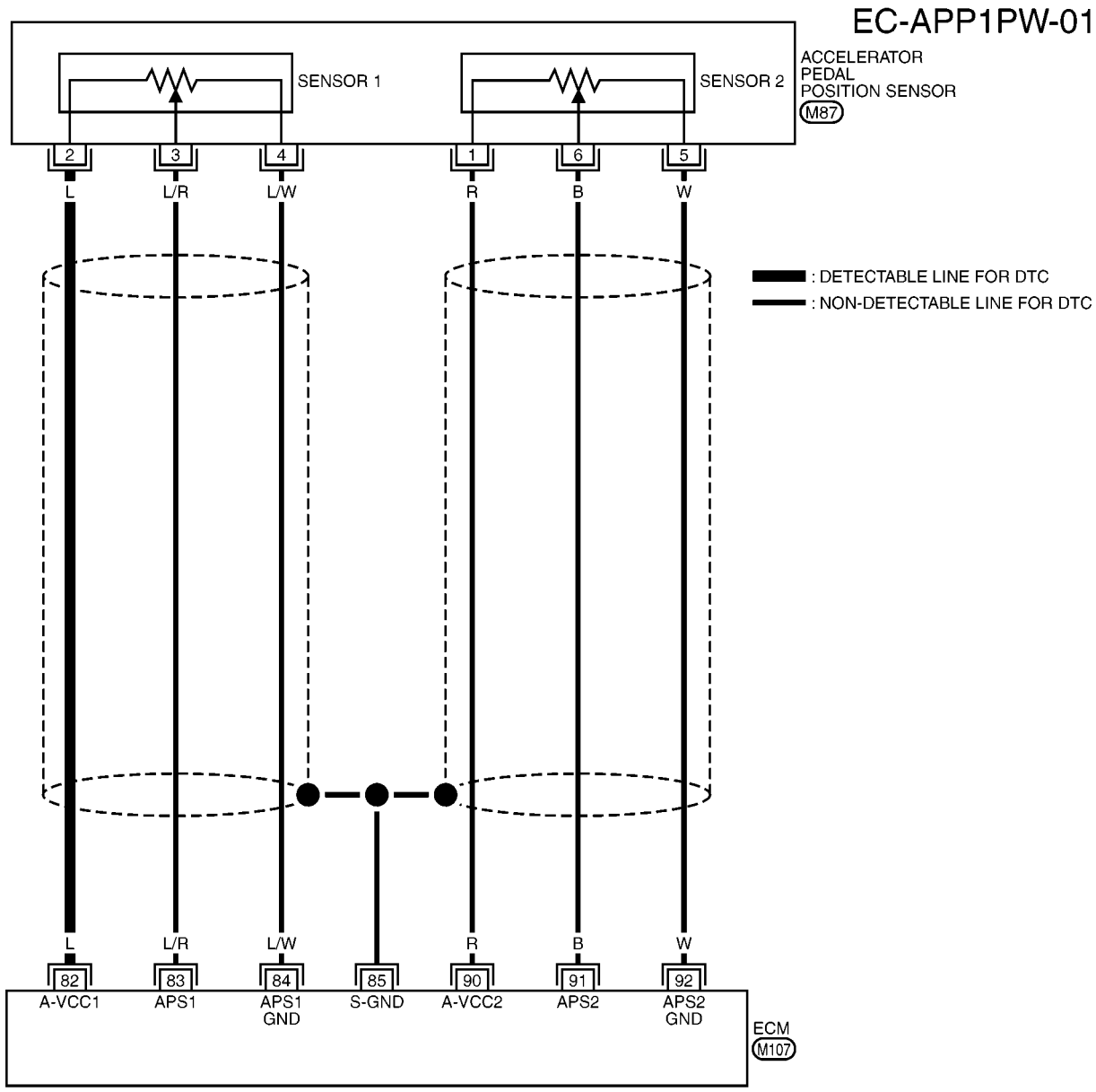


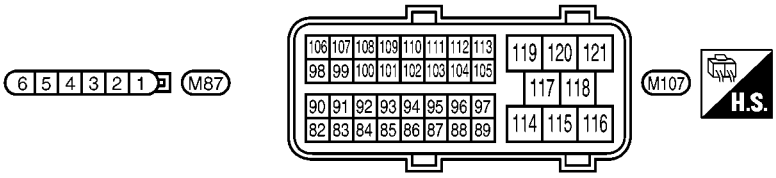
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013EO





YEC522A

Diagnostic Procedure

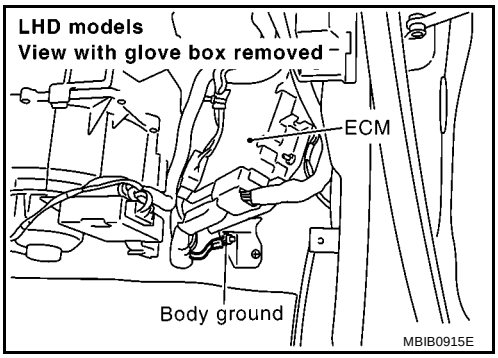
EBS013EP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

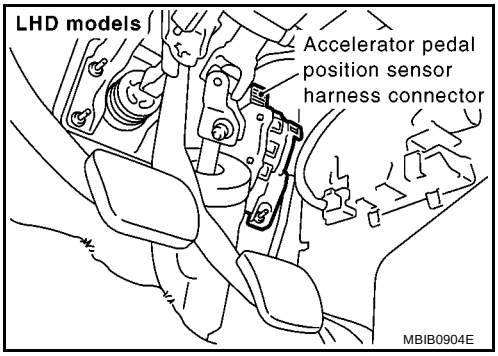
OK or NG

OK >> GO TO 2.
NG >> 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.

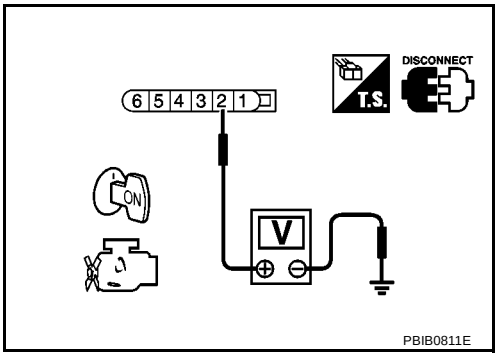


3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR

Refer to EC-1166, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace accelerator pedal assembly.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

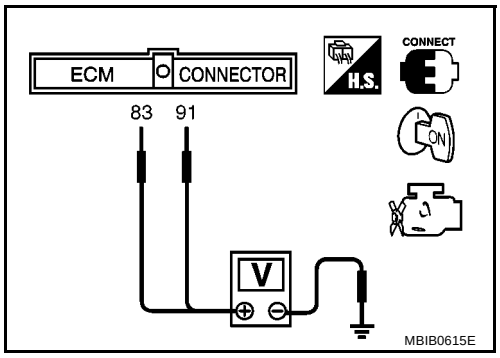
Component Inspection

EBS013EQ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS013ER

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

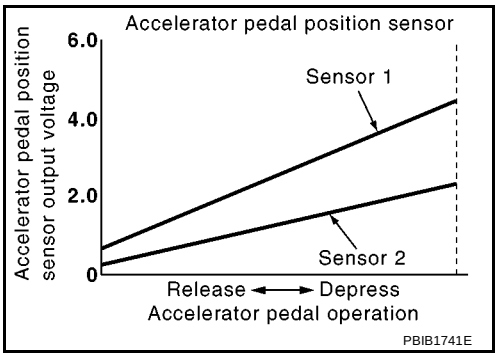
DTC P0652, P0653 SENSOR POWER SUPPLY

PFP:18002

Description

EBS013ES

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS013ET

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS013EU

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013EV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0652	Accelerator pedal position sensor 2 power supply circuit low	ECM detects a voltage of power source for the APP sensor 2 is excessively low.	● Harness or connectors (The APP sensor 2 power supply circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0653	Accelerator pedal position sensor 2 power supply circuit high	ECM detects a voltage of power source for the APP sensor 2 is excessively high.	

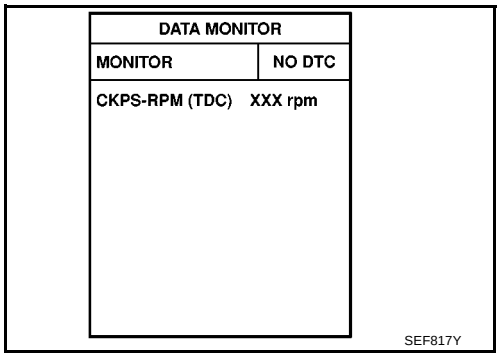
DTC Confirmation Procedure

EBS013EW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1170, "Diagnostic Procedure" .

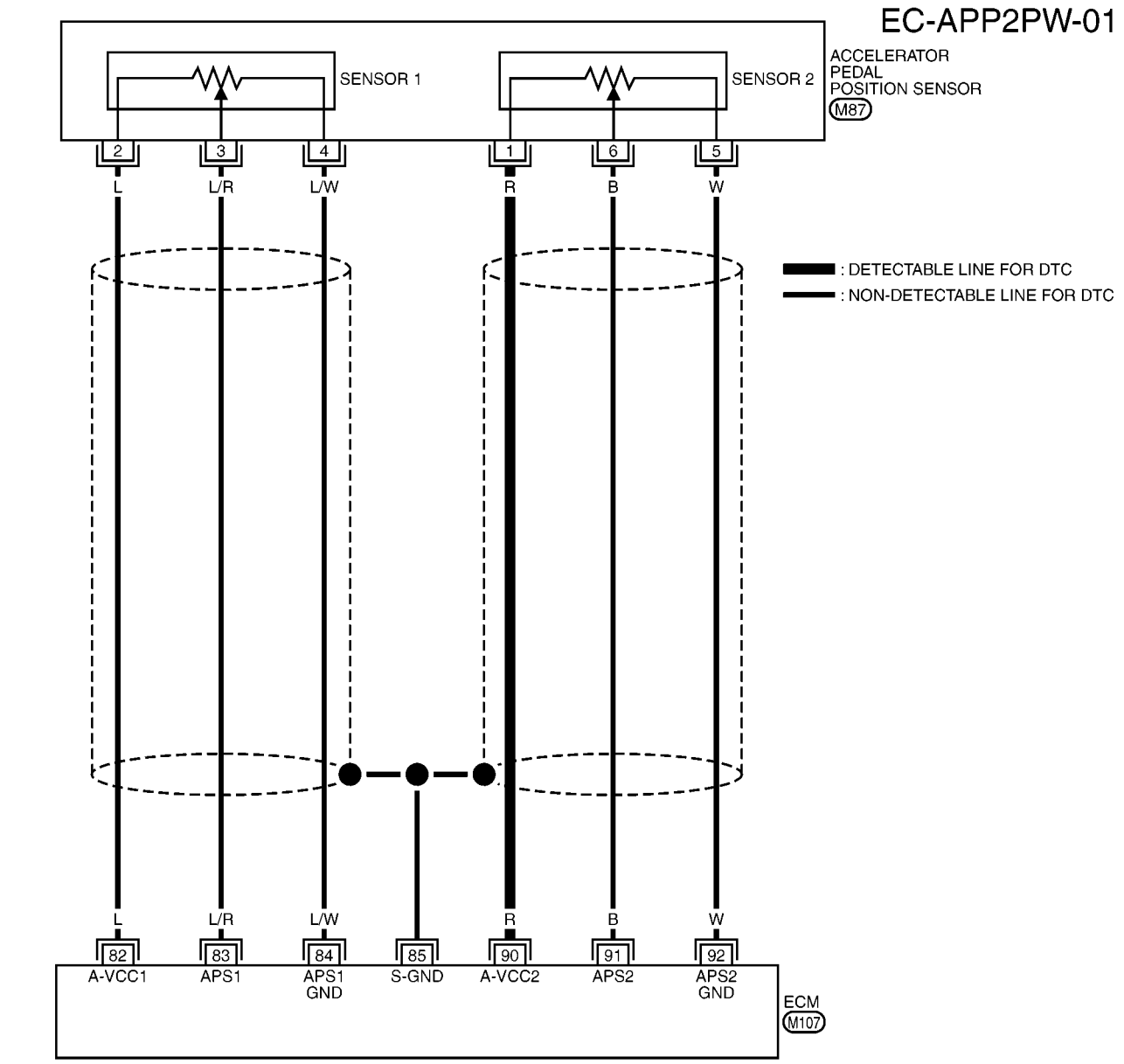


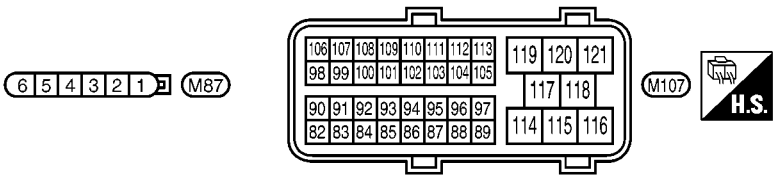
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013EX





YEC523A

Diagnostic Procedure

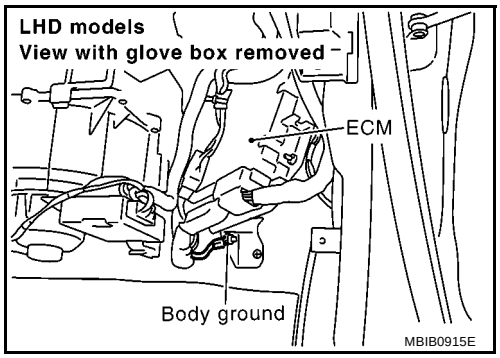
EBS013EY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

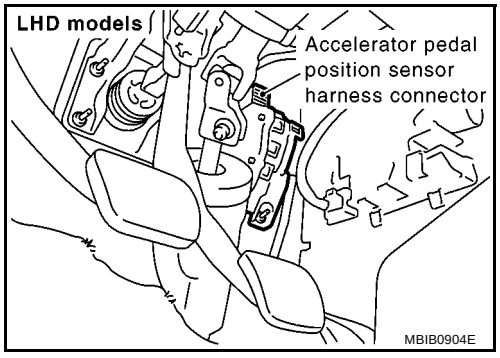
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

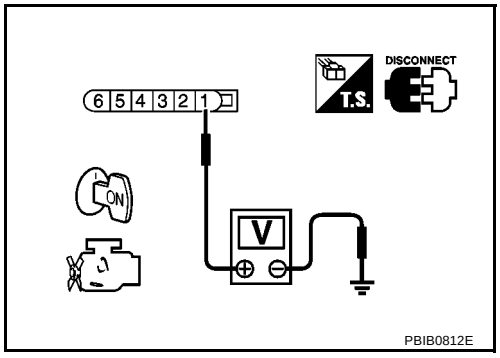


3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace accelerator pedal assembly.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

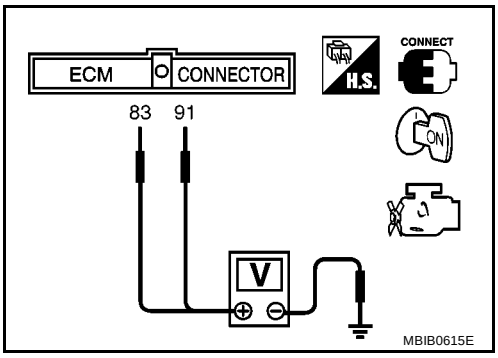
Component Inspection

EBS013EZ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and engine body under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS013F0

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

DTC P0686 ECM RELAY

PFP:25230

ECM Terminals and Reference valve

EBS013F1

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

EBS013F2

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0686	ECM relay circuit	ECM detects ECM relay is stuck closed even if ignition switch OFF.	● Harness or connectors (The ECM relay circuit is shorted.) ● ECM relay

DTC Confirmation Procedure

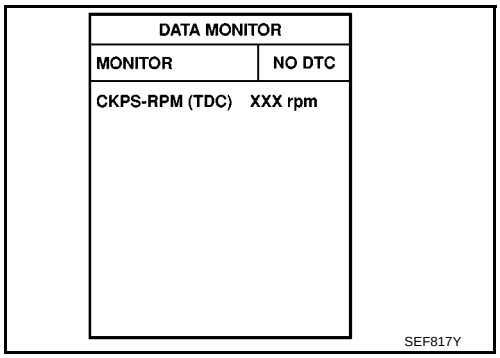
EBS013F3

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-1174, "Diagnostic Procedure" .



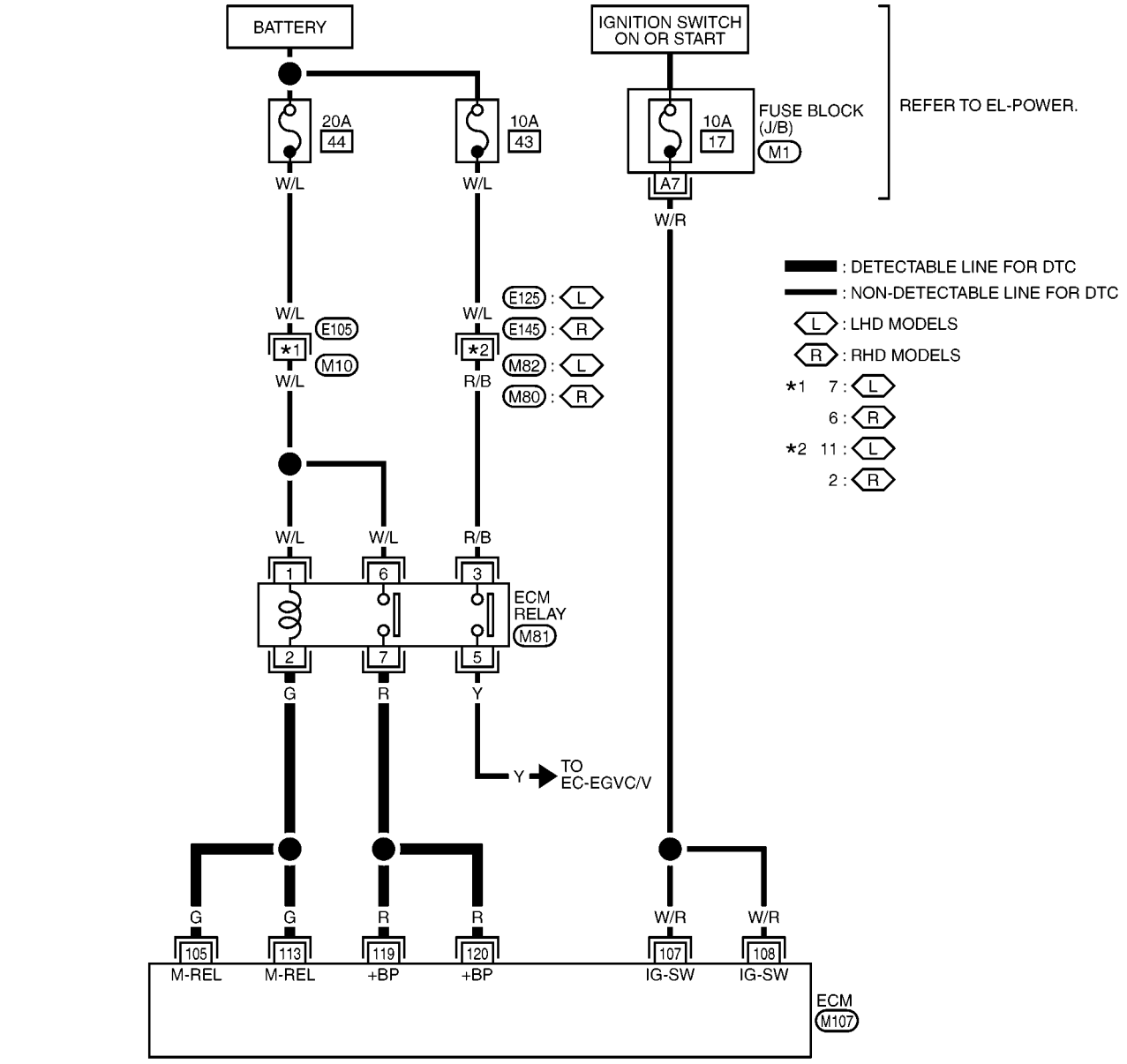
WITH GST

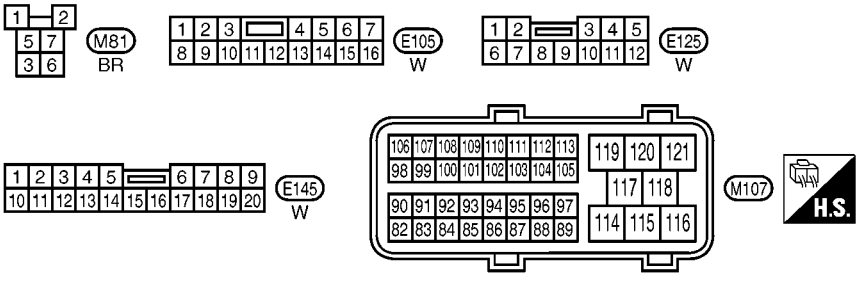
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013F4

EC-ECMRLY-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

MBWA0652E

Diagnostic Procedure

EBS013F5

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 2.
NG >> Repair short to ground in harness or connectors.

2. CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

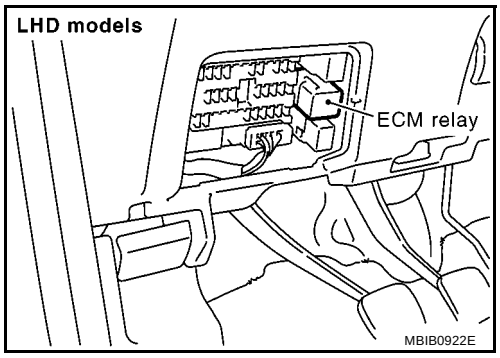
1. Disconnect ECM relay.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK ECM RELAY

Refer to EC-1174, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace ECM relay.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

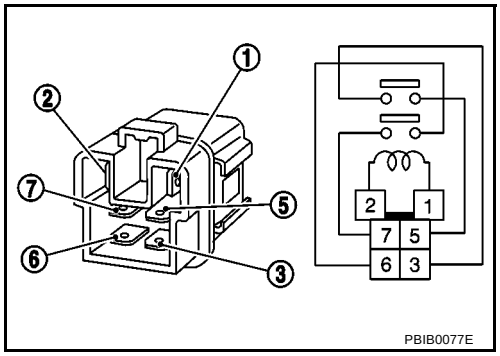
EBS013F6

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

EBS013F7

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

EBS013F8

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

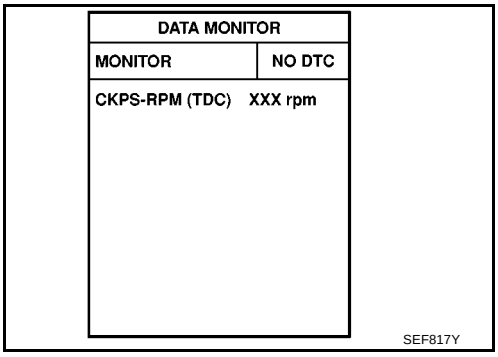
DTC Confirmation Procedure

EBS013F9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1175, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSLT-II” above.

Diagnostic Procedure

EBS013FA

Go to BR-97, “TROUBLE DIAGNOSIS” (models with ESP system) or BR-61, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” (model without ESP system).

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

EBS013FB

NOTE:
If DTC P1212 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1011, "DTC U1000 CAN COMMUNICATION LINE" .
This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.
Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

EBS013FC

This self-diagnosis has the one trip detection logic.
The MI will not light up 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 ESP/TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

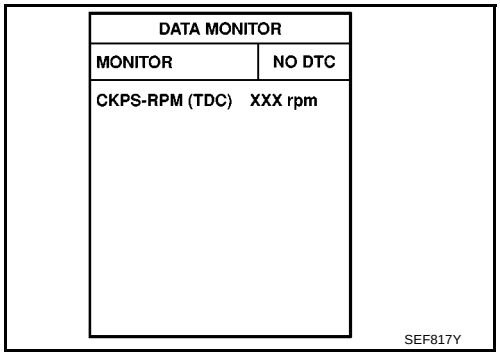
DTC Confirmation Procedure

EBS013FD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1176, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013FE

1. CHECK ESP/TCS/ABS CONTROL UNIT FUNCTION

Go to BR-97, “TROUBLE DIAGNOSIS” (models with ESP system) or BR-61, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” (model without ESP system).

>> **INSPECTION END**

DTC P1260 - P1267 FUEL INJECTOR ADJUSTMENT RESISTOR

PFP:16600

Description

EBS013FF

The fuel injector adjustment resistor is built into the fuel injector. The resistance is constant and individual. ECM uses the individual resistance to determine the fuel injection pulse.

ECM Terminals and Reference Value

EBS013FG

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	L/G	Fuel injector adjustment resistor No. 1	**[Ignition switch ON]**	0.5 - 5.1V (There are individual differences between fuel injector adjustment resistors.)
60	L/R	Fuel injector adjustment resistor No. 3		
61	R/Y	Fuel injector adjustment resistor No. 4		
62	LG/W	Fuel injector adjustment resistor No. 2		
78	R	Fuel injector adjustment resistor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013FH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1260	No. 1 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 1 cylinder fuel injector adjustment resistor is sent to ECM.	● Harness or connectors (The fuel injector adjustment resistor circuit is open or shorted.) ● Fuel injector adjustment resistor
P1261	No. 1 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 1 cylinder fuel injector adjustment resistor is sent to ECM.	
P1262	No. 2 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 2 cylinder fuel injector adjustment resistor is sent to ECM.	
P1263	No. 2 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 2 cylinder fuel injector adjustment resistor is sent to ECM.	
P1264	No. 3 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 3 cylinder fuel injector adjustment resistor is sent to ECM.	
P1265	No. 3 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 3 cylinder fuel injector adjustment resistor is sent to ECM.	
P1266	No. 4 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 4 cylinder fuel injector adjustment resistor is sent to ECM.	
P1267	No. 4 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 4 cylinder fuel injector adjustment resistor is sent to ECM.	

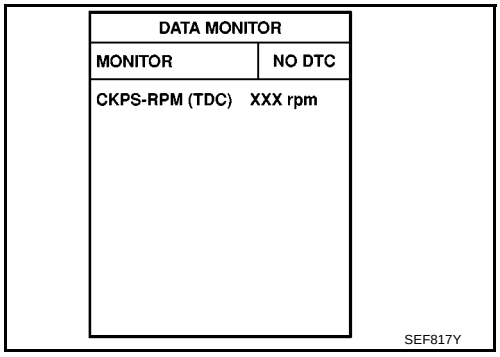
DTC Confirmation Procedure

EBS013FI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1180, "Diagnostic Procedure" .



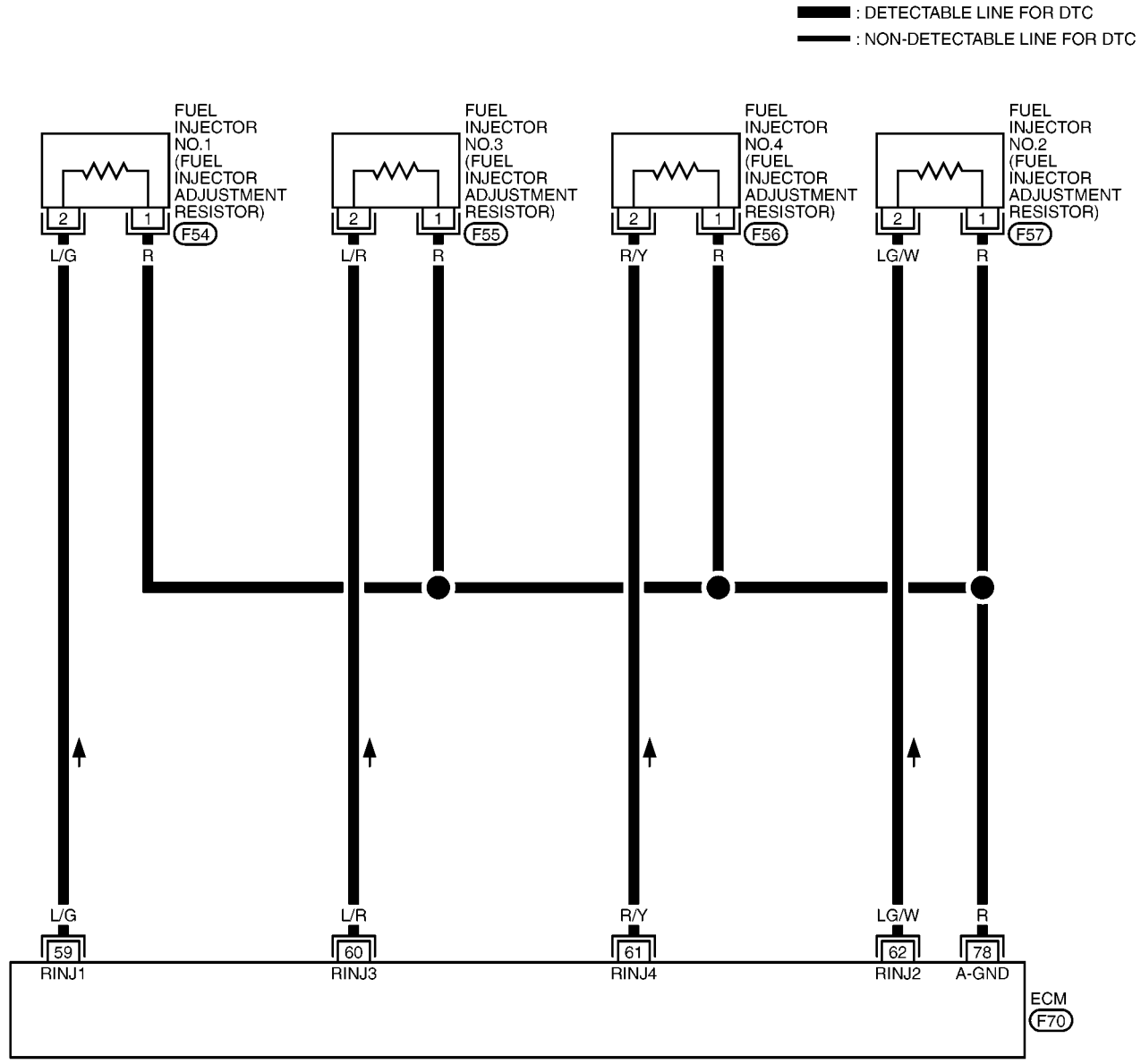
WITH GST

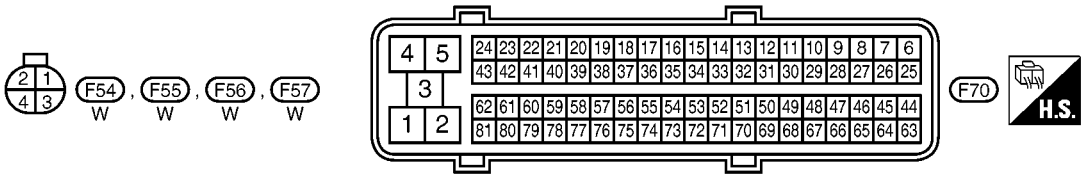
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013FJ

EC-FIAR-01





MBWA0631E

Diagnostic Procedure

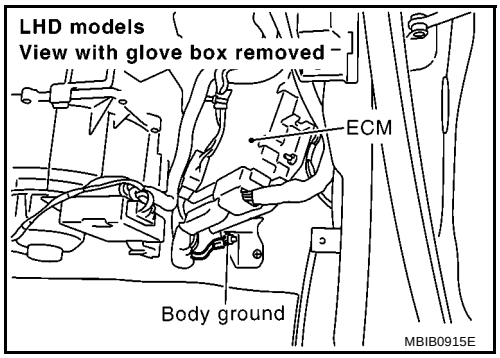
EBS013FK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

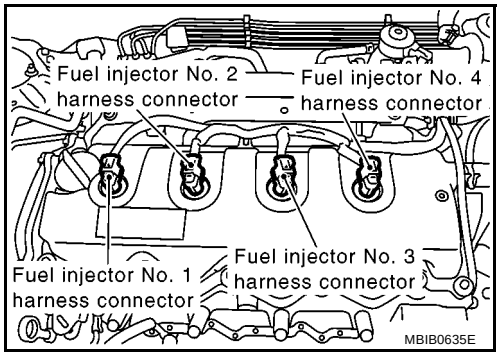
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR POWER SUPPLY CIRCUIT

1. Disconnect fuel injector harness connector of malfunctioning cylinder.
2. Turn ignition switch ON.

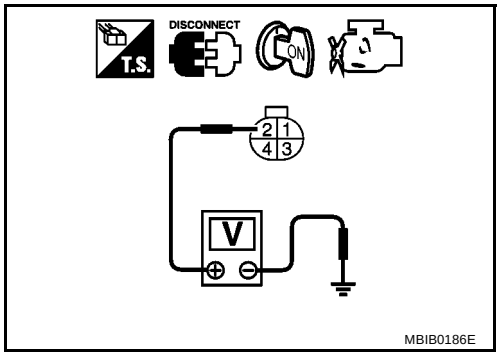


3. Check voltage between fuel injector terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 1 and ECM terminal 78.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR

Refer to EC-1181, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel injector.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

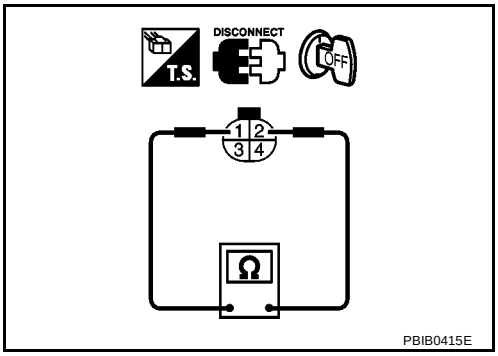
EBS013FL

FUEL INJECTOR ADJUSTMENT RESISTOR

1. Disconnect fuel injector harness connector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

If NG, replace fuel injector.



PBIB0415E

Removal and Installation

EBS013FM

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

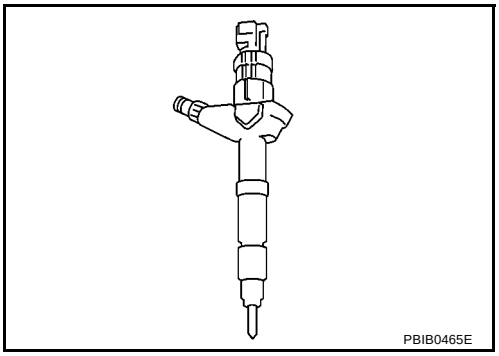
DTC P1268 - P1271 FUEL INJECTOR

PFP:16600

Component Description

EBS013FN

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS013FO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

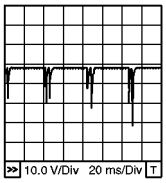
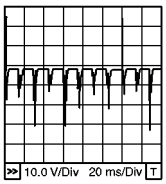
ECM Terminals and Reference Value

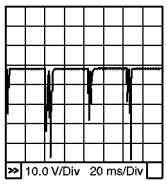
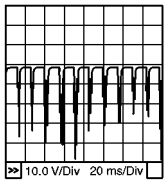
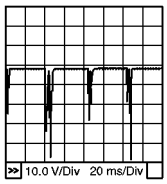
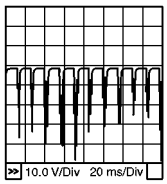
EBS013FP

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013FQ

This self-diagnosis has the one trip detection logic.
The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1268	No. 1 cylinder fuel injector	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	● Fuel injector
P1269	No. 2 cylinder fuel injector	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270	No. 3 cylinder fuel injector	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271	No. 4 cylinder fuel injector	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC Confirmation Procedure

EBS013FR

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

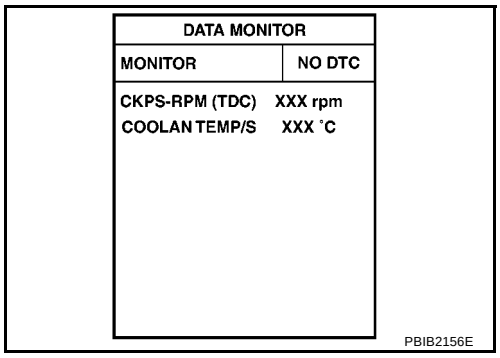
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Restart engine and let it idle for about 15 minutes.
3. If DTC is detected, go to EC-1186, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
4. Drive vehicle and maintain the following conditions for at least 60 seconds.

CKPS·RPM	700 - 2000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

5. If DTC is detected, go to EC-1186, "Diagnostic Procedure" .



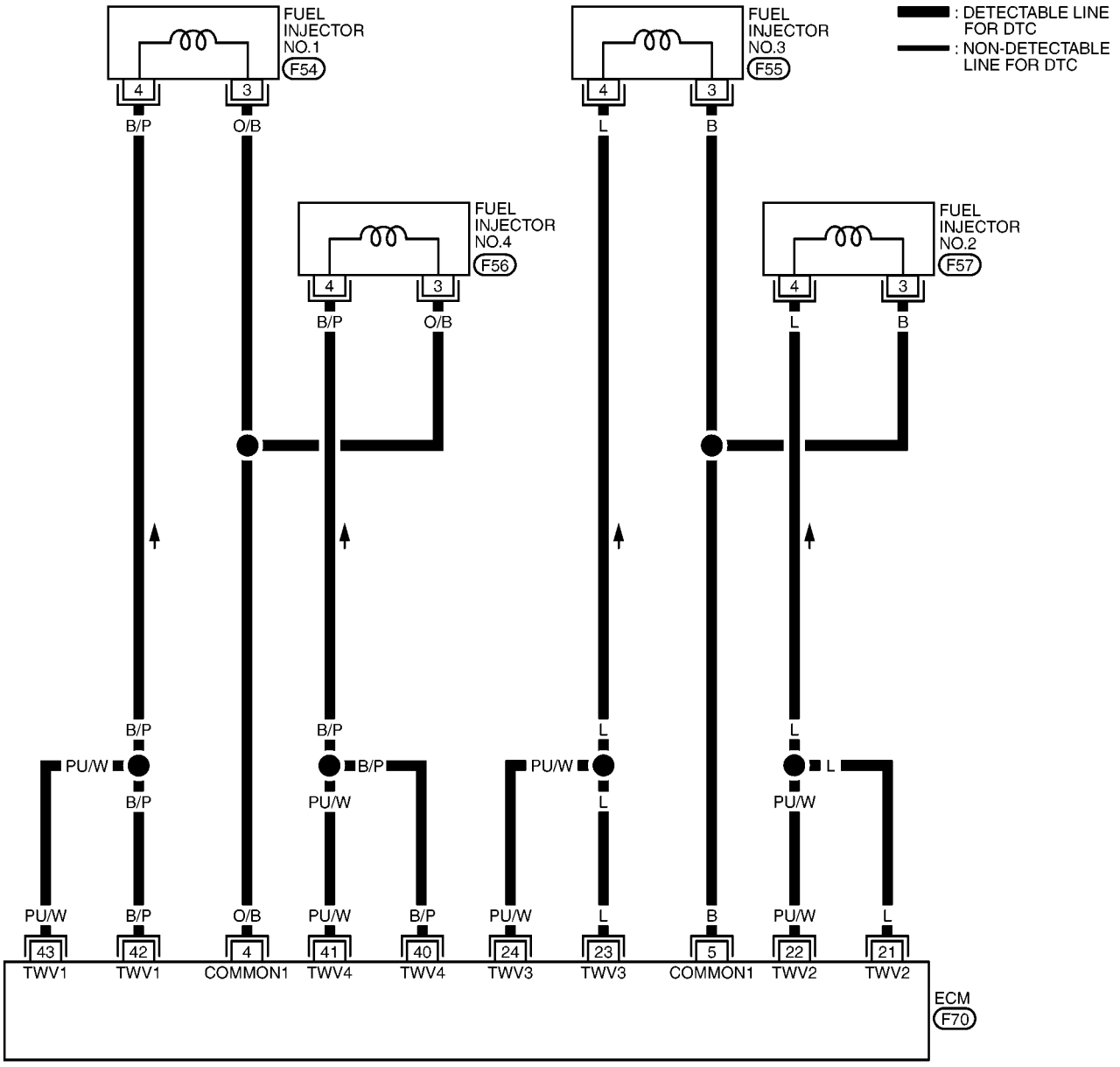
WITHOUT CONSULT-II

Follow the procedure “WITH CONSULT-II” above.

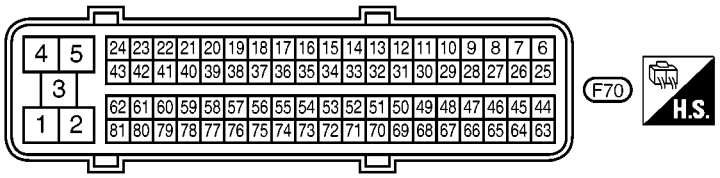
Wiring Diagram

EBS013FS

EC-INJECT-01







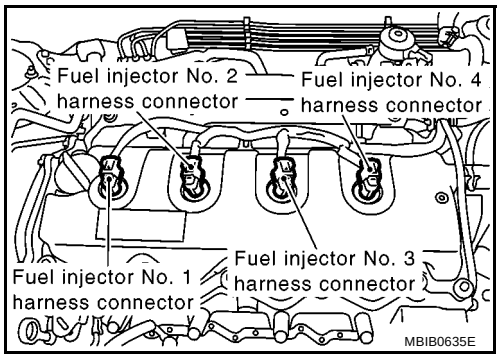
MBWA0633E

Diagnostic Procedure

EBS013FT

1. CHECK FUEL INJECOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	4	3	No.1
P1269	5	3	No.2
P1270	5	3	No.3
P1271	4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	42, 43	4	No.1
P1269	21, 22	4	No.2
P1270	23, 24	4	No.3
P1271	40, 41	4	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1187, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select “SELF DIAG RESULTS” mode with CONSULT-II.
6. Touch “ERASE”.
7. Perform EC-1184, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

With GST

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select MODE4 with GST.
6. Touch “ERASE”.
7. Perform EC-1184, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

Yes or No

Yes >> Replace fuel injector of malfunctioning cylinder.
No >> GO TO 5.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

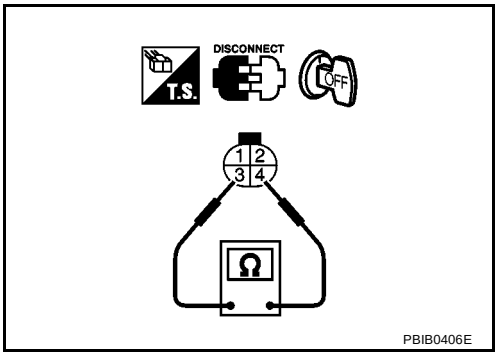
EBS013FU

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS013FV

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

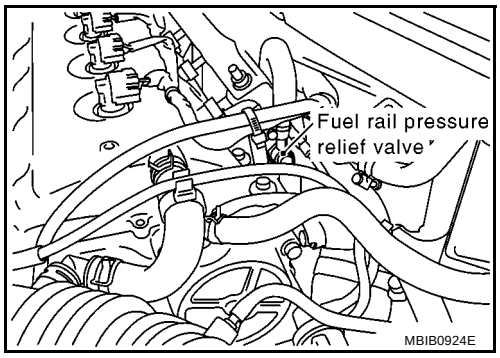
DTC P1272 FUEL PUMP

PFP:16700

Description

EBS013FW

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve opens to carry excess fuel to the return hose.



CONSULT-II Reference Value in Data Monitor Mode

EBS013FX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

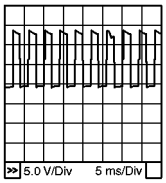
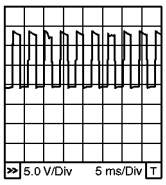
ECM Terminals and Reference Value

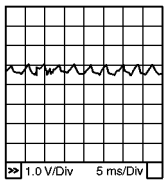
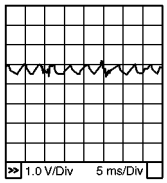
EBS013FY

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013FZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1272	Fuel rail pressure relief valve open	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	● Harness or connectors (Fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor ● Air mixed with fuel ● Lack of fuel

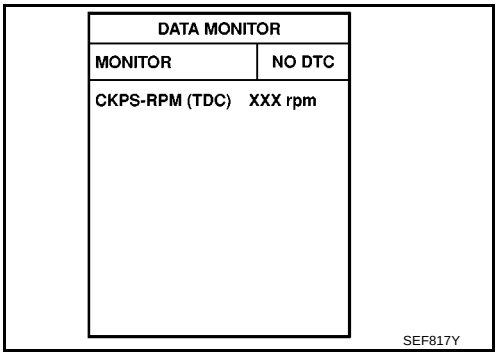
DTC Confirmation Procedure

EBS013G0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
4. If 1st trip DTC is detected, go to EC-1191, "Diagnostic Procedure" .



SEF817Y

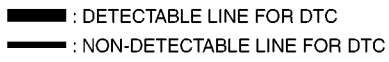
WITH GST

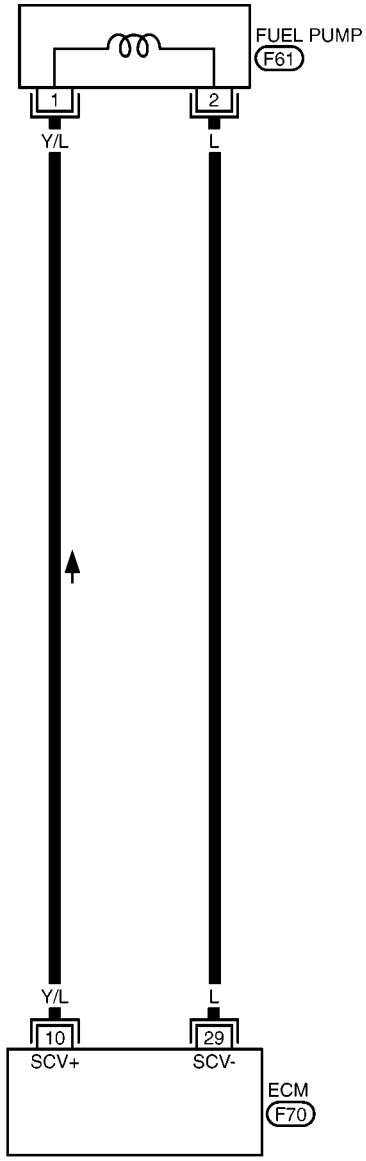
Follow the procedure “WITH CONSULT-II” above.

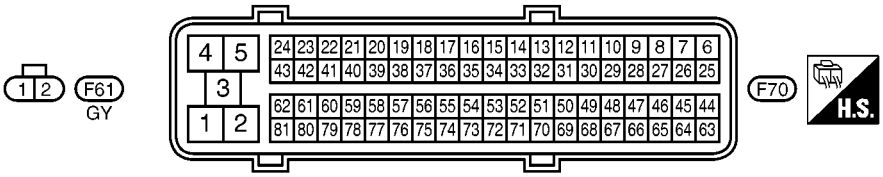
Wiring Diagram

EBS013G1

EC-F/PUMP-01







YEC509A

Diagnostic Procedure

EBS013G2

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1189, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

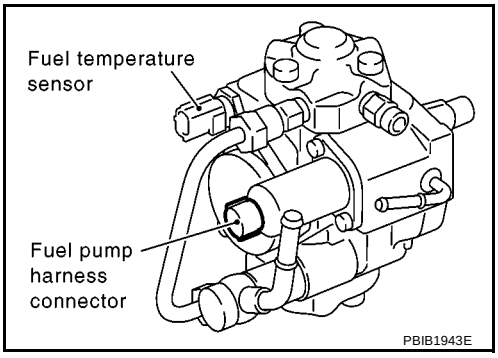
1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select MODE 4 with GST.
5. Touch “ERASE”.
6. Perform EC-1189, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.



3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP

Refer to EC-1192, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

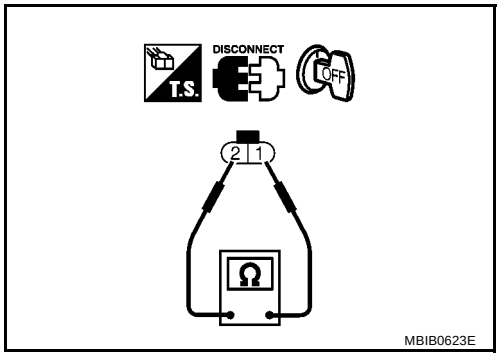
EBS013G3

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

   Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS013G4

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1273 FUEL PUMP

PFP:16700

Description

EBS013G5

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS013G6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

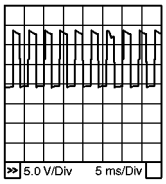
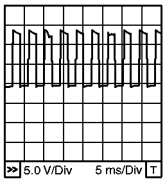
ECM Terminals and Reference Value

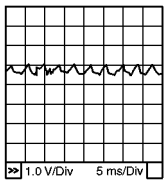
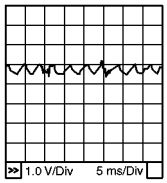
EBS013G7

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013G8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1273	Fuel pump insufficient flow	ECM detects the abnormal pulse of fuel pressure.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

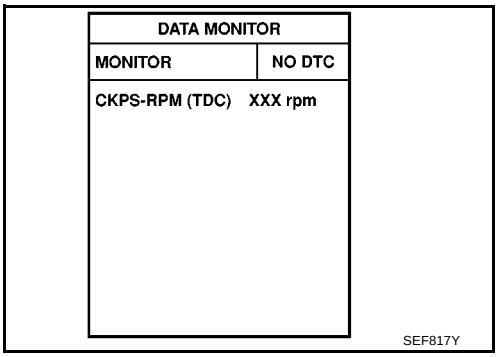
DTC Confirmation Procedure

EBS013G9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 10 seconds.
4. If 1st trip DTC is detected, go to EC-1197, "Diagnostic Procedure" .



SEF817Y

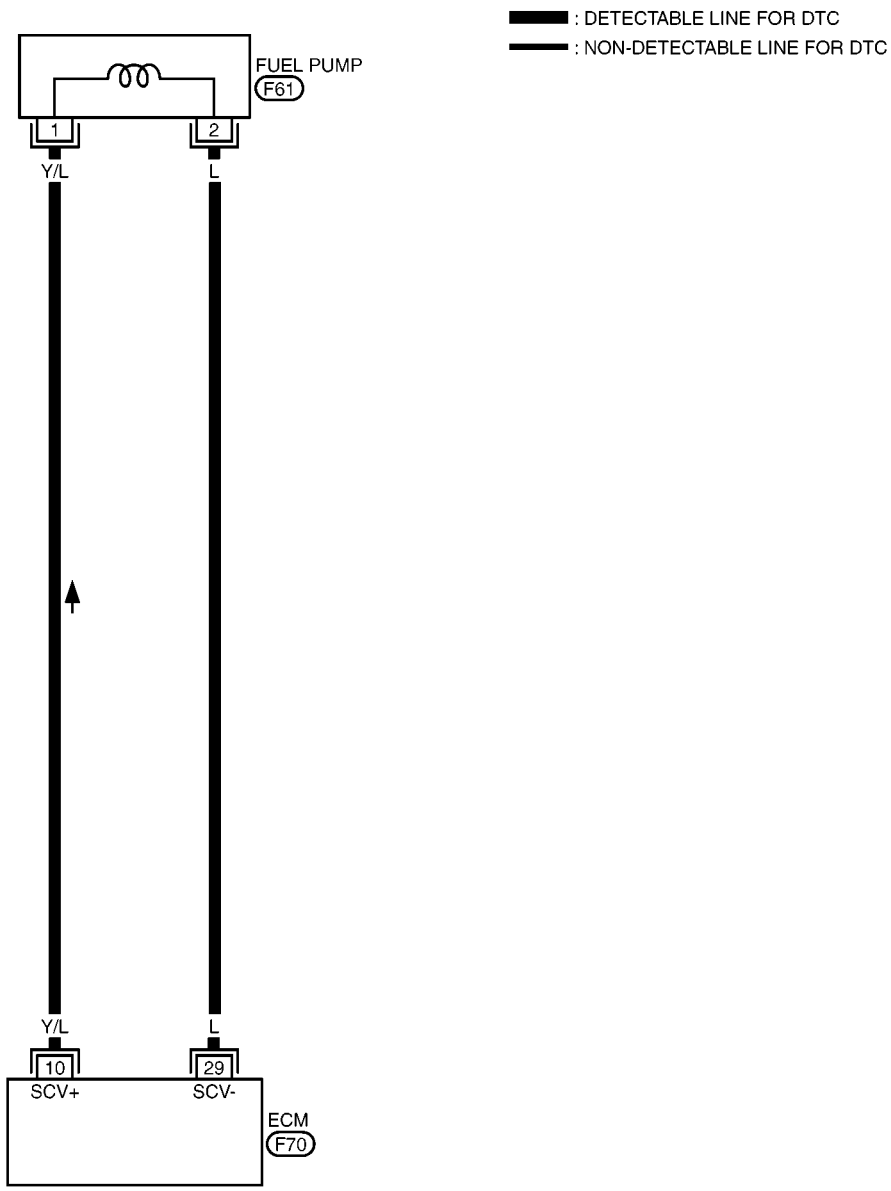
WITH GST

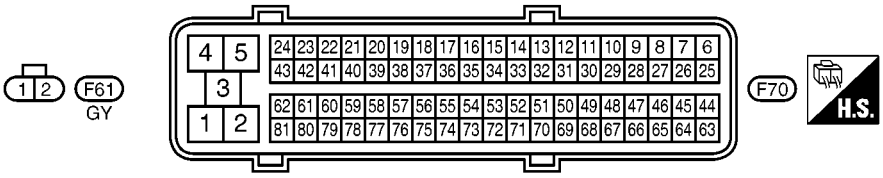
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013GA

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

EBS013GB

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1195, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select MODE 4 with GST.
5. Touch “ERASE”.
6. Perform EC-1195, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

Yes or No

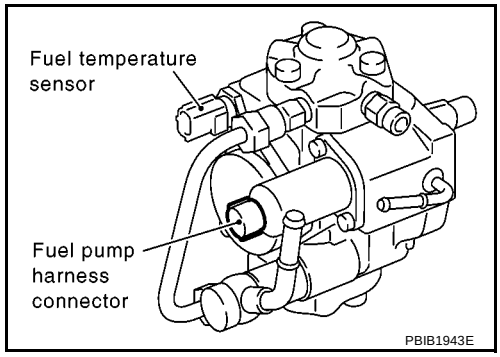
Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel rail.

5. CHECK FUEL PUMP

Refer to EC-1198, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

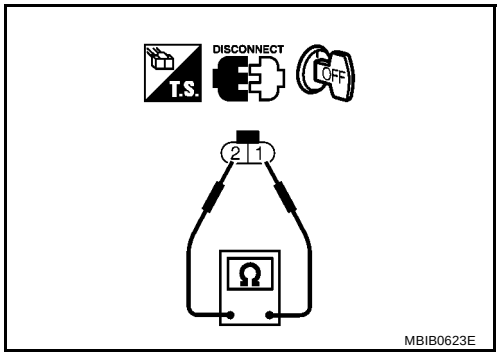
EBS013GC

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS013GD

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1274 FUEL PUMP

PFP:16700

Description

EBS013GE

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS013GF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

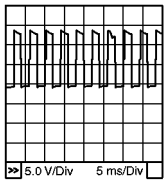
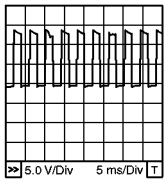
ECM Terminals and Reference Value

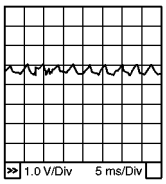
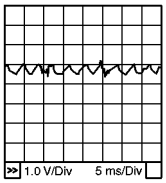
EBS013GG

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013GH

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1274	Fuel pump protection	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

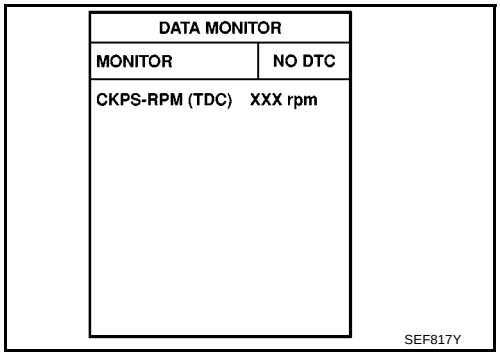
DTC Confirmation Procedure

EBS013GI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Tuning ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let idle for at least 5 seconds.
4. If DTC is detected, go to EC-1202, "Diagnostic Procedure" .



SEF817Y

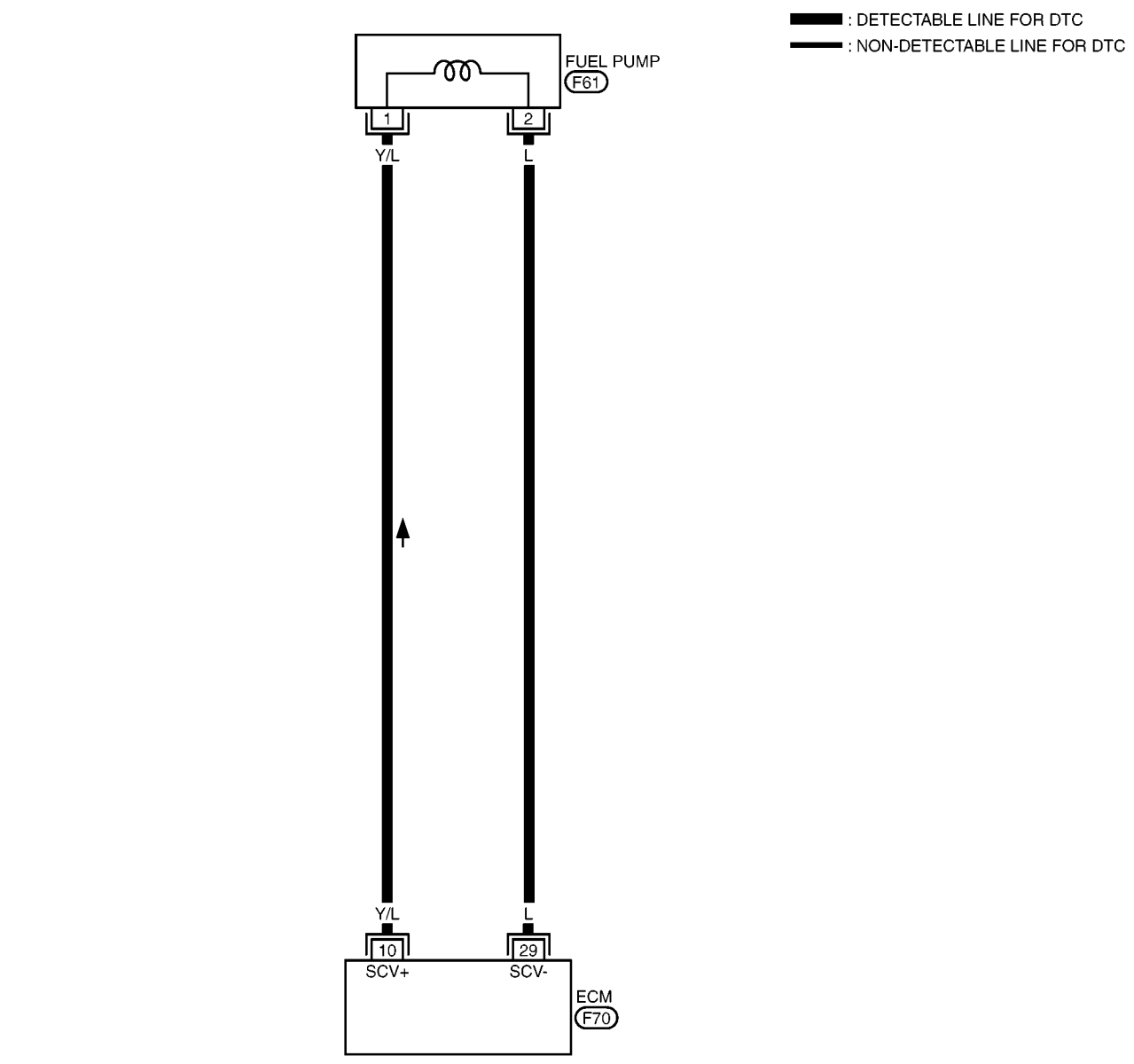
WITH GST

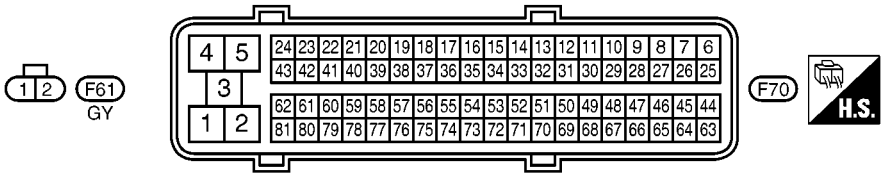
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013GJ

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

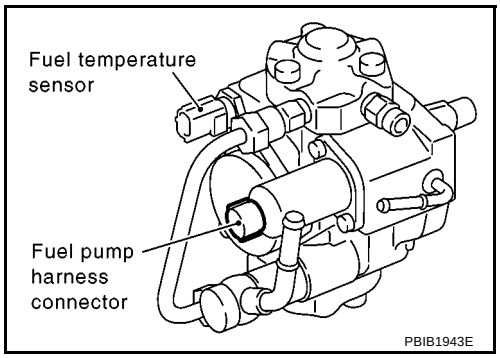
EBS013GK

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1203, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

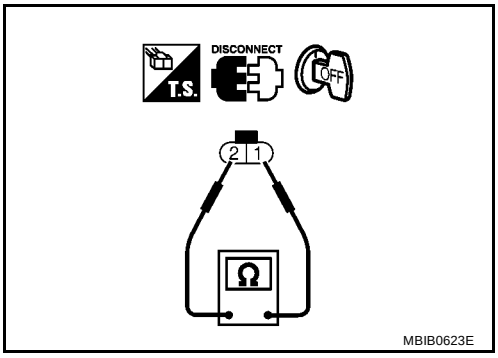
EBS013GL

FUEL PUMP

1. Check continuity between fuel pump terminals 1 and 2.

Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS013GM

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1275 FUEL PUMP

PFP:16700

Description

EBS013GN

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS013GO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

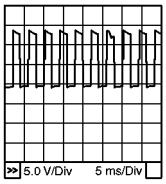
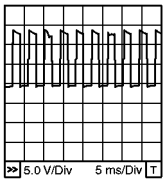
ECM Terminals and Reference Value

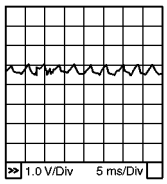
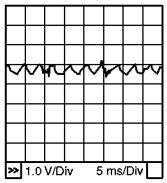
EBS013GP

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013GQ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1275	Fuel pump exchange	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

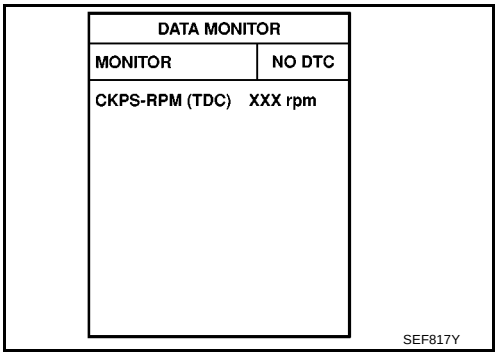
DTC Confirmation Procedure

EBS013GR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 60 seconds.
4. If DTC is detected, go to EC-1207, "Diagnostic Procedure" .



SEF817Y

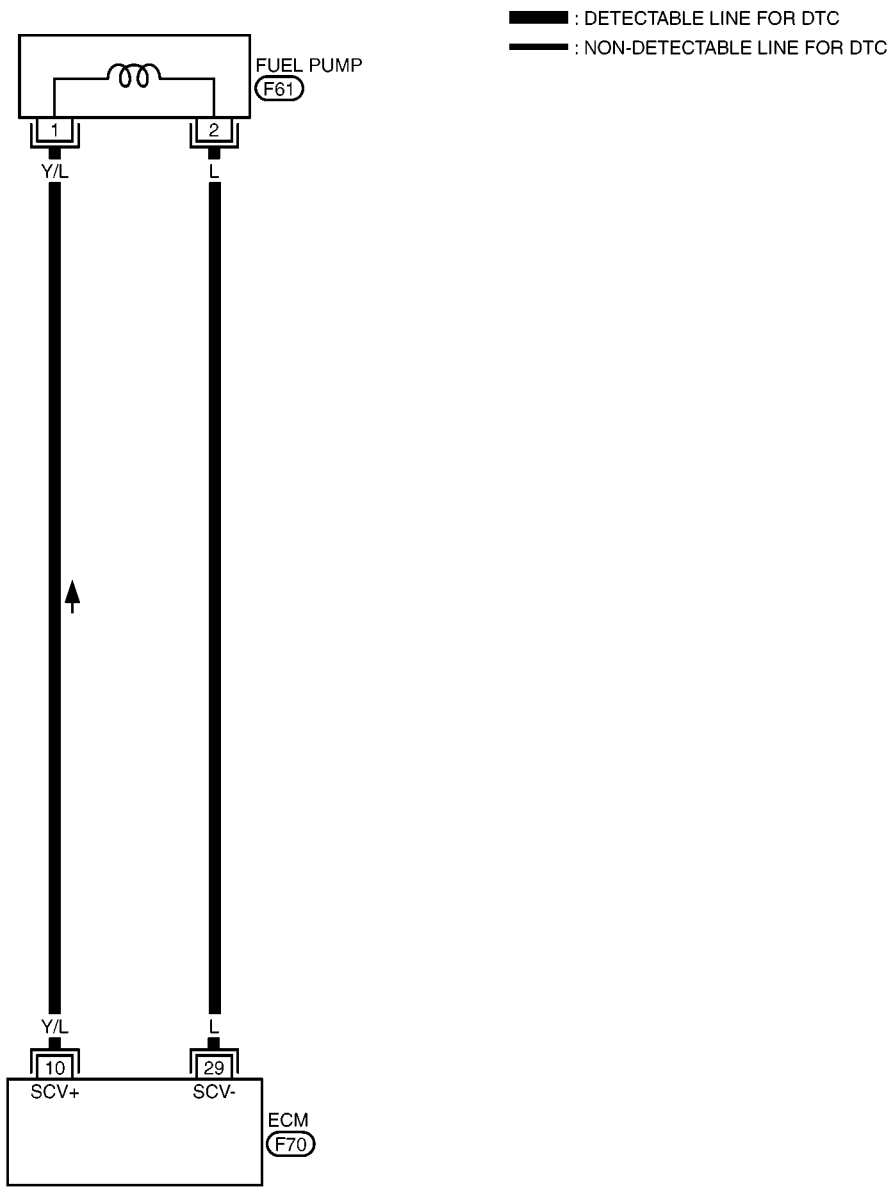
WITH GST

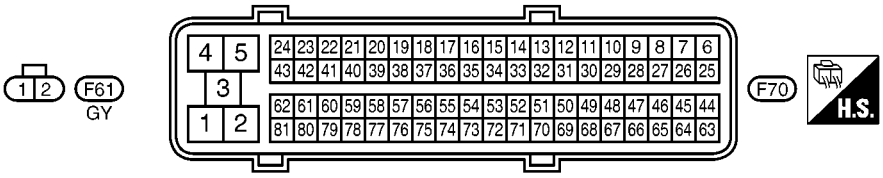
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013GS

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

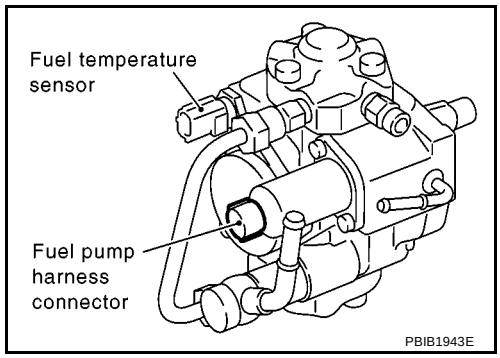
EBS013GT

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1063, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1208, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

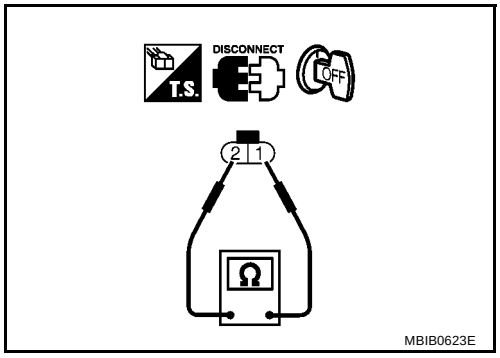
EBS013GU

FUEL PUMP

1. Check continuity between fuel pump terminals 1 and 2.

   Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS013GV

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

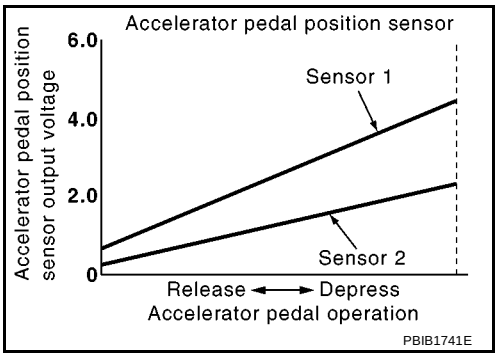
DTC P2135 APP SENSOR

PFP:18002

Description

EBS013GW

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS013GX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS013GY

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS013GZ

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	● Harness or connectors (The APP sensor circuit is open or shorted.) ● Accelerator pedal position sensor

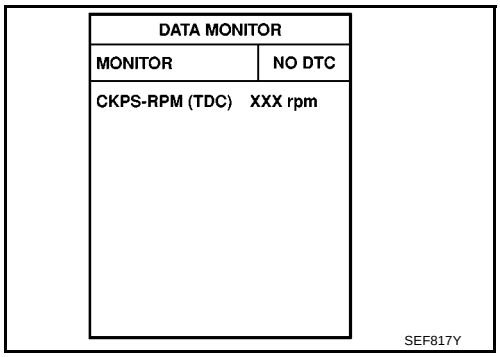
DTC Confirmation Procedure

EBS013H0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
5. If DTC is detected, go to EC-1212, "Diagnostic Procedure" .

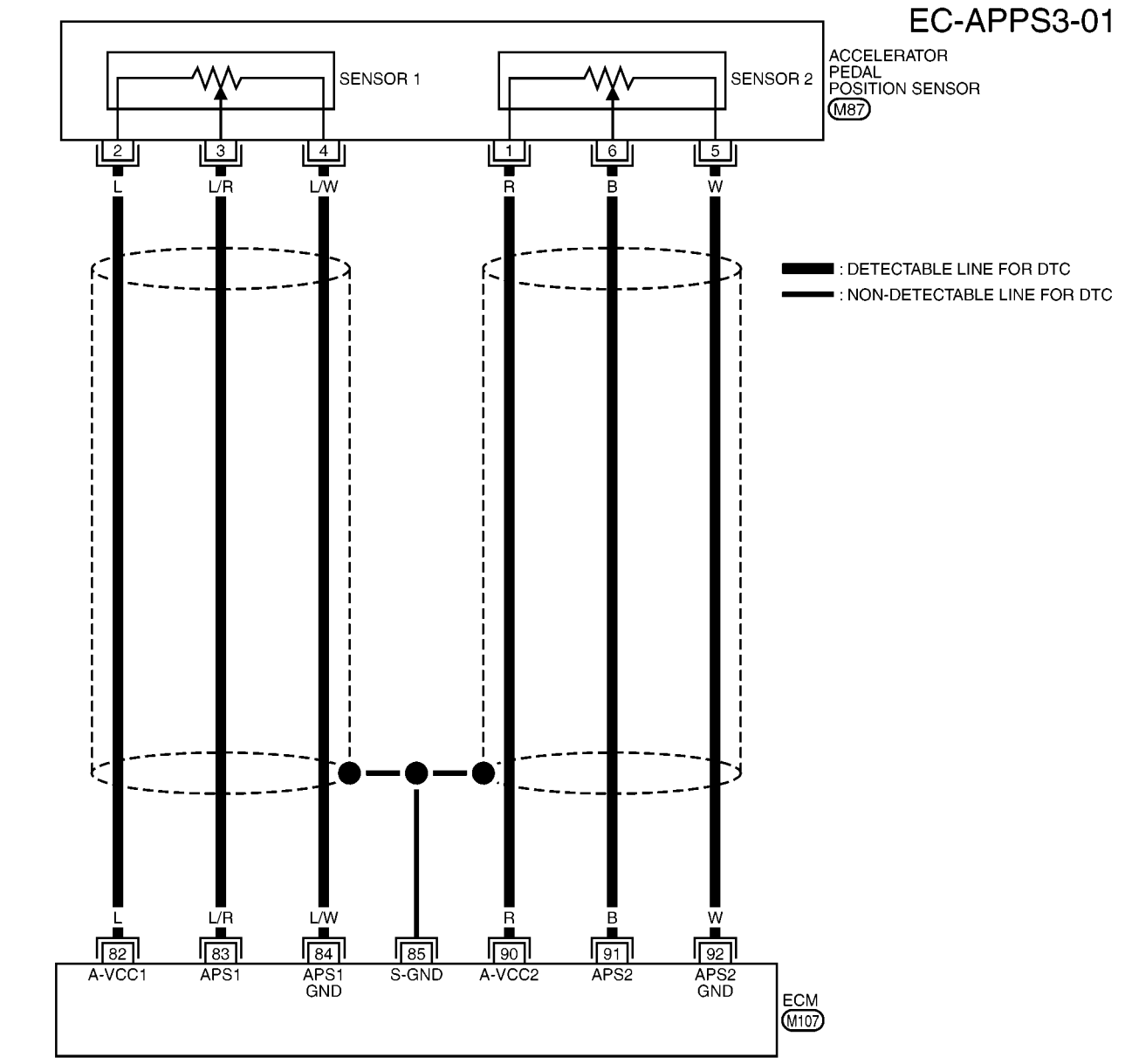


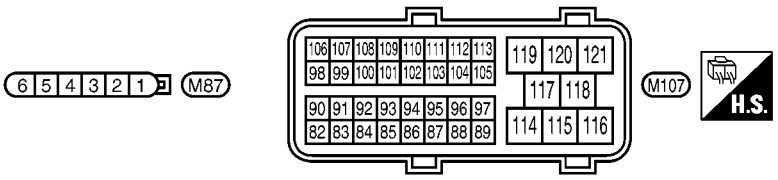
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013H1





YEC521A

Diagnostic Procedure

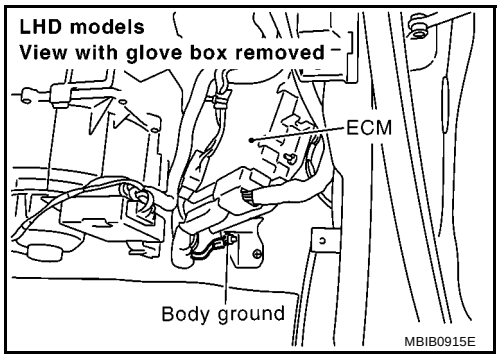
EBS013H2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

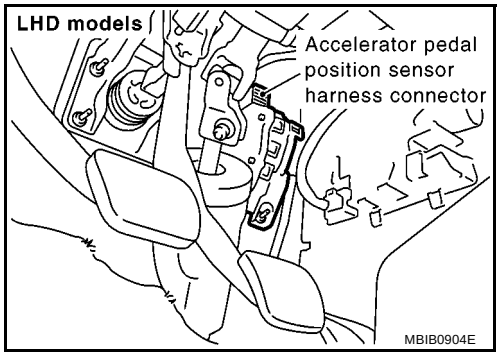
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

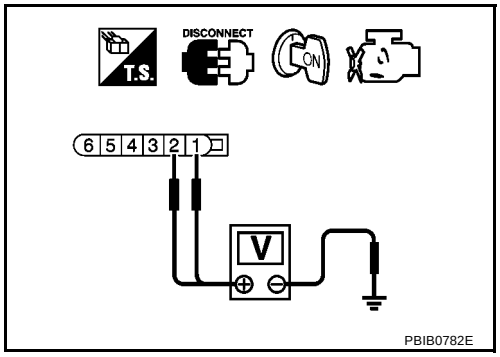


3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 84, APP sensor terminal 5 and ECM terminal 92.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 83 and APP sensor terminal 3, ECM terminal 91 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1213, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

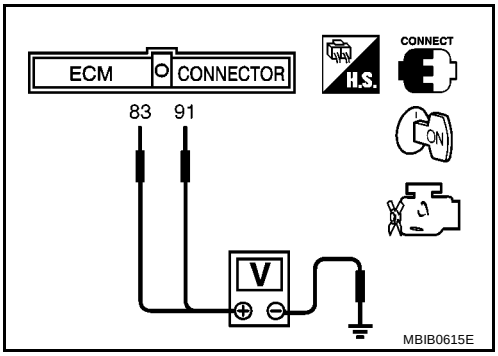
Component Inspection

EBS013H3

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS013H4

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

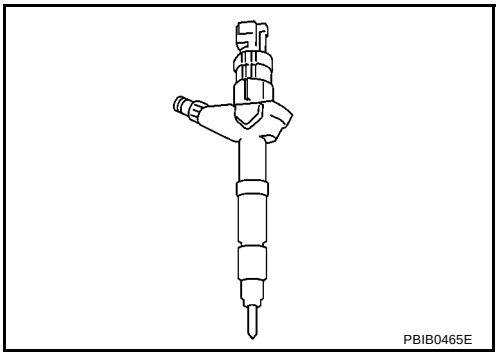
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

PFP:16600

Component Description

EBS013H5

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS013H6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

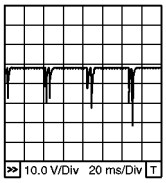
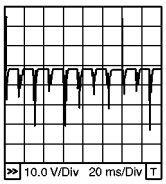
ECM Terminals and Reference Value

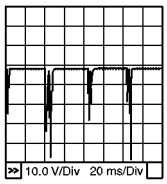
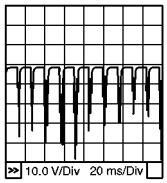
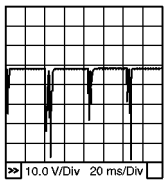
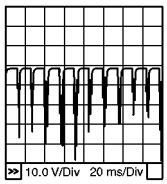
EBS013H7

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013H8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2146	No. 1 and 4 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.)
P2149	No. 2 and 3 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC Confirmation Procedure

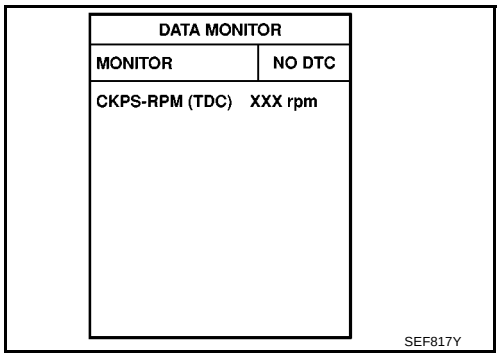
EBS013H9

NOTE:
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 the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1218, "Diagnostic Procedure" .

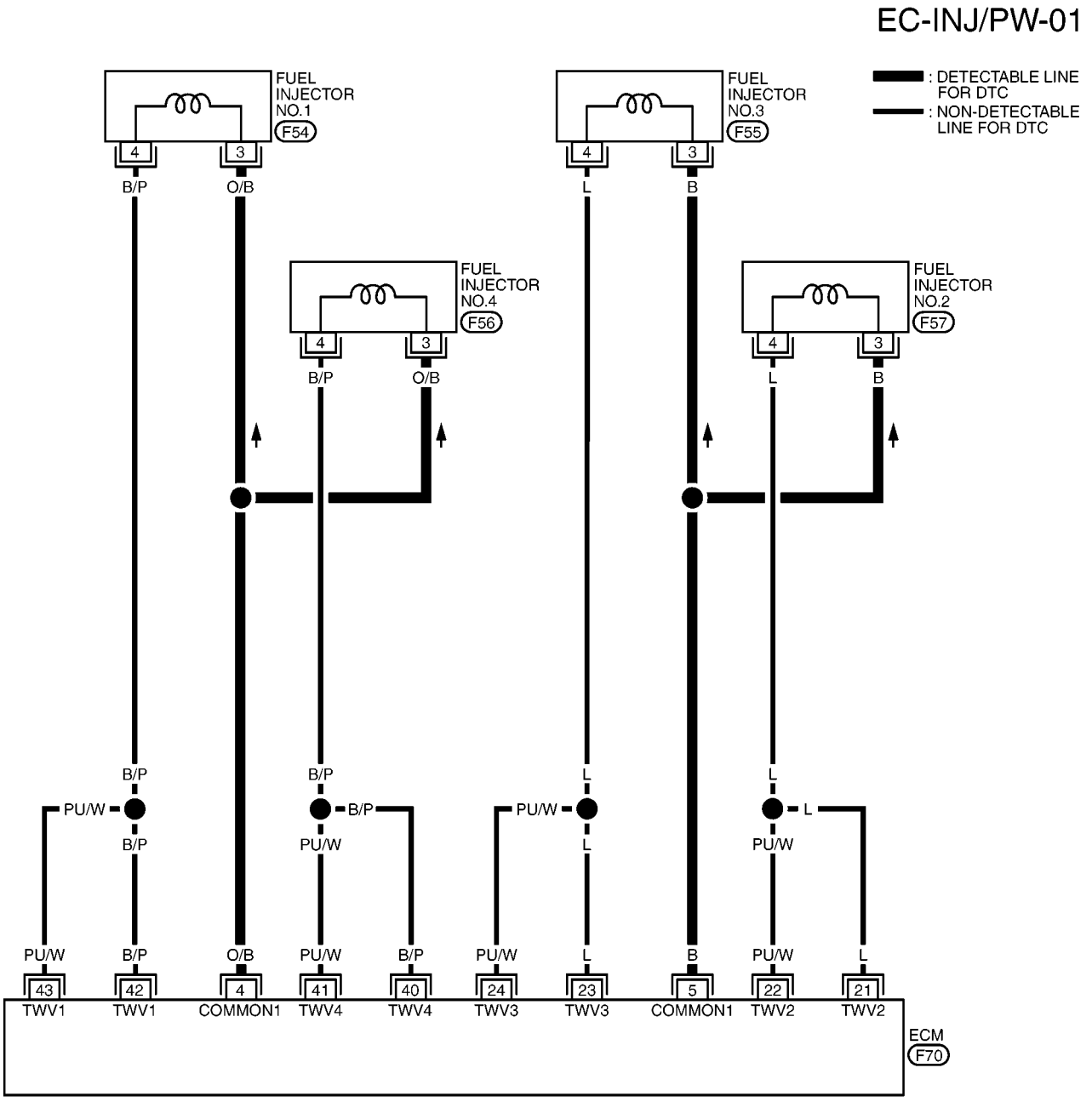


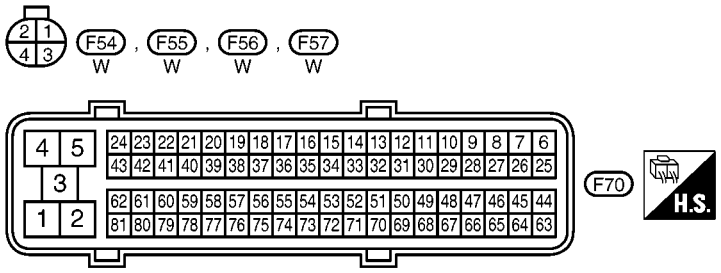
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

EBS013HA





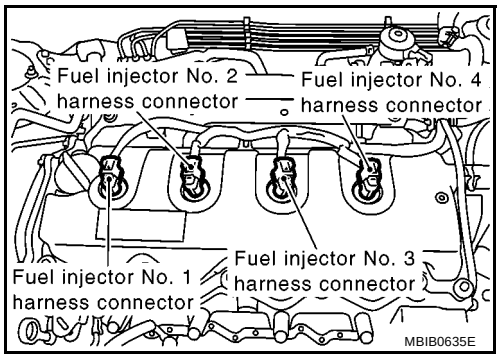
MBWA0632E

Diagnostic Procedure

EBS013HB

1. CHECK FUEL INJECOR POWER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Terminal		Cylinder
ECM	Fuel injector	
4	3	No.1
5	3	No.2
5	3	No.3
4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

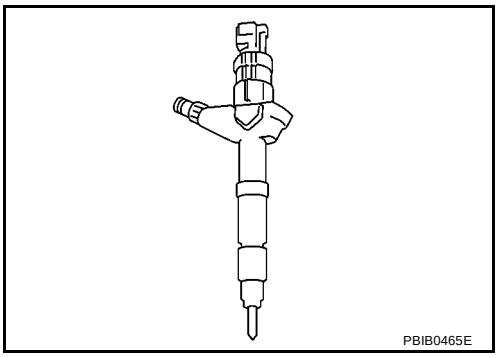
DTC P2147, P2148 FUEL INJECTOR CIRCUIT

PFP:16600

Component Description

EBS013HC

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS013HD

Specification data are reference values.

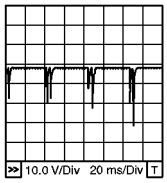
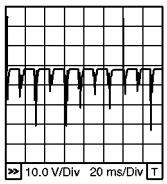
MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

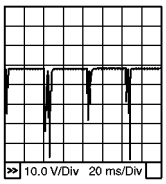
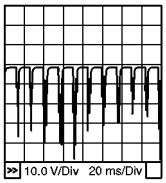
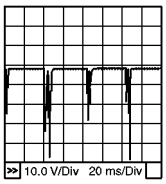
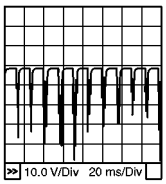
ECM Terminals and Reference Value

EBS013HE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS013HF

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2147	Fuel injector circuit low input	ECM detects the fuel injector circuit is shorted to ground.	● Harness or connectors (The fuel injector circuit is shorted.)
P2148	Fuel injector circuit high input	ECM detects the fuel injector circuit is shorted to power.	

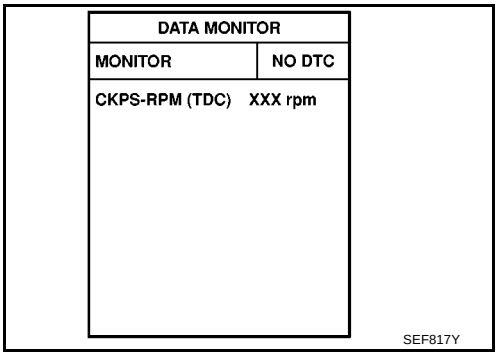
DTC Confirmation Procedure

EBS013HG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1223, "Diagnostic Procedure" .



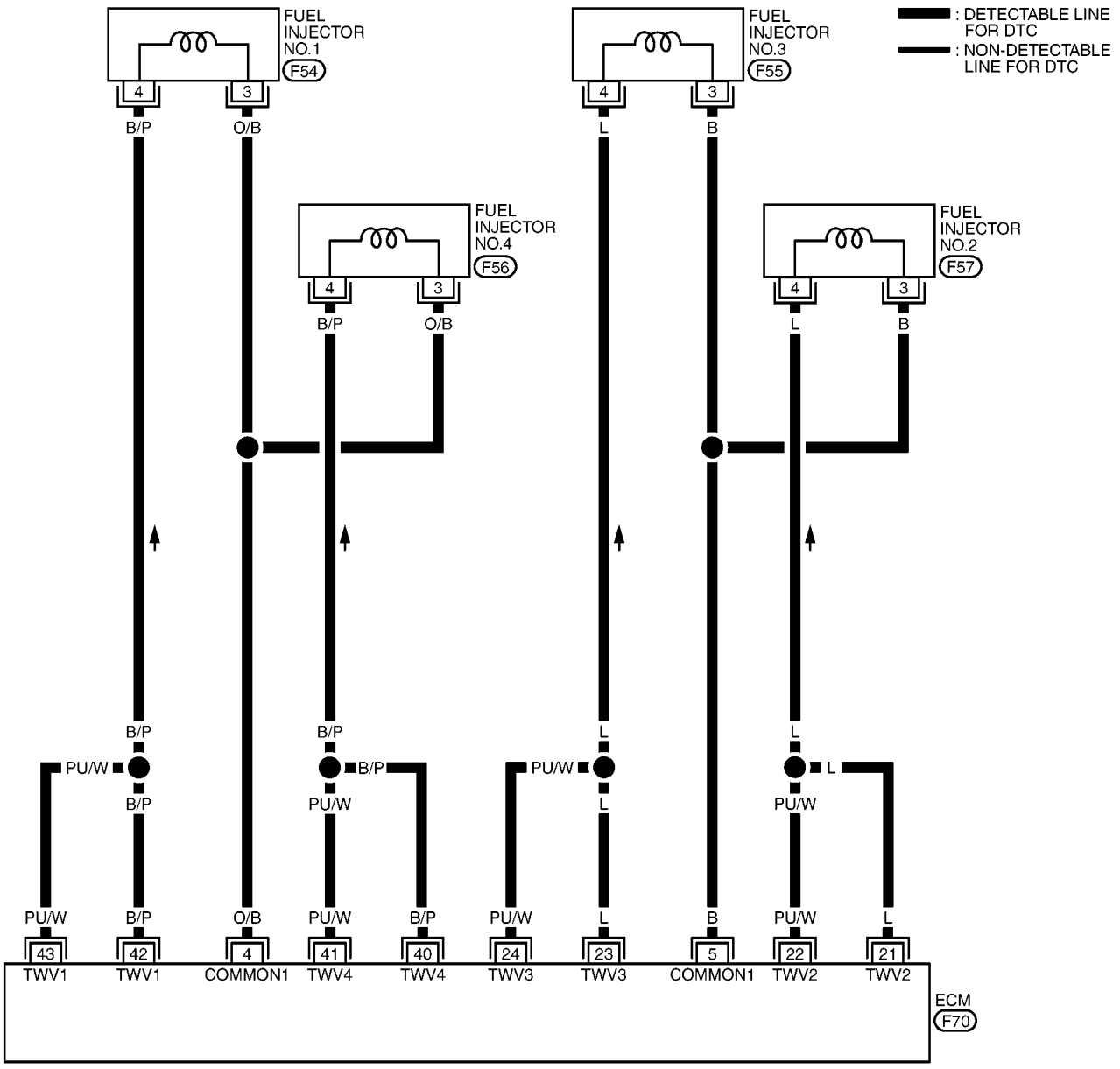
WITH GST

Follow the procedure “WITH CONSULT-II” above.

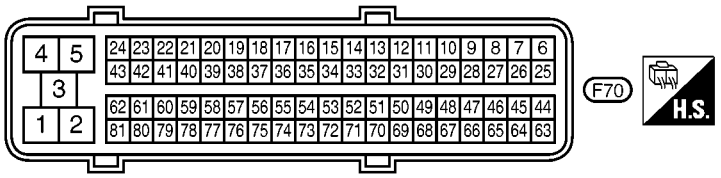
Wiring Diagram

EBS013HH

EC-INJECT-01







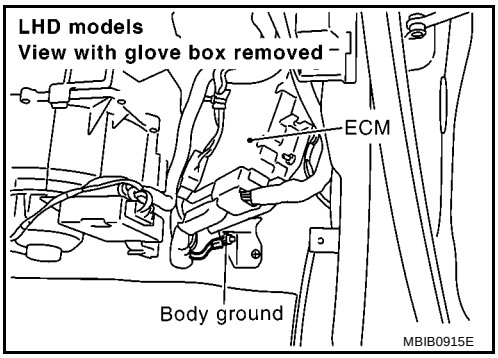
MBWA0633E

Diagnostic Procedure

EBS013HI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1010, "Ground Inspection" .

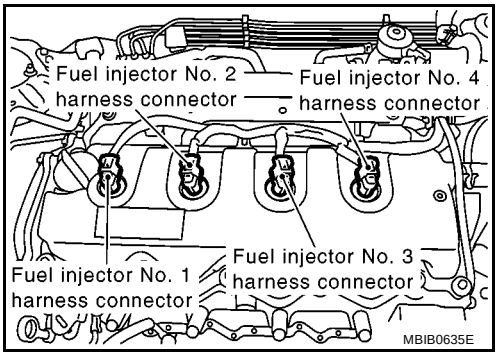


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Cylinder	Terminal		Continuity
	Fuel injector	ECM	
No.1	3	42, 43	Should not exist
		4	Should exist
	4	42,43	Should exist
		4	Should not exist
No.2	3	21, 22	Should not exist
		5	Should exist
	4	21, 22	Should exist
		5	Should not exist
No.3	3	23, 24	Should not exist
		5	Should exist
	4	23, 24	Should exist
		5	Should not exist
No.4	3	40, 41	Should not exist
		4	Should exist
	4	40, 41	Should exist
		4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FUEL INJECTOR

Refer to EC-1224, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

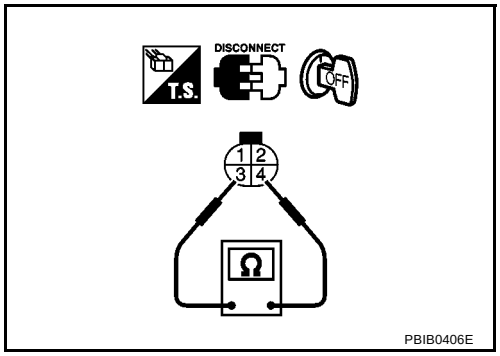
EBS013HJ

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS013HK

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

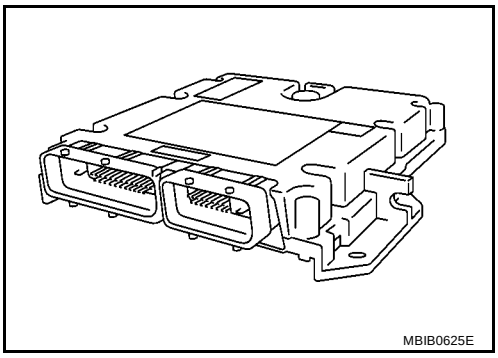
DTC P2228, P2229 BARO SENSOR

PFP:23731

Description

EBS013HL

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.


MBIB0625E

On Board Diagnosis Logic

EBS013HM

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	● ECM
P2229	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

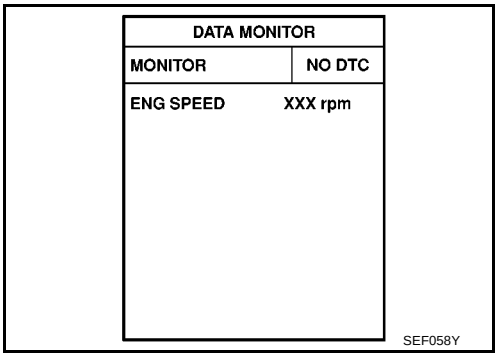
DTC Confirmation Procedure

EBS013HN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1226, "Diagnostic Procedure" .



SEF058Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

EBS013HO

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1225, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P2228 or P2229 displayed again?

With GST

1. Turn ignition switch ON.
2. Select MODE4 with GST.
3. Touch “ERASE”.
4. Perform EC-1225, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P2228 or P2229 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-962, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Valve Clearing. Refer to EC-956, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

GLOW CONTROL SYSTEM

PFP:25230

Description

EBS013HP

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Glow control	Glow lamp Glow relay Glow plugs
Engine coolant temperature sensor	Engine coolant temperature		

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When coolant temperature is lower than approximately 80°C (176°F):

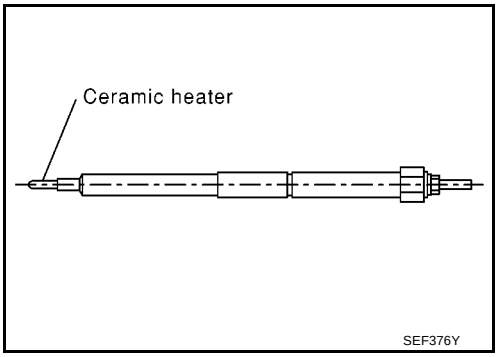
- Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
- Starting
  After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

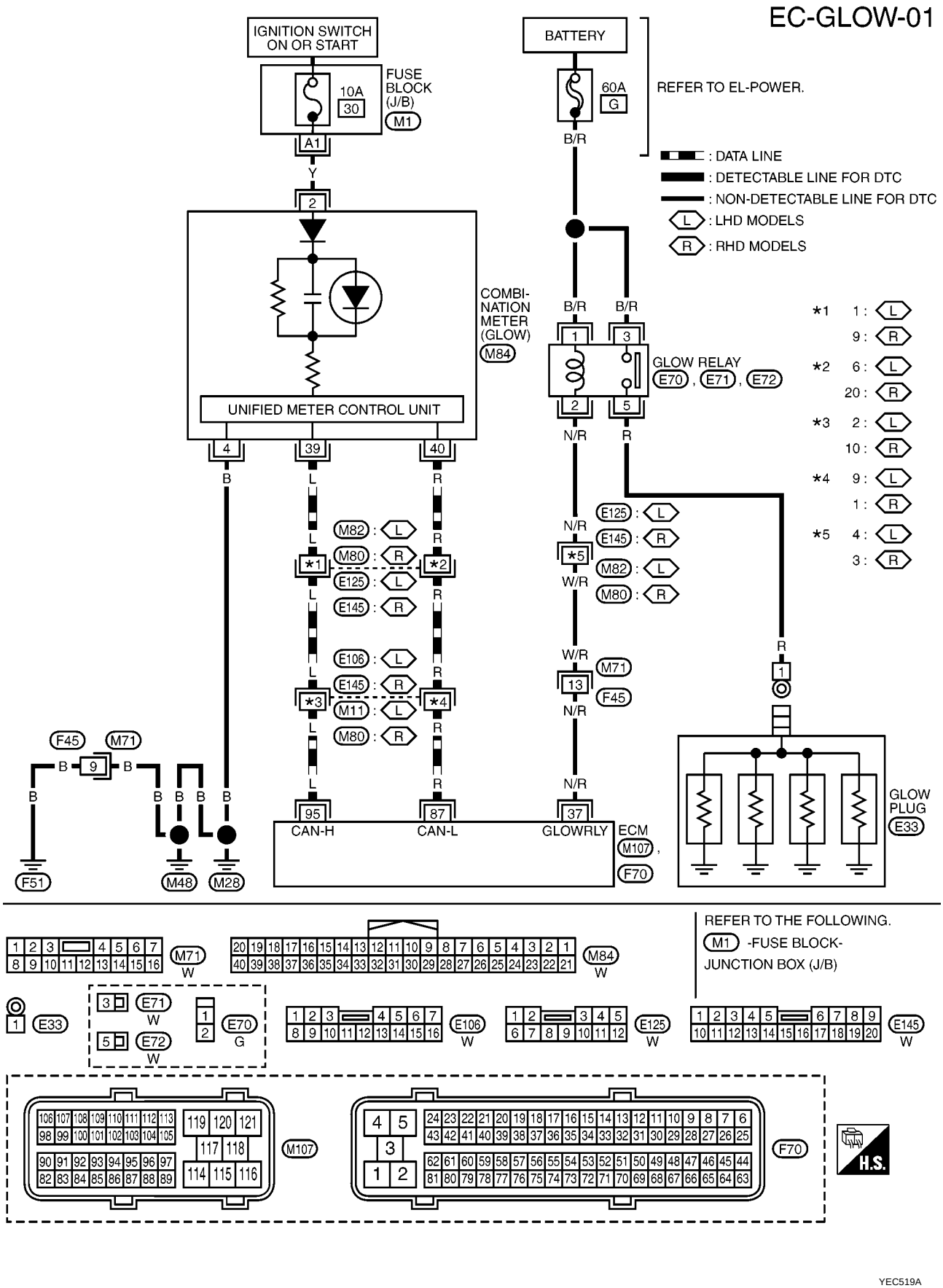
Glow Plug

The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.



Wiring Diagram

EBS013HQ



YEC519A

Diagnostic Procedure

EBS013HR

1. INSPECTION START

Check fuel level, fuel supplying system, starter motor, etc.

OK or NG

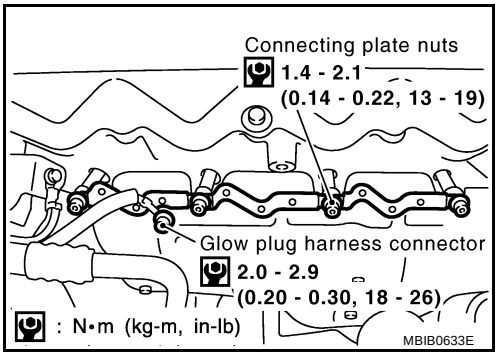
OK >> GO TO 2.
NG >> Correct.

2. CHECK INSTALLATION

Check that glow plug nut and all glow plug connecting plate nuts are installed properly.

OK or NG

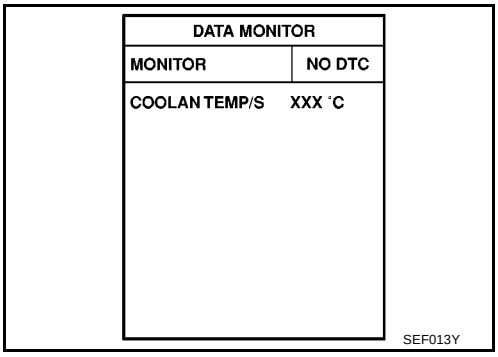
OK >> GO TO 3.
NG >> Install properly.



3. CHECK GLOW INDICATOR LAMP OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

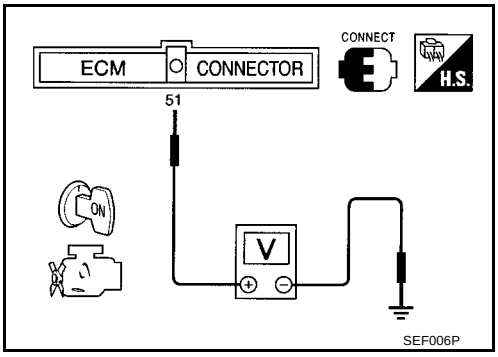


Without CONSULT-II

1. Turn ignition switch ON.
2. Confirm that the voltage between ECM terminal 51 (engine coolant temperature sensor signal) and ground is above 1.53V. If it is below 1.53V, cool down engine.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

OK or NG

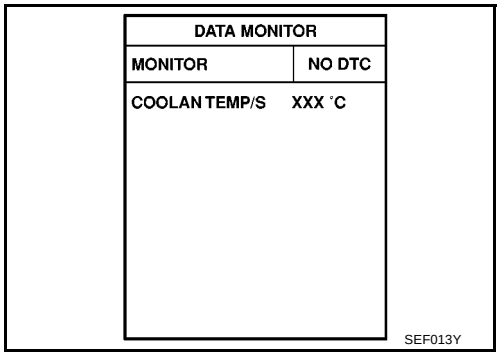
OK >> GO TO 4.
NG >> GO TO 5.



4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

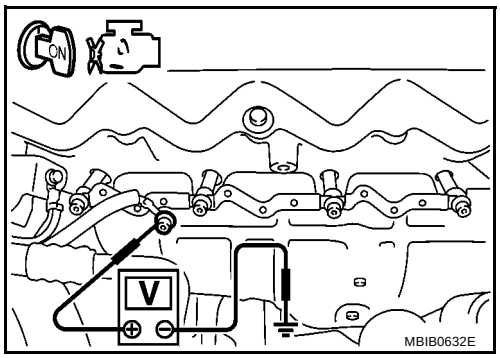
With CONSULT-II

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



6. Check the voltage between glow plug and engine body under the following conditions.

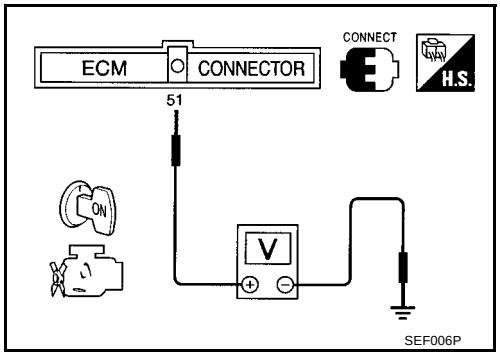
Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



Without CONSULT-II

1. Confirm that the voltage between ECM terminal 51 (engine coolant temperature sensor signal) and ground is above 3.62V. If it is below 3.62V, cool down engine.
2. Turn ignition switch OFF.
3. Set voltmeter probe between glow plug and engine body.
4. Turn ignition switch ON.
5. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

5. CHECK DTC

Check that DTC U1000 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, refer to EC-1011, "DTC U1000 CAN COMMUNICATION LINE" .
No >> GO TO 6.

6. CHECK COMBINATON METER OPERATION

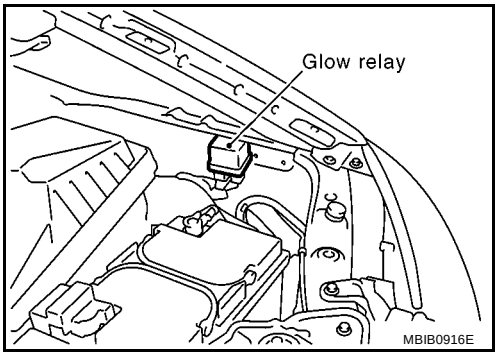
Does combination meter operate normally?

Yes or No

Yes >> GO TO 14.
No >> Check warning lamps circuit. Refer to EL-115, “WARNING LAMPS”.

7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.

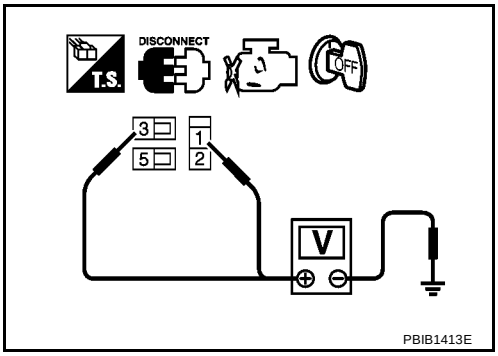


3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open or short between glow relay and battery

>> Repair harness or connectors.

9. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between glow relay and ECM

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

11. CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check harness continuity between glow relay terminal 5 and glow plug harness connector. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK GLOW RELAY

Refer to EC-1233, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace glow relay.

13. CHECK GLOW PLUG

Refer to EC-1233, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace glow plug.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

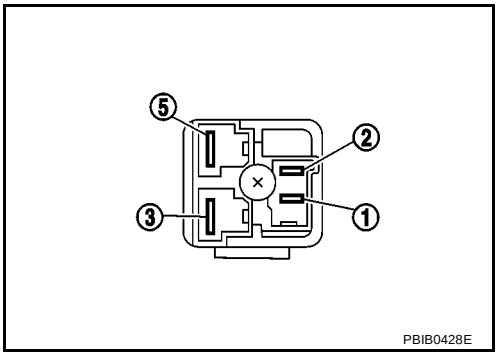
EBS013HS

GLOW RELAY

Check continuity between glow relay terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

Operation takes less than 1 second.



PBIB0428E

GLOW PLUG

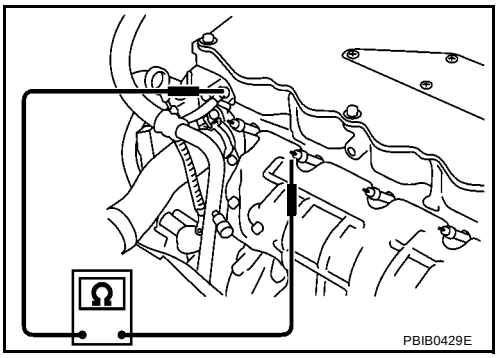
1. Remove glow plug connecting plate.
2. Check glow plug resistance.

Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

NOTE:

- **Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.**
- **If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.**
- **If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.**
- **Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.**

: 20.1 N-m (2.1 kg-m, 15 ft-lb)



PBIB0429E

Removal and Installation

EBS013HT

GLOW PLUG

Refer to EM-142, "GLOW PLUG" .

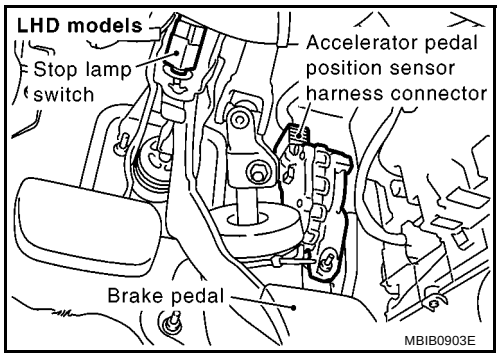
BRAKE SWITCH

PFP:25230

Description

EBS013HU

The stop lamp switch is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.



CONSULT-II Reference Value in Data Monitor Mode

EBS013HV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ECM Terminals and Reference Value

EBS013HW

Specification data are reference values and are measured between each terminal and ground.

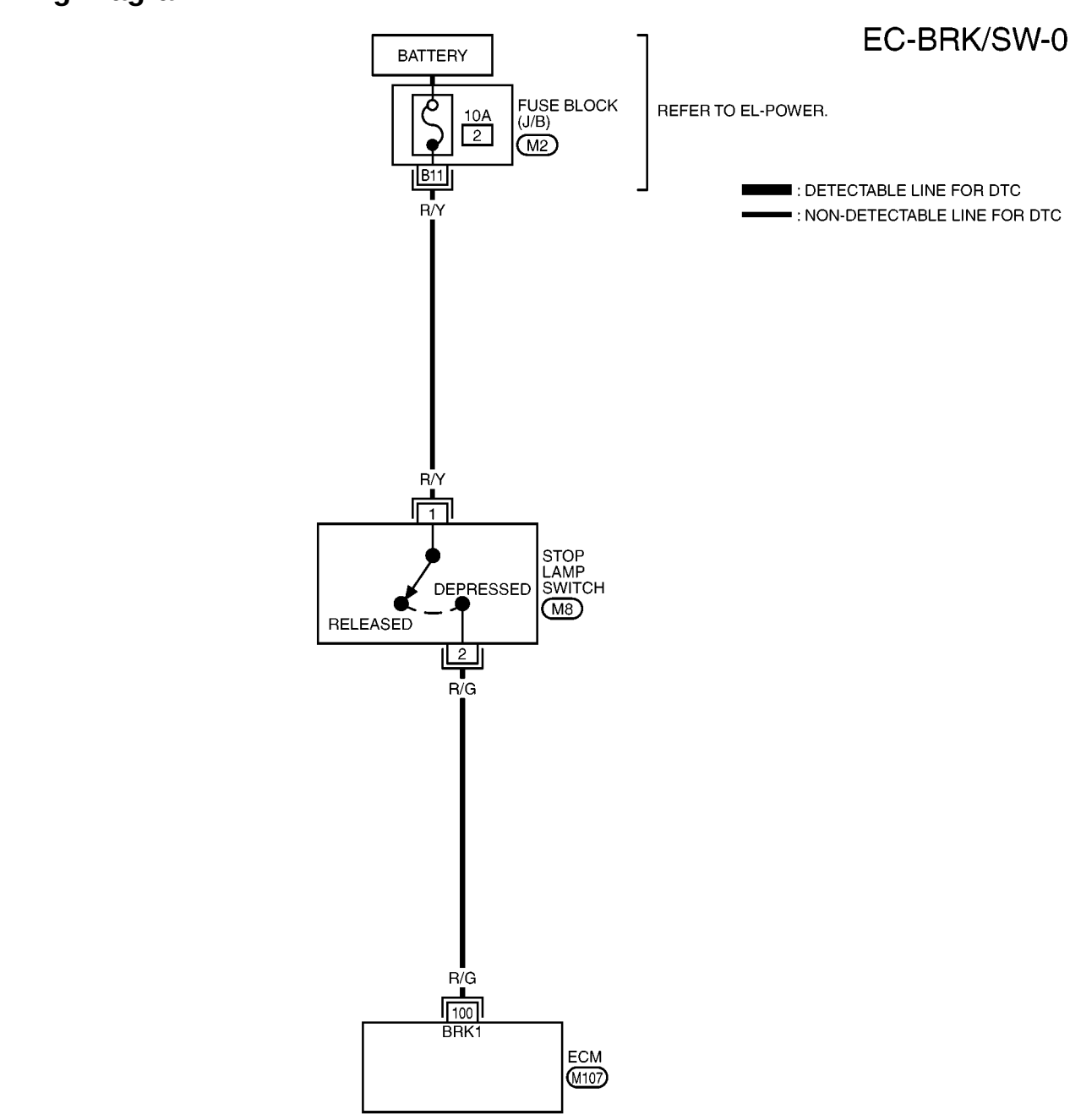
CAUTION:

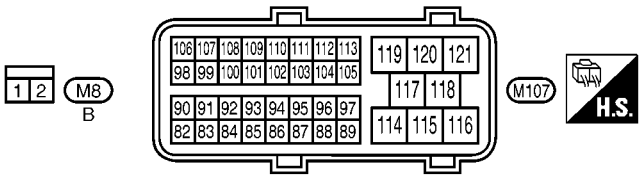
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	R/G	Stop lamp switch	**[Ignition switch ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS013HX





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC514A

Diagnostic Procedure

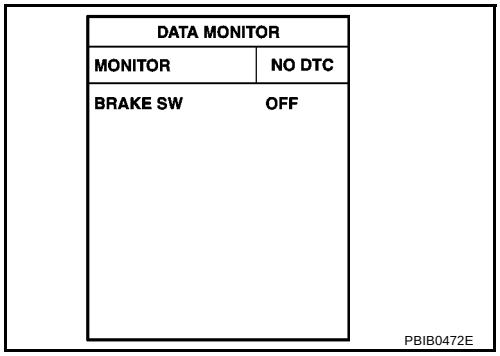
EBS013HY

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” signal under the following conditions.

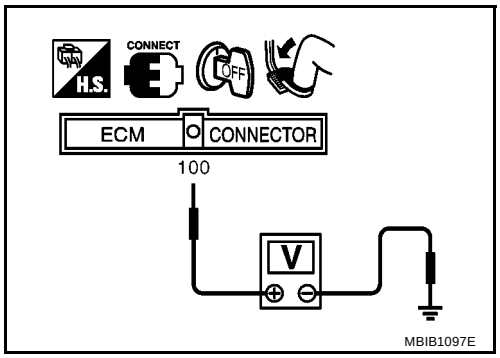
Conditions	BRAKE SW
Brake pedal released	OFF
Brake pedal slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 100 and ground under the following conditions.

Condition	Voltage
Brake pedal released	Approximately 0V
Brake pedal slightly depressed	Battery voltage

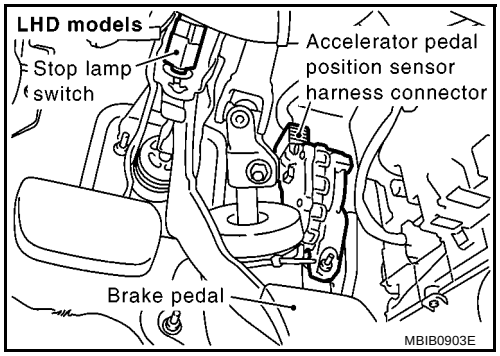


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

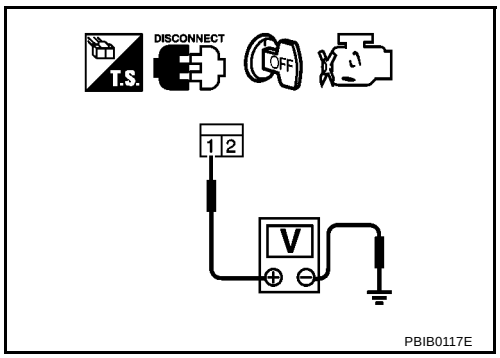
2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M2
- Harness for open and 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 harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> 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-1237, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

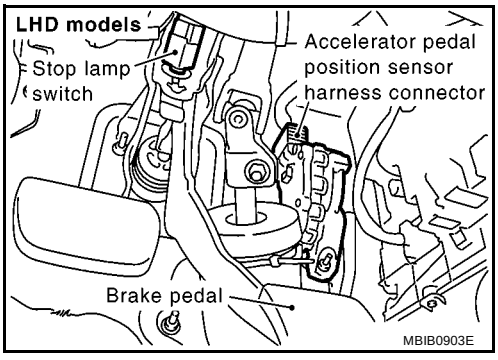
>> **INSPECTION END**

Component Inspection

EBS013HZ

STOP LAMP SWITCH

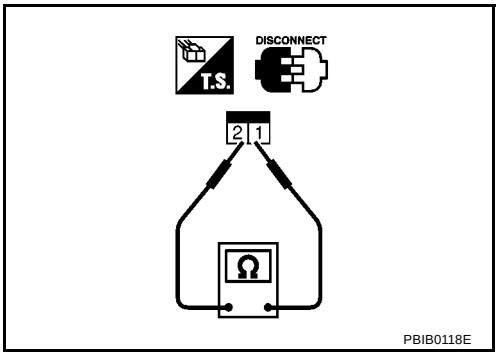
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to BR-14, “BRAKE PEDAL AND BRACKET”, and perform step 2 again.



PNP SWITCH

PFP:32006

Description

EBS013I0

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

EBS013I1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF

ECM Terminals and Reference Value

EBS013I2

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

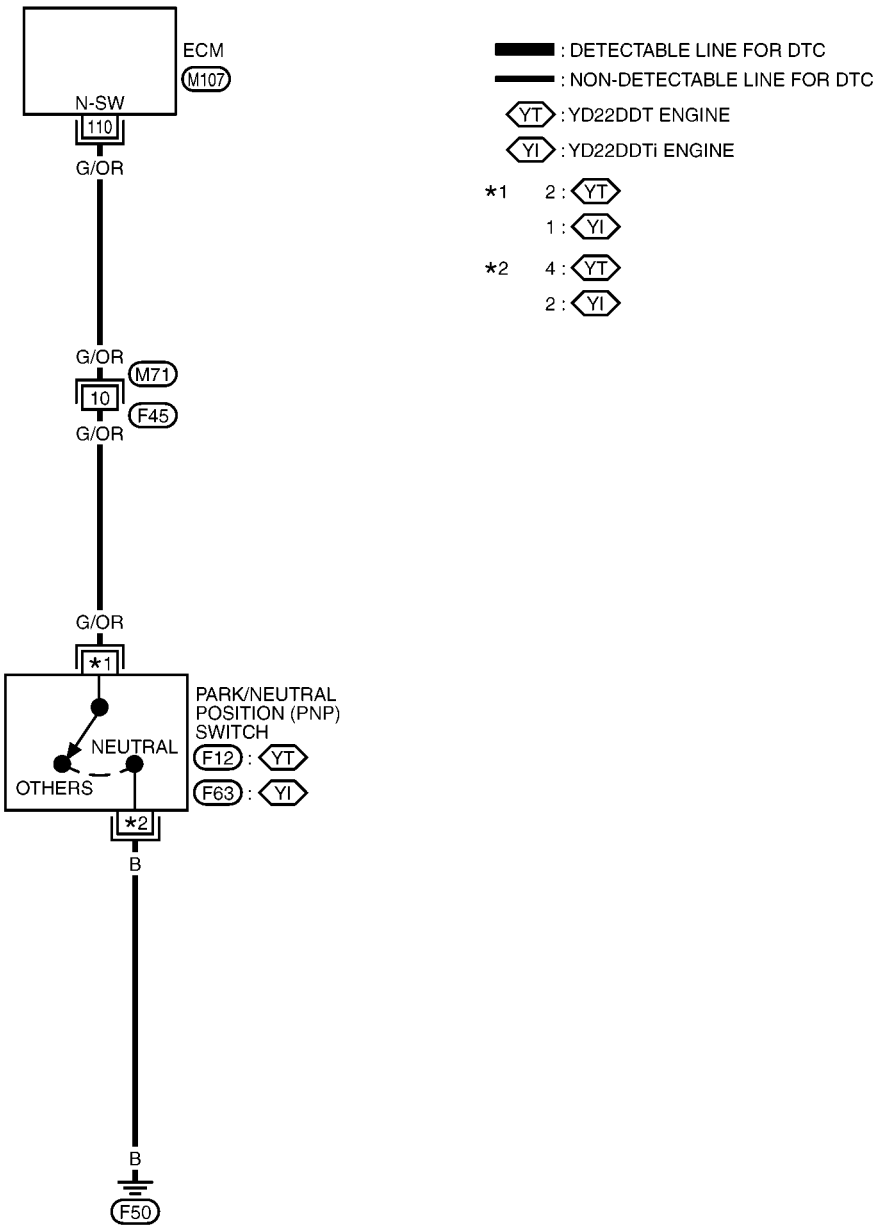
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

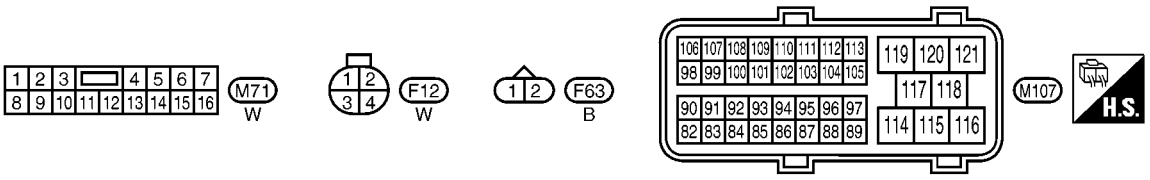
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Gear position is Neutral	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS013I3

EC-PNP/SW-01





YEC515A

Diagnostic Procedure

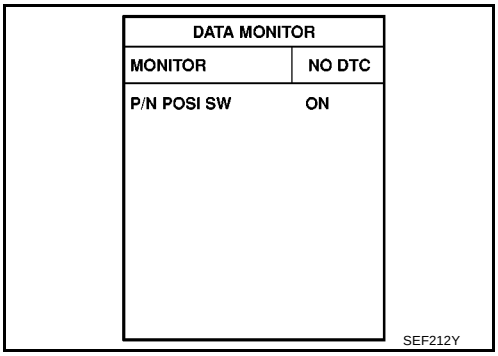
EBS013I4

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

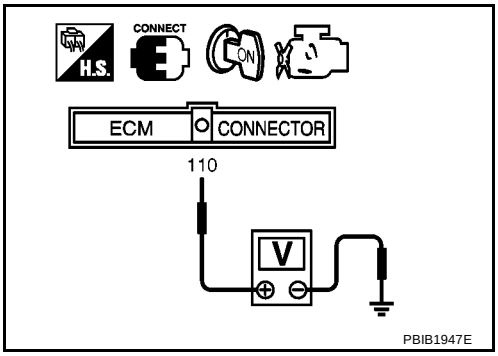
Shift lever position	P/N POSI SW
Neutral position	ON
Except the above position	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 110 and ground under the following conditions.

Shift lever position	Voltage
Neutral position	Approximately 0V
Except the above position	Battery voltage



OK or NG

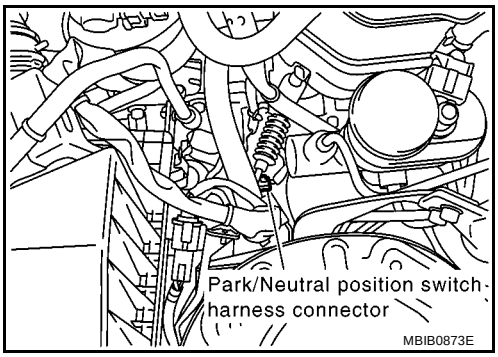
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 4 (YD22DDT engine models), 2 (YD22DDTi engine models) and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 2 (YD22DDT engine models), 1 (YD22DDTi engine models).
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between PNP switch and ECM

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

5. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to MT-12, "POSITION SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

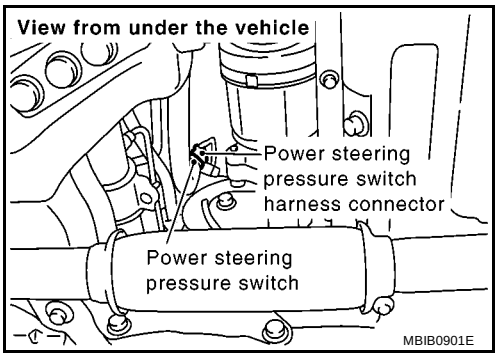
PSP SWITCH

PFP:49761

Component Description

EBS013I5

The power steering pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the fuel injector pulse width to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

EBS013I6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

ECM Terminals and Reference Value

EBS013I7

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

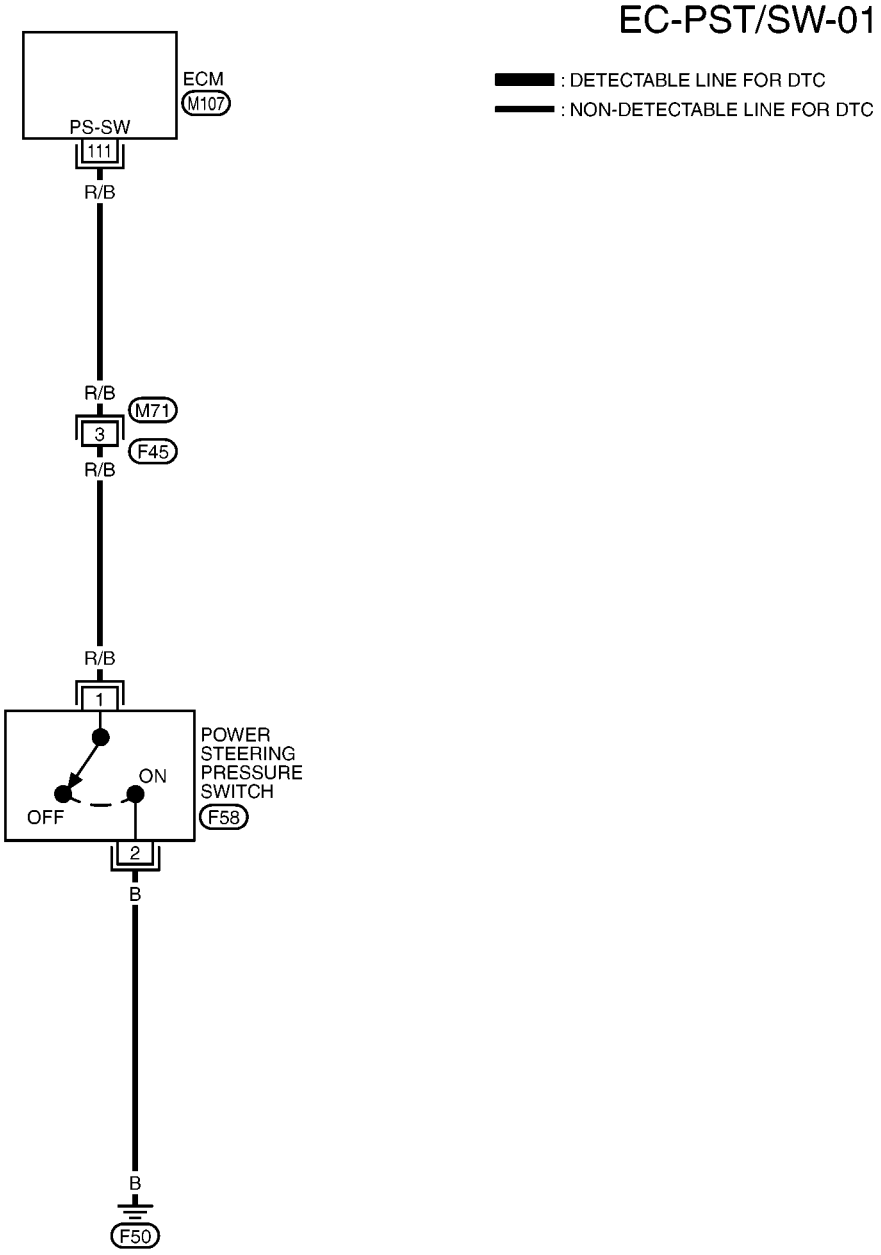
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

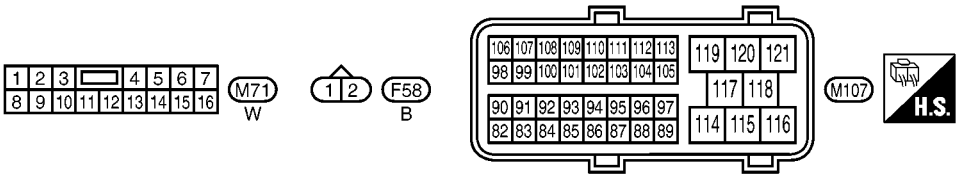
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	R/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS013I8

EC-PST/SW-01





YEC517A

Diagnostic Procedure

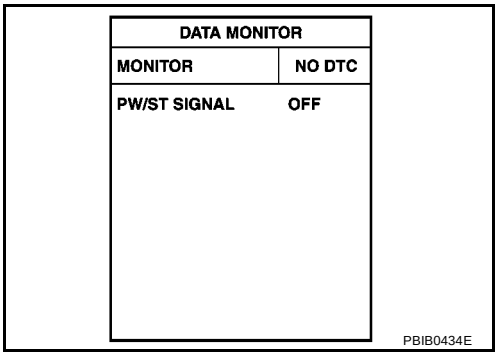
EBS013I9

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

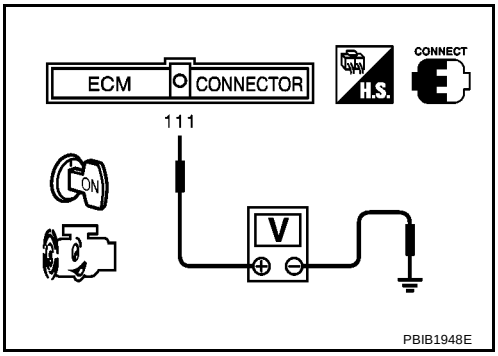
Conditions	PW/ST SIGNAL
Steering wheel is in neutral position	OFF
Steering wheel is turned	ON



Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 111 and ground under the following conditions.

Conditions	Voltage
Steering wheel is in neutral position	Battery voltage
Steering wheel is turned	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK POWER STEERING PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

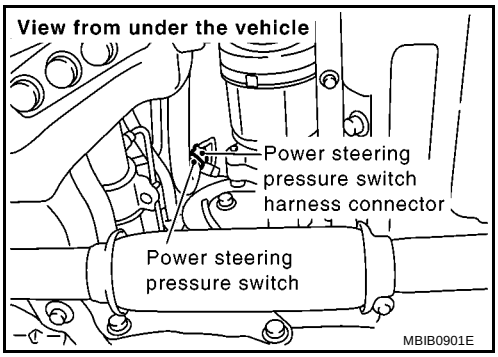
1. Turn ignition switch OFF.
2. Disconnect power steering pressure switch harness connector.
3. Check harness continuity between power steering pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.



3. CHECK POWER STEERING PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 111 and power steering pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open and short between power steering pressure switch and ECM

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

5. CHECK POWER STEERING PRESSURE SWITCH

Refer to EC-1246, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace power steering pressure switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

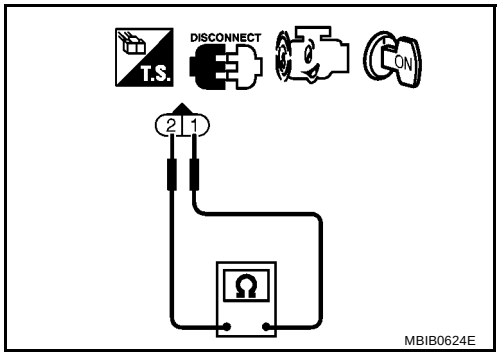
Component Inspection

EBS013IA

POWER STEERING PRESSURE SWITCH

1. Disconnect power steering pressure switch harness connector and then start engine.
2. Check continuity between power steering pressure switch terminal 1 and 2 under the following conditions.

Conditions	Continuity
Steering wheel is being fully turned.	Yes
Steering wheel is not being turned.	No



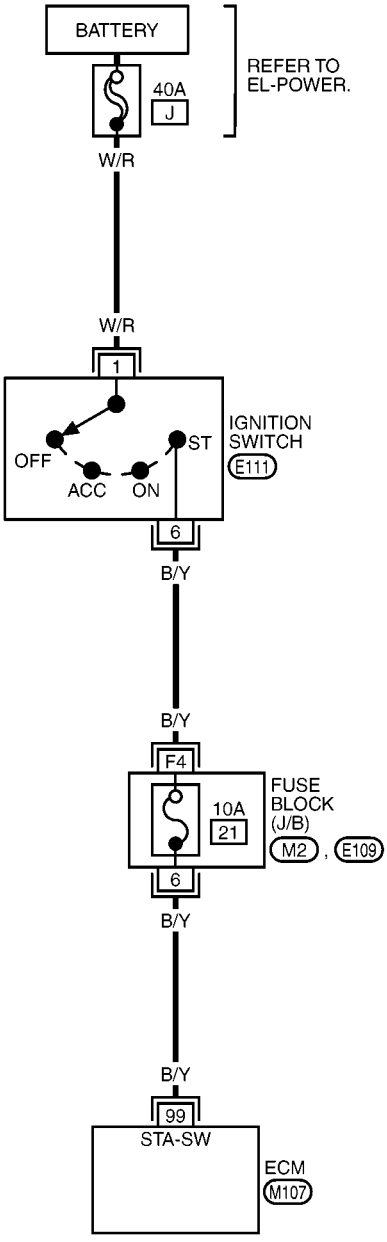
START SIGNAL

PFP:48750

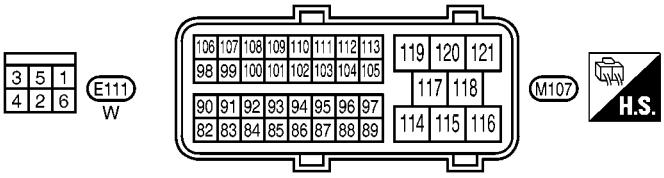
Wiring Diagram

EBS013II

EC-S/SIG-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
M2 , E109 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC516A

Diagnostic Procedure

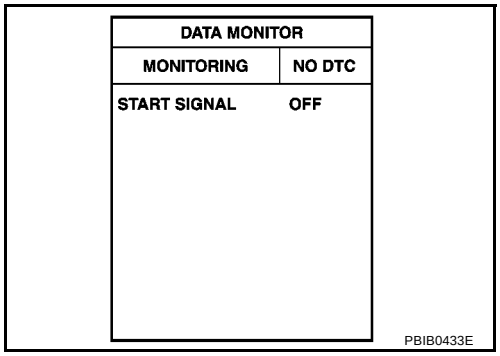
EBS013IJ

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

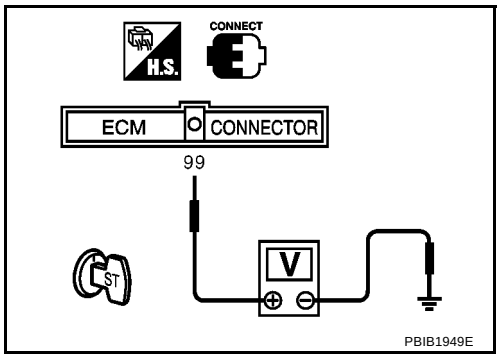
Condition	START SIGNAL
Ignition switch ON	OFF
Ignition switch START	ON



Without CONSULT-II

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Ignition switch ON	Approximately 0V
Ignition switch START	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connectors M2, E109
- Harness for open or short between ECM and ignition switch

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

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1002, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

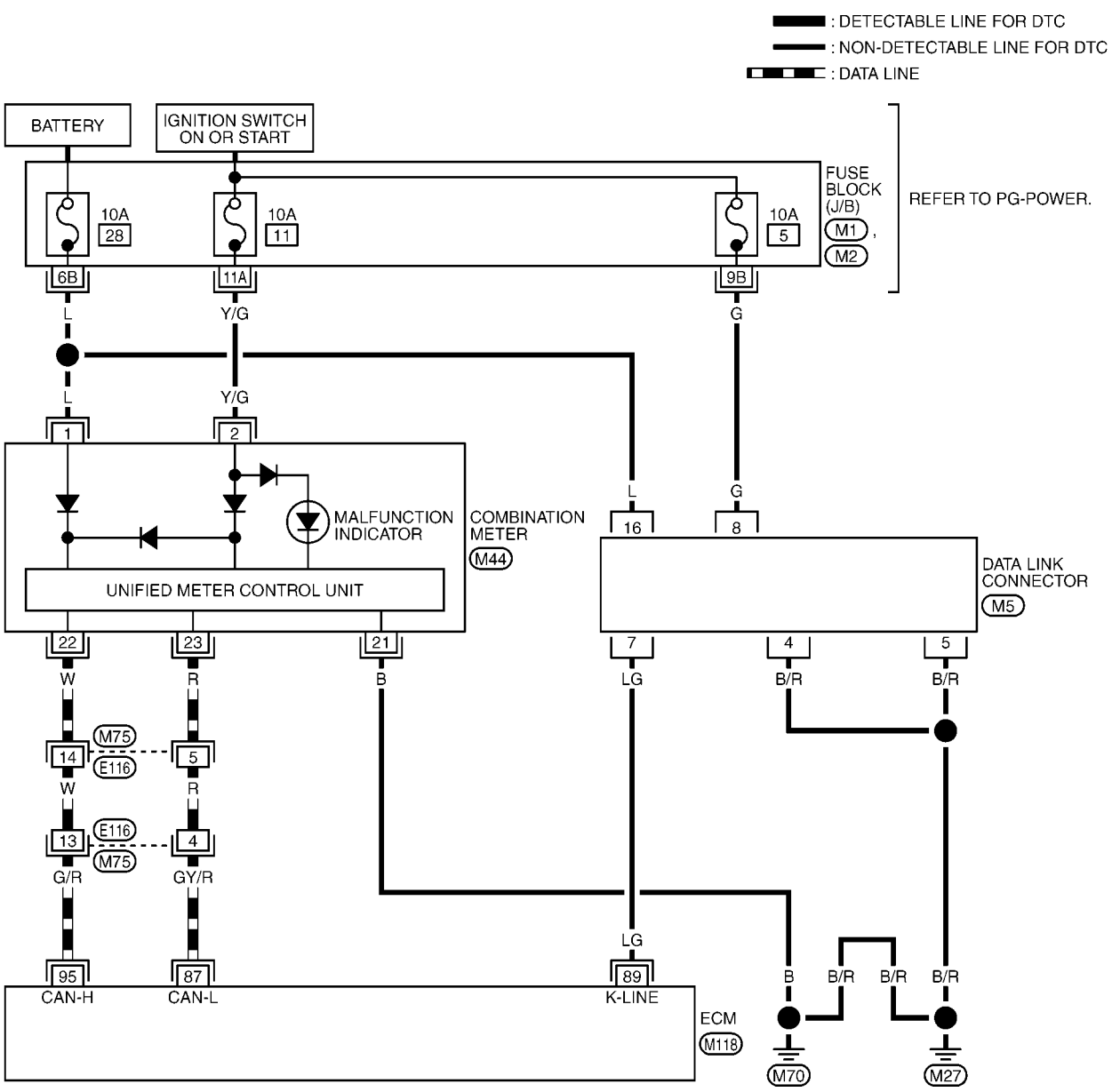
MI & DATA LINK CONNECTORS

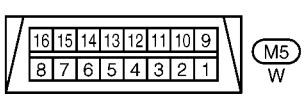
PFP:24814

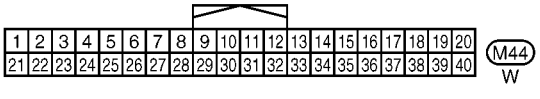
Wiring Diagram

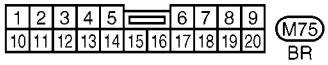
EBS013IK

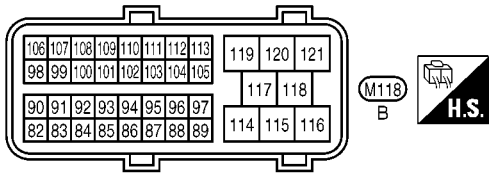
EC-MIL/DL-01











REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0585E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

General Specifications

EBS013IL

Engine	YD22DDT/YD22DDTi
Idle speed	725 ± 25 rpm
Maximum engine speed	4,900 rpm

Mass Air Flow Sensor

EBS013IM

Supply voltage	Battery voltage (11 - 14V)
Ignition switch ON (Engine stopped.)	Approx. 0.4V
Idle (Engine is warmed up to normal operating temperature.)	1.5 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.2 - 2.7V

Engine Coolant Temperature Sensor

EBS013IN

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Rail Pressure Sensor

EBS013IO

Supply voltage	Approximately 5V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3V

Glow Plug

EBS013IP

Resistance [at 25°C (77°F)] Ω	Approximately 0.8

EGR Volume Control Valve

EBS013IQ

Resistance [at 25°C (77°F)] Ω	13 - 17

Crankshaft Position Sensor

EBS013IR

Refer to EC-1110, "Component Inspection" .

Camshaft Position Sensor

EBS013IS

Refer to EC-1121, "Component Inspection" .

INDEX FOR DTC

PFP:00024

Alphabetical Index

EBS014S4

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-40, “IDENTIFICATION PLATE”.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	MI lighting up	Reference page
APP SEN 1/CIRCUIT	P0122	—	EC-1343
APP SEN 1/CIRCUIT	P0123	—	EC-1343
APP SEN 2/CIRCUIT	P0222	—	EC-1378
APP SEN 2/CIRCUIT	P0223	—	EC-1378
APP SENSOR	P2135	—	EC-1477
BARO SEN/CIRC	P2228	—	EC-1493
BARO SEN/CIRC	P2229	—	EC-1493
BATTERY VOLTAGE	P0563	—	EC-1419
CAN COMM CIRCUIT	U1000	—	EC-1318
CKP SEN/CIRCUIT	P0335	×	EC-1396
CKP SENSOR	P0336	×	EC-1401
CMP SEN/CIRCUIT	P0340	×	EC-1407
CMP SENSOR	P0341	×	EC-1413
CMP/CKP RELATION	P0016	—	EC-1321
CYL1 INJECTOR	P0201	—	EC-1358
CYL2 INJECTOR	P0202	—	EC-1358
CYL3 INJECTOR	P0203	—	EC-1358
CYL4 INJECTOR	P0204	—	EC-1358
ECM	P0605	×	EC-1421
ECM	P0606	×	EC-1423
ECM RELAY	P0686	—	EC-1440
ECT SEN/CIRCUIT	P0117	—	EC-1339
ECT SEN/CIRCUIT	P0118	—	EC-1339
ENG OVER TEMP	P0217	×	EC-1364
FRP RELIEF VALVE	P1272	—	EC-1456
FRP SEN/CIRC	P0192	—	EC-1352
FRP SEN/CIRC	P0193	—	EC-1352
FUEL LEAK	P0093	×	EC-1327
FUEL PUMP	P0089	—	EC-1325
FUEL PUMP	P1273	—	EC-1462
FUEL PUMP	P1274	×	EC-1467
FUEL PUMP	P1275	×	EC-1472
FUEL PUMP/CIRC	P0628	×	EC-1425
FUEL PUMP/CIRC	P0629	×	EC-1425
FUEL TEMP SEN/CIRC	P0182	—	EC-1348
FUEL TEMP SEN/CIRC	P0183	—	EC-1348
HIGH FUEL PRESS	P0088	×	EC-1323

Items (CONSULT-II screen terms)	DTC*1	MI lighting up	Reference page
IAT SEN/CIRCUIT	P0112	—	EC-1335
IAT SEN/CIRCUIT	P0113	—	EC-1335
INJ ADJ RES/CIRC1	P1260	—	EC-1445
INJ ADJ RES/CIRC1	P1261	—	EC-1445
INJ ADJ RES/CIRC2	P1262	—	EC-1445
INJ ADJ RES/CIRC2	P1263	—	EC-1445
INJ ADJ RES/CIRC3	P1264	—	EC-1445
INJ ADJ RES/CIRC3	P1265	—	EC-1445
INJ ADJ RES/CIRC4	P1266	—	EC-1445
INJ ADJ RES/CIRC4	P1267	—	EC-1445
INJ PWR/CIRC	P2146	×	EC-1482
INJ PWR/CIRC	P2149	×	EC-1482
INJECTOR	P0200	×	EC-1357
INJECTOR/CIRC	P2147	×	EC-1487
INJECTOR/CIRC	P2148	×	EC-1487
INJECTOR 1	P1268	—	EC-1450
INJECTOR 2	P1269	—	EC-1450
INJECTOR 3	P1270	—	EC-1450
INJECTOR 4	P1271	—	EC-1450
MAF SEN/CIRCUIT	P0102	—	EC-1330
MAF SEN/CIRCUIT	P0103	—	EC-1330
NATS MALFUNCTION	P1610 - P1617	—	EC-1273
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—
SENSOR PWR/CIRC1	P0642	—	EC-1430
SENSOR PWR/CIRC1	P0643	—	EC-1430
SENSOR PWR/CIRC2	P0652	—	EC-1435
SENSOR PWR/CIRC2	P0653	—	EC-1435
TC BOOST SEN/CIRC*2	P0237	—	EC-1391
TC BOOST SEN/CIRC*2	P0238	—	EC-1391
TC SYSTEM	P0234	—	EC-1383
TCS/CIRC	P1212	—	EC-1444
TCS C/U FUNCTN	P1211	—	EC-1443

*1: This number is prescribed by ISO 15031-6.
*2: For YD22DDTi engine models

DTC No. Index

EBS014S5

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-40, “IDENTIFICATION PLATE”.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

DTC*1	Items (CONSULT-II screen terms)	MI lighting up	Reference page
U1000	CAN COMM CIRCUIT	—	EC-1318
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—
P0016	CMP/CKP RELATION	—	EC-1321
P0088	HIGH FUEL PRESS	×	EC-1323
P0089	FUEL PUMP	—	EC-1325
P0093	FUEL LEAK	×	EC-1327
P0102	MAF SEN/CIRCUIT	—	EC-1330
P0103	MAF SEN/CIRCUIT	—	EC-1330
P0112	IAT SEN/CIRCUIT	—	EC-1335
P0113	IAT SEN/CIRCUIT	—	EC-1335
P0117	ECT SEN/CIRCUIT	—	EC-1339
P0118	ECT SEN/CIRCUIT	—	EC-1339
P0122	APP SEN 1/CIRCUIT	—	EC-1343
P0123	APP SEN 1/CIRCUIT	—	EC-1343
P0182	FUEL TEMP SEN/CIRC	—	EC-1348
P0183	FUEL TEMP SEN/CIRC	—	EC-1348
P0192	FRP SEN/CIRC	—	EC-1352
P0193	FRP SEN/CIRC	—	EC-1352
P0200	INJECTOR	×	EC-1357
P0201	CYL1 INJECTOR	—	EC-1358
P0202	CYL2 INJECTOR	—	EC-1358
P0203	CYL3 INJECTOR	—	EC-1358
P0204	CYL4 INJECTOR	—	EC-1358
P0217	ENG OVER TEMP	×	EC-1364
P0222	APP SEN 2/CIRCUIT	—	EC-1378
P0223	APP SEN 2/CIRCUIT	—	EC-1378
P0234	TC SYSTEM	—	EC-1383
P0237*2	TC BOOST SEN/CIRC	—	EC-1391
P0238*2	TC BOOST SEN/CIRC	—	EC-1391
P0335	CKP SEN/CIRCUIT	×	EC-1396
P0336	CKP SENSOR	×	EC-1401
P0340	CMP SEN/CIRCUIT	×	EC-1407
P0341	CMP SENSOR	×	EC-1413
P0563	BATTERY VOLTAGE	—	EC-1419
P0605	ECM	×	EC-1421
P0606	ECM	×	EC-1423

DTC*1	Items (CONSULT-II screen terms)	MI lighting up	Reference page
P0628	FUEL PUMP/CIRC	×	EC-1425
P0629	FUEL PUMP/CIRC	×	EC-1425
P0642	SENSOR PWR/CIRC1	—	EC-1430
P0643	SENSOR PWR/CIRC1	—	EC-1430
P0652	SENSOR PWR/CIRC2	—	EC-1435
P0653	SENSOR PWR/CIRC2	—	EC-1435
P0686	ECM RELAY	—	EC-1440
P1211	TCS C/U FUNCTN	—	EC-1443
P1212	TCS/CIRC	—	EC-1444
P1260	INJ ADJ RES/CIRC1	—	EC-1445
P1261	INJ ADJ RES/CIRC1	—	EC-1445
P1262	INJ ADJ RES/CIRC2	—	EC-1445
P1263	INJ ADJ RES/CIRC2	—	EC-1445
P1264	INJ ADJ RES/CIRC3	—	EC-1445
P1265	INJ ADJ RES/CIRC3	—	EC-1445
P1266	INJ ADJ RES/CIRC4	—	EC-1445
P1267	INJ ADJ RES/CIRC4	—	EC-1445
P1268	INJECTOR 1	—	EC-1450
P1269	INJECTOR 2	—	EC-1450
P1270	INJECTOR 3	—	EC-1450
P1271	INJECTOR 4	—	EC-1450
P1272	FRP RELIEF VALVE	—	EC-1456
P1273	FUEL PUMP	—	EC-1462
P1274	FUEL PUMP	×	EC-1467
P1275	FUEL PUMP	×	EC-1472
P1610 - P1617	NATS MALFUNTION	—	EC-1273
P2135	APP SENSOR	—	EC-1477
P2146	INJ PWR/CIRC	×	EC-1482
P2147	INJECTOR/CIRC	×	EC-1487
P2148	INJECTOR/CIRC	×	EC-1487
P2149	INJ PWR/CIRC	×	EC-1482
P2228	BARO SEN/CIRC	—	EC-1493
P2229	BARO SEN/CIRC	—	EC-1493

*1: This number is prescribed by ISO 15031-6.
*2: For YD22DDTi engine models

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS014S6

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. Information necessary to service the system safely is included in the SRS 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 SRS 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.**

On Board Diagnostic (OBD) System of Engine

EBS014S7

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.

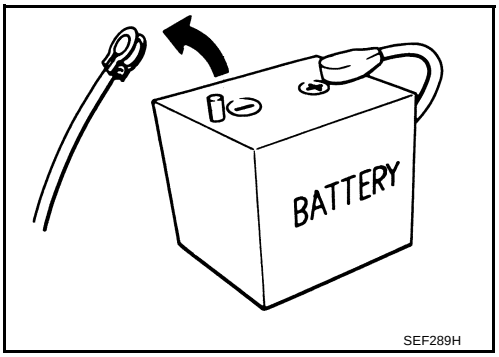
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground 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 EL-7, “HARNESS CONNECTOR”.**
- **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.**

Precautions

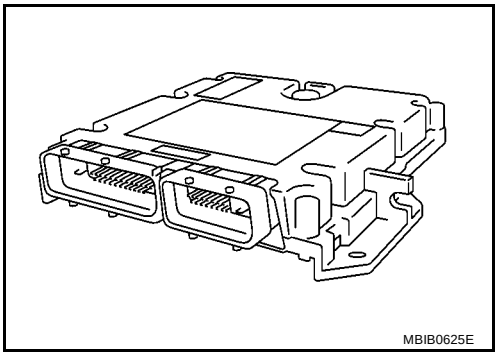
EBS014S8

- **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 battery ground 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.**

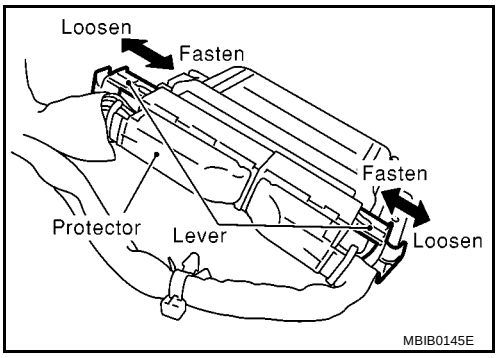


SEF289H

- **Do not disassemble ECM.**

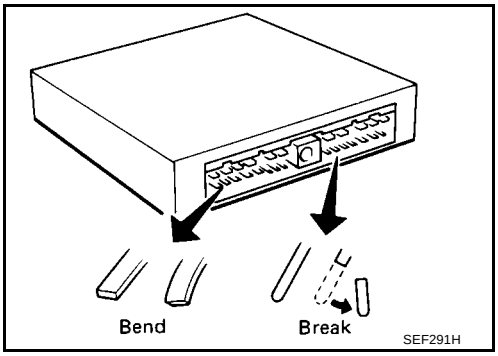

MBIB0625E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



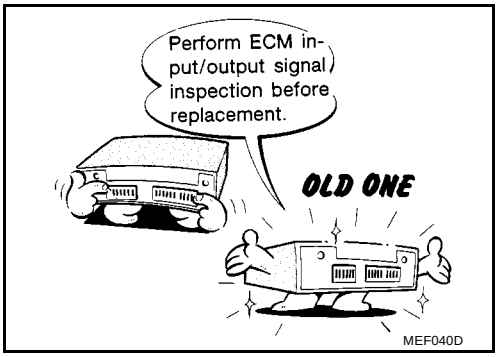
MBIB0145E

- **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.**



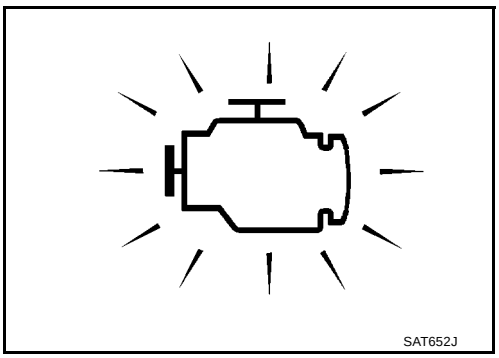
SEF291H

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1293, "ECM Terminals And Reference Value" .**
- **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.**

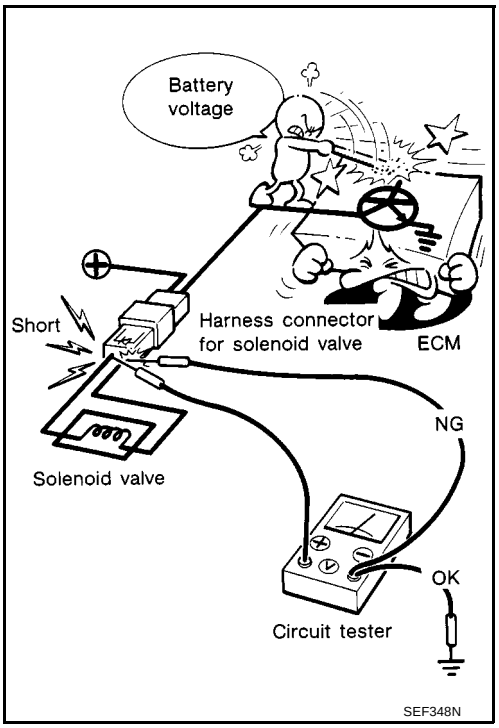


MEF040D

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

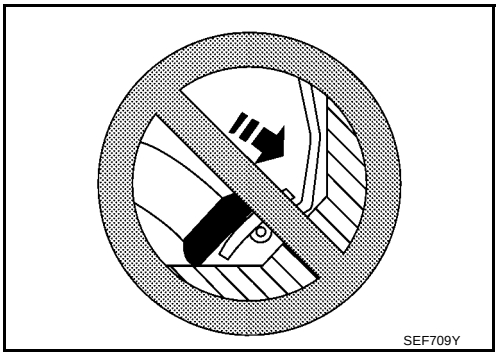

SAT652J

- **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.

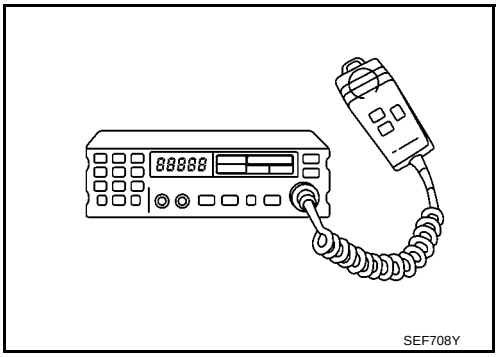


SEF348N

- **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.**


SEF709Y

- **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.**



SEF708Y

Wiring Diagrams and Trouble Diagnosis

EBS014S9

When you read Wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAM”
- EL-11, “POWER SUPPLY ROUTING” for power distribution circuit

When you perform trouble diagnosis, refer to the following:

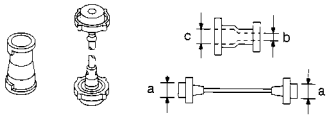
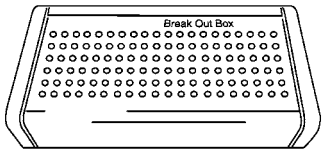
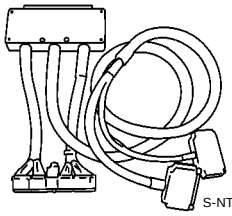
- GI-32, “How to Follow Test Groups in Trouble Diagnoses”
- GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”

PREPARATION

PFP:00002

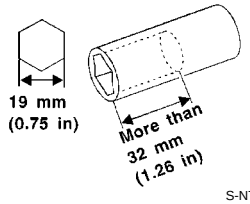
Special Service Tools

EBS014SA

Tool number Tool name	Description	
EG17650301 Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

EBS014SB

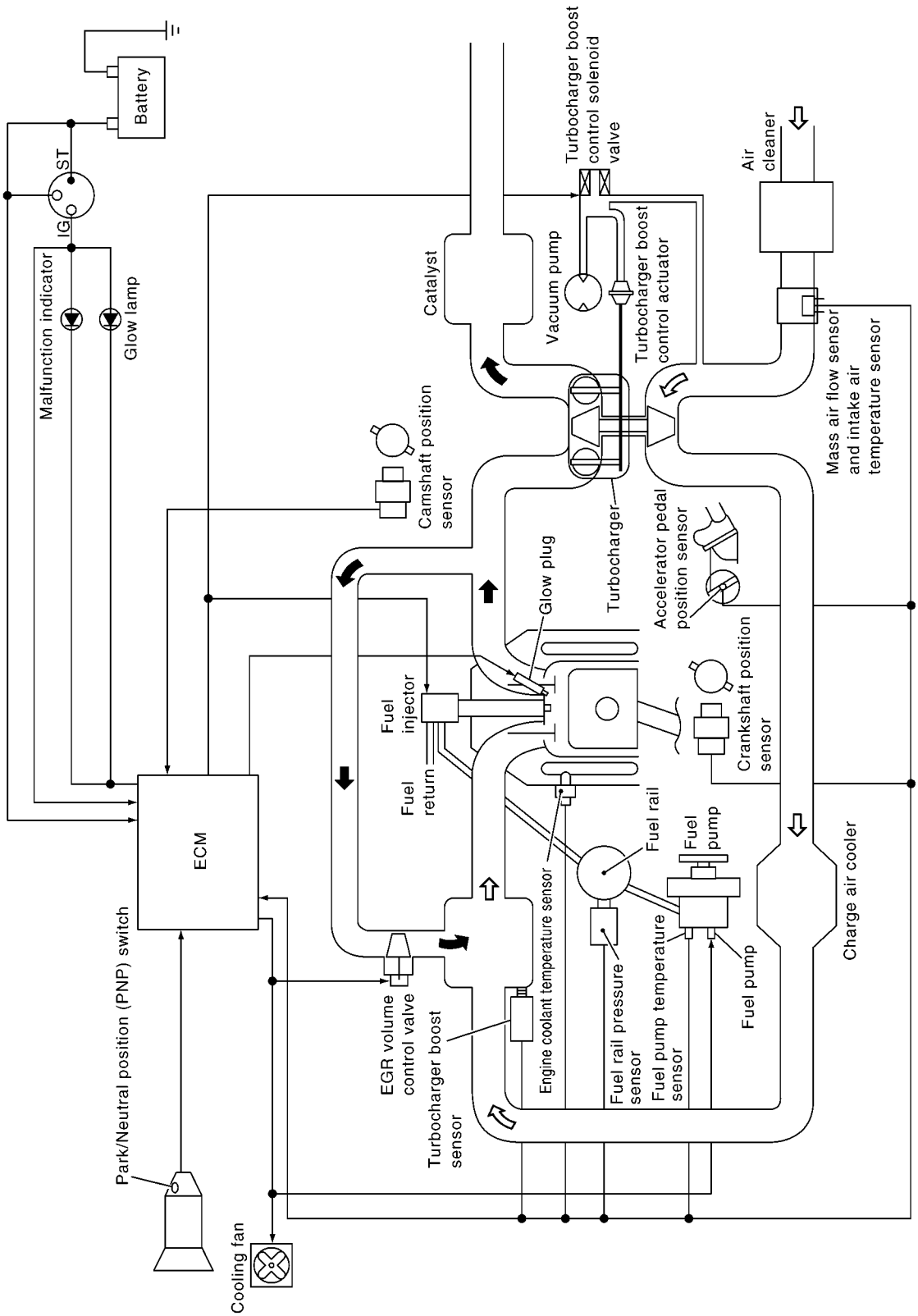
Tool name	Description	
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram(YD22DDTi Engine Models)

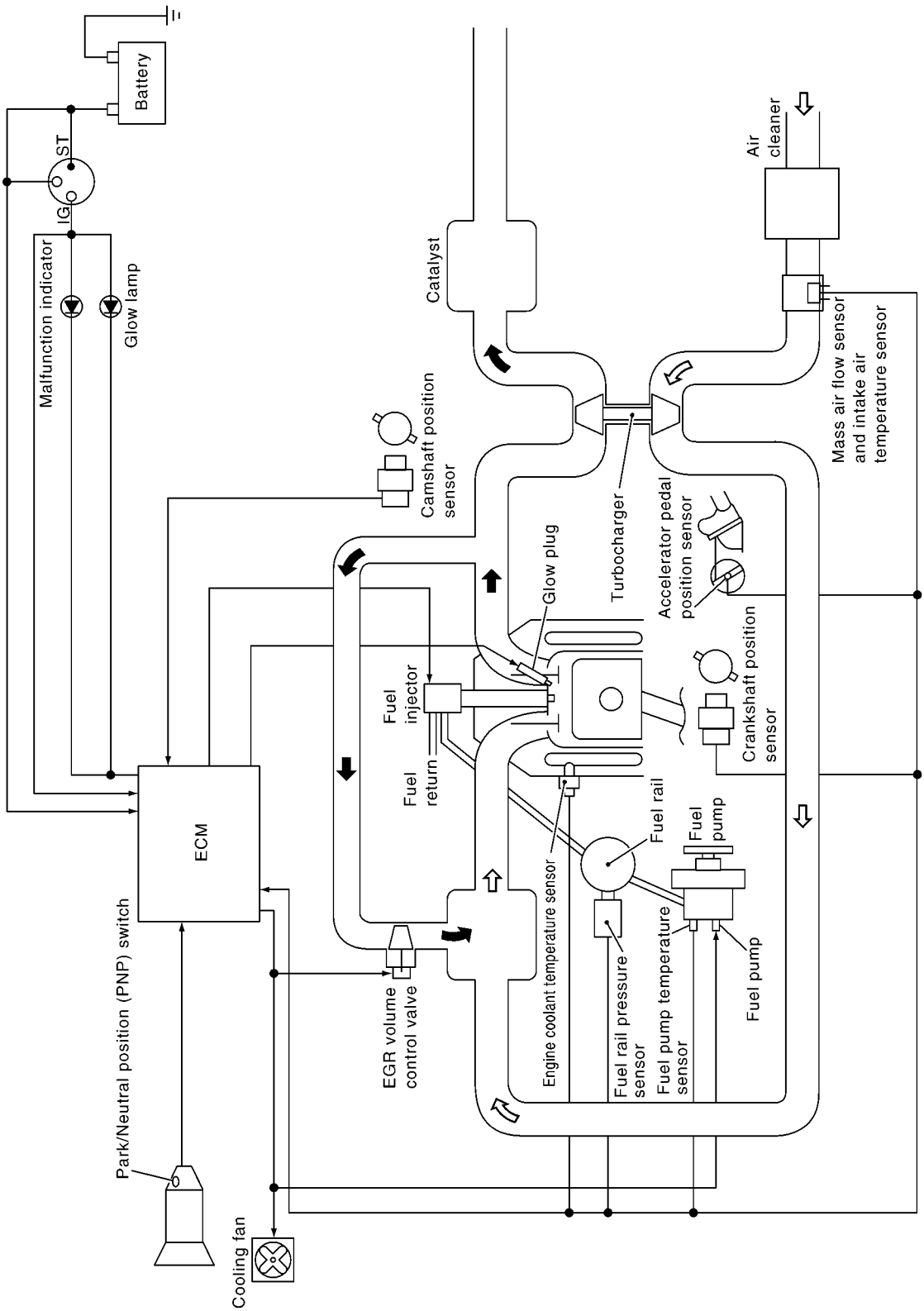
EBS014SC



MBIB0608E

System Diagram(YD22DDT Engine Models)

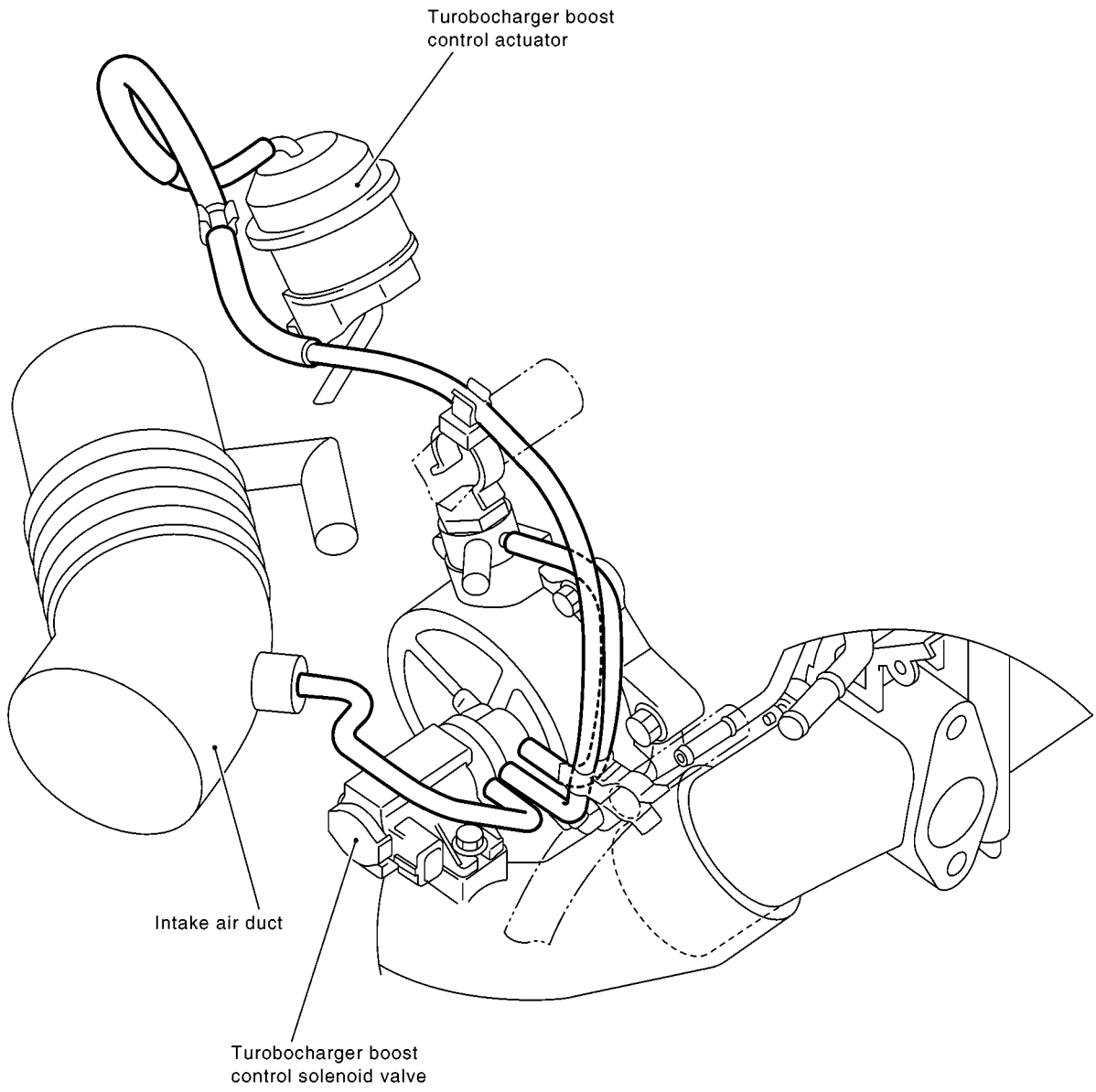
EBS016LI



MBIB0620E

Vacuum Hose Drawing(YD22DDTi Engine Models)

EBS014SD



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

MBIB0609E

Refer to EC-1261, "System Diagram(YD22DDTi Engine Models)" for Vacuum Control System.

System Chart

EBS014SE

Input (Sensor)	ECM Function	Output (Actuator)
● Accelerator pedal position sensor ● Fuel rail pressure sensor ● Fuel pump temperature sensor ● Engine coolant temperature sensor ● Mass air flow sensor ● Intake air temperature sensor ● Crankshaft position sensor ● Camshaft position sensor ● Turbocharger boost sensor*3 ● Vehicle speed sensor*1 ● ESP/TCS/ABS control unit*1 ● Ignition switch ● Stop lamp switch ● Air conditioner switch*1 ● Park/neutral position switch ● Battery voltage ● Power steering pressure switch	Fuel injection control	Fuel injector and Fuel pump
	Fuel injection timing control	Fuel injector and Fuel pump
	Fuel cut control	Fuel injector and Fuel pump
	Glow control system	Glow relay and glow indicator lamp*2
	On board diagnostic system	Malfunction indicator (MI)*2
	EGR volume control	EGR volume control valve
	Cooling fan control	Cooling fan relay*2
	Turbocharger boost control*3	Turbocharger boost control solenoid valve*3
	Air conditioning cut control	Air conditioner relay*2

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.
*3: For YD22DDTi engine models

Fuel Injection Control System

EBS014SF

SYSTEM DESCRIPTION

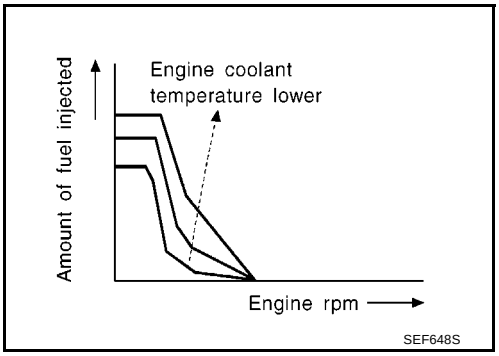
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.
Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (start control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Piston position		
Ignition switch	Start signal		
Fuel rail pressure sensor	Fuel rail pressure		

When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.
For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.



IDLE CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (Idle control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Battery	Battery voltage		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Vehicle speed sensor*	Vehicle speed		
Air conditioner switch*	Air conditioner signal		

*: The input signal is sent to the ECM through CAN communication line.

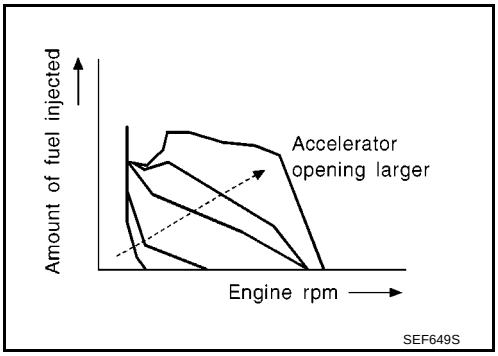
When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Accelerator pedal position sensor	Accelerator position		
Fuel rail pressure sensor	Fuel rail pressure		

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM.
The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.



MAXIMUM AMOUNT CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection control (Maximum amount control)	Fuel Injector
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor	Engine speed		
Accelerator pedal position sensor	Accelerator pedal position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions.
This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection control (Deceleration control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

EBS014SG

DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

Air Conditioning Cut Control

EBS014SH

INPUT / OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay*2
Accelerator pedal position sensor	Accelerator pedal opening angle		
Vehicle speed sensor*1	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.
When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (At No Load & High Engine Speed)

EBS014SI

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor*	Vehicle speed	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor	Engine speed		

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 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.

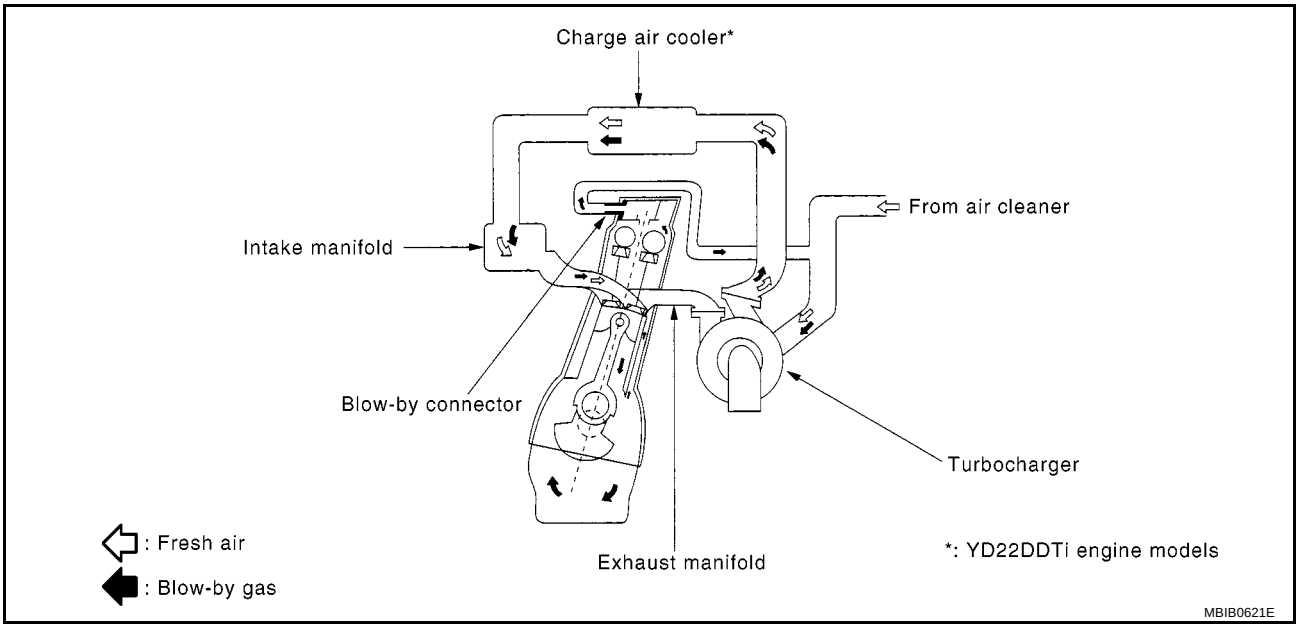
NOTE:
This function is different from deceleration control listed under EC-1264, "Fuel Injection Control System" .

Crankcase Ventilation System

EBS014SJ

DESCRIPTION

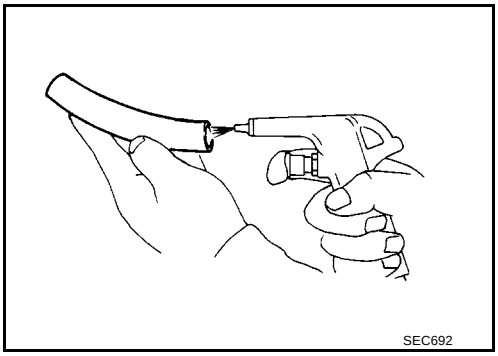
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



INSPECTION

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



CAN Communication

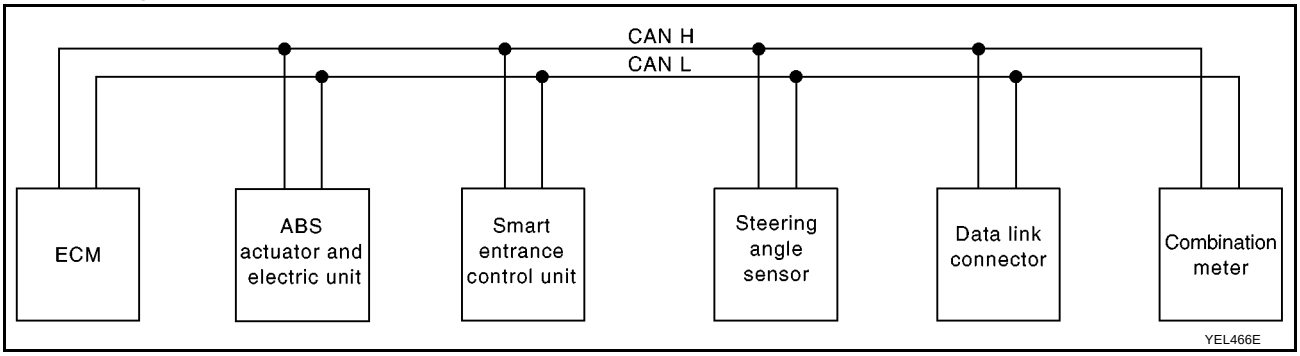
EBS014SK

SYSTEM DESCRIPTION

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.

MODELS WITH ESP

System diagram



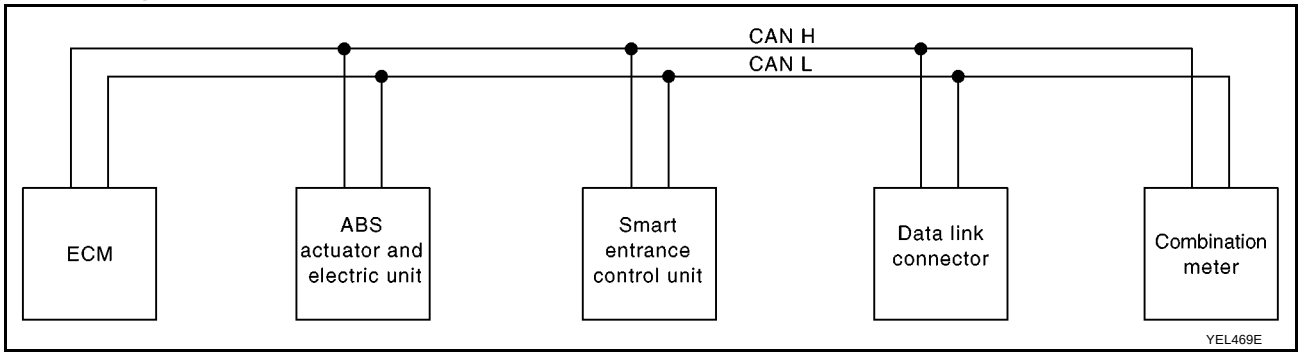
Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ESP/TCS/ABS control unit	Smart entrance control unit	Steering angle sensor	Combination meter
Engine speed signal	T	R			R
Air conditioner switch signal	R				T
MI signal	T				R
Glow indicator lamp signal	T				R
Engine coolant temperature signal	T				R
Fuel consumption signal	T				R
Vehicle speed signal		T			R
	R				T
Seat belt reminder signal			R		T
Headlamp switch signal			T		R
Flashing indicator signal			T		R
Engine cooling fan speed signal	T		R		
Door switches state signal			T		R
A/C compressor signal	T		R		
Accelerator pedal position signal	T	R			
Steering angle sensor signal		R		T	
ABS warning lamp signal		T			R
Slip indicator lamp signal		T			R
VDC off indicator lamp signal		T			R
Brake warning lamp signal		T			R

MODELS WITHOUT ESP

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Engine speed signal	T			R
Air conditioner switch signal	R			T
MI signal	T			R
Glow indicator lamp signal	T			R
Engine coolant temperature signal	T			R
Fuel consumption signal	T			R

Signals	ECM	ABS actuator and electric unit (control unit)	Smart entrance control unit	Combination meter
Vehicle speed signal		T		R
	R			T
Seat belt reminder signal			R	T
Headlamp switch signal			T	R
Flashing indicator signal			T	R
Engine cooling fan speed signal	T		R	
Door switches state signal			T	R
A/C compressor signal	T		R	
ABS operation signal		T		R
ABS warning lamp signal		T		R

BASIC SERVICE PROCEDURE

PFP:00018

Fuel Filter

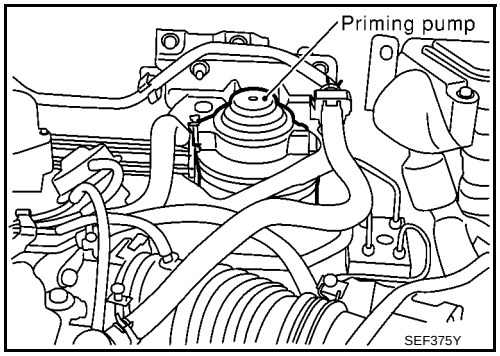
EBS014SL

DESCRIPTION

A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING

Pump the priming pump to bleed air.



- When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop the operation at that time.
- If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the fuel gallery. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, then bleed air again.
- Start engine and let it idle for at least 1 minute after performing air bleeding.

WATER DRAINING

1. Remove the fuel filter, filter bracket, protector assembly from the dash panel as follows.

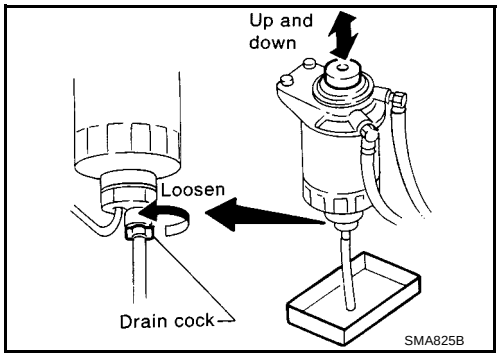
a. Remove the air cleaner case (upper), air duct assembly, and vacuum hose for brake booster (between the vacuum pump and vacuum pipe).

CAUTION:
After the duct is removed, cover the opening with gum tape, etc. to prevent foreign object from getting into the engine during the operation.

b. Remove the mounting nuts on the dash panel, then remove the fuel filter, filter bracket, and protector assembly from the dash panel.

- It is not necessary to disconnect the fuel hose.

2. Using a tool such as a pliers, loosen the water draining cock at the bottom of the fuel filter.
Loosening drain cock four to five turns causes water to start draining.
Do not remove drain cock by loosening it excessively.
If water dose not drain properly, move the priming up and down.



CAUTION:
When the water is drained, the fuel is also drained. Use a pan, etc. to avoid fuel adherence to the rubber parts such as the engine mount insulator.
Do not over-tighten the water draining cock. This will damage the cock thread, resulting in water or fuel leak.

3. Bleed air of the fuel filter. Refer to EC-1270, "AIR BLEEDING" .
4. Start the engine.

Fuel Pump Learning Value Clearing

EBS014SM

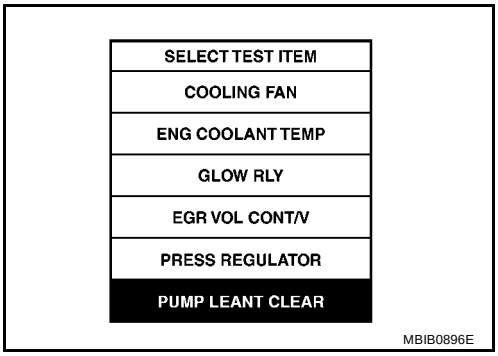
DESCRIPTION

In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.
Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operating to clear the value of the fuel pump learning.
It must be performed after the fuel pump is changed. When the ECM is replaced with brand new one, the Fuel Pump Learning Value Clearing is not necessary to be performed. If the ECM to be replaced has the possibility of learning the characteristic value of fuel pump, the Fuel Pump Learning Value Clearing is necessary to be performed after the ECM has been replaced.

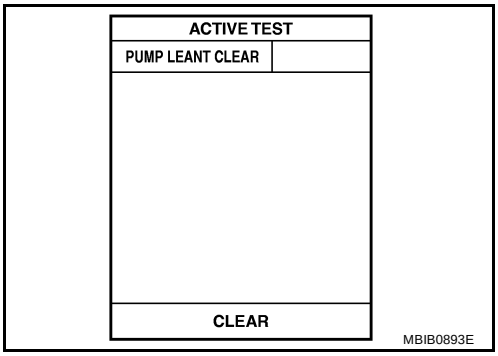
OPERATION PROCEDURE

NOTE:
Remove fuel pump without starting engine after performing Fuel Pump Learning Value Clearing.

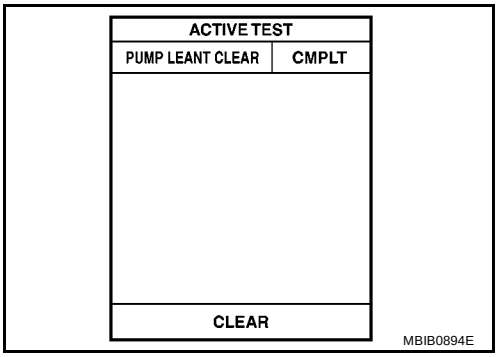
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

DTC and MI Detection Logic

EBS014SN

When a malfunction is detected, the malfunction (DTC) and freeze frame data are stored in the ECM memory. The MI will light up each time the ECM detects malfunction. For diagnostic items causing the MI to light up, refer to EC-1252, "INDEX FOR DTC" .

Diagnostic Trouble Code (DTC)

EBS014SO

HOW TO READ DTC

The DTC can be read by CONSULT-II only.

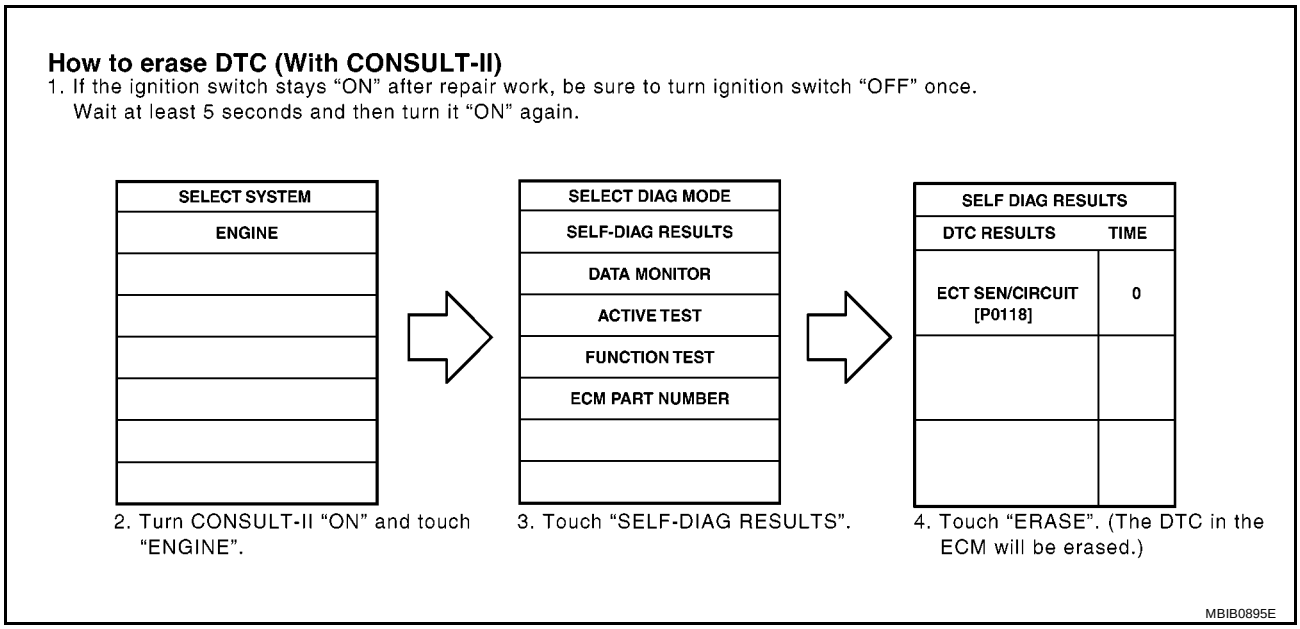
With CONSULT-II

CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Example: P0117, P0335, P1260, etc. These DTCs are prescribed by ISO15031-6.
(CONSULT-II also displays the malfunctioning component or system.)

HOW TO ERASE DTC

How to Erase DTC (With CONSULT-II)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)



The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

Freeze Frame Data

EBS014SP

The ECM records the driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed and intake manifold pressure at the moment a malfunction is detected.
The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II. For details, see EC-1301, "Freeze Frame Data" .
Only one set of freeze frame data can be stored in the ECM. If freeze frame data is stored in the ECM memory and another freeze frame data occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-1272, "HOW TO ERASE DTC" .

NATS (Nissan Anti-theft System)

EBS014SQ

- **If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to EL-352, NATS “(NISSAN ANTI-THEFT SYSTEM)”.**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DAIG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedure of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

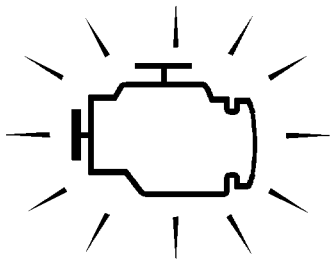
Malfunction Indicator (MI)

EBS014SR

DESCRIPTION

The MI is located on the instrument panel.

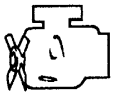
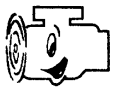
1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   - If the MI does not light up, refer to EL-115, “WARNING LAMPS” or see EC-1528, "MI & DATA LINK CONNECTORS" .
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



SAT652J

On Board Diagnostic System Function

The on board diagnostic system has the following two 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. (See EC-1528, "MI & DATA LINK CONNECTORS" .)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.

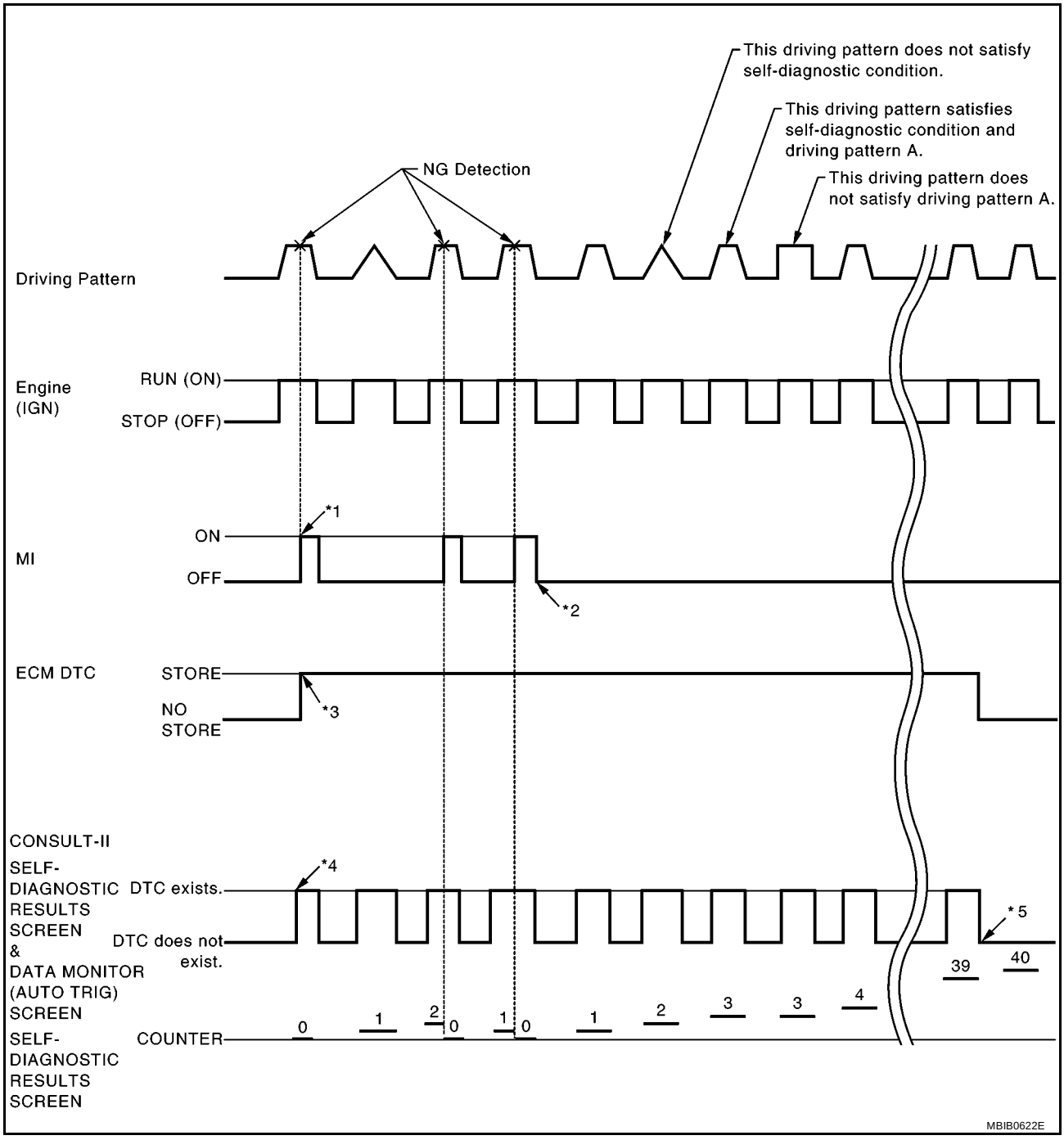
Diagnostic Test Mode I - Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-“WARNING LAMPS” or see EC-1528, "MI & DATA LINK CONNECTORS" .

Diagnostic Test Mode I - Malfunction Warning

MI	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

Relationship Between MI, DTC, CONSULT-II and Driving Patterns



*1: When a malfunction is detected, MI will light up.

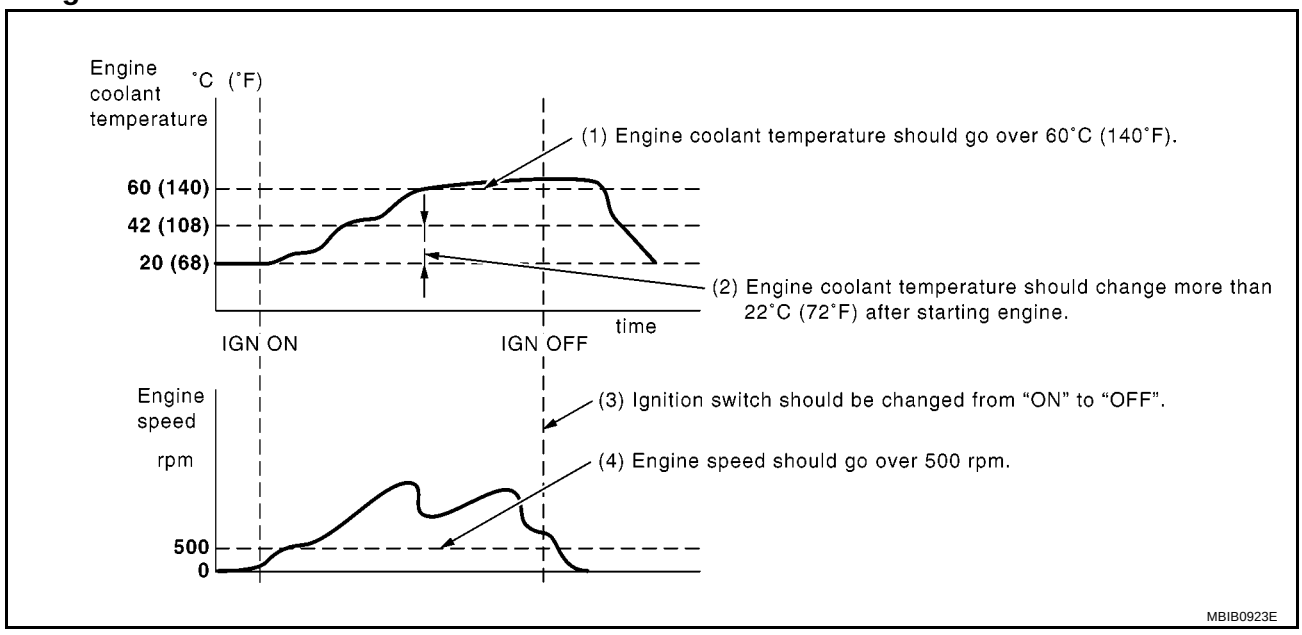
*2: MI will not light up after ignition switch is turned OFF.

*3: When a malfunction is detected for the first time, the DTC will be stored in ECM.

*4: Other screens except SELF-DIAGNOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction. DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

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

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.

TROUBLE DIAGNOSIS

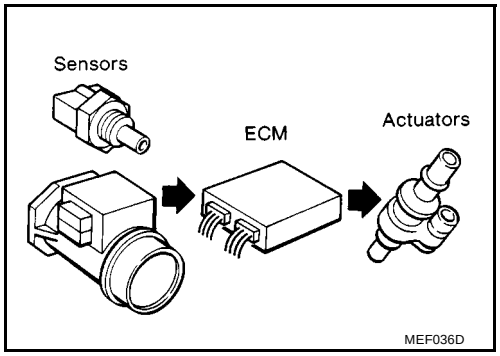
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Trouble Diagnosis Introduction

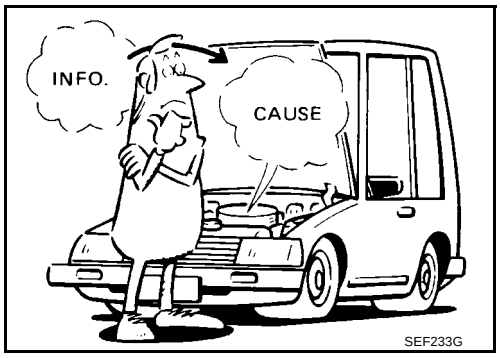
EBS014SS

INTRODUCTION

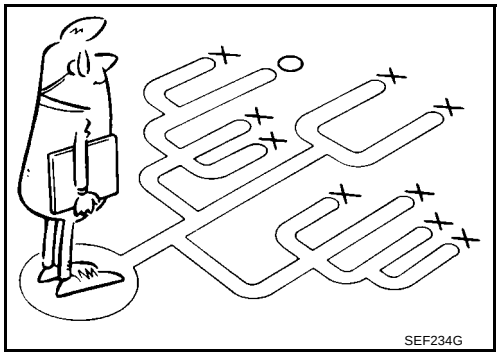
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.



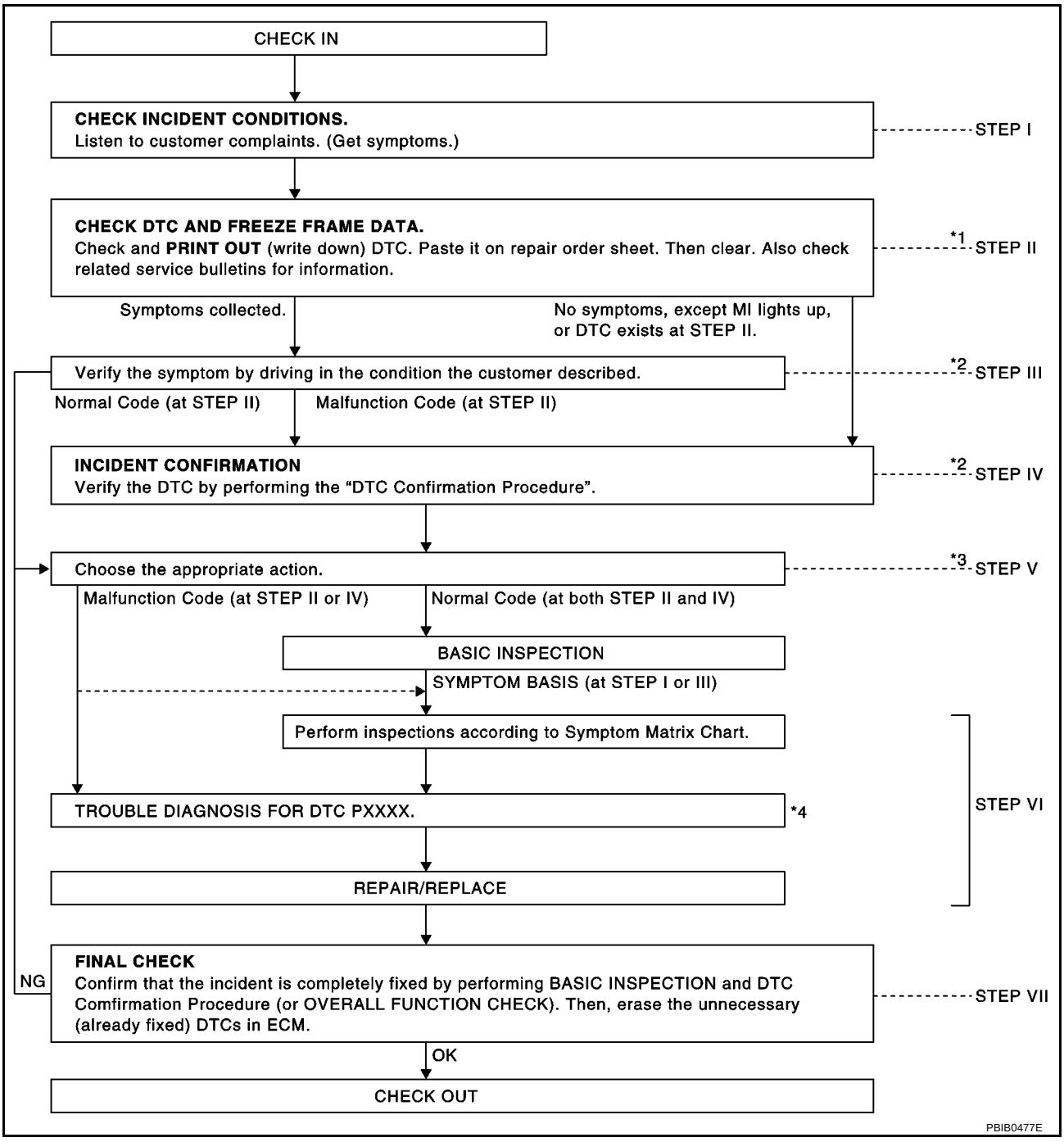
It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the EC-1277, "WORK FLOW" .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.
Start your diagnosis by looking for conventional incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.



WORK FLOW



*1 If time data of "SELF-DIAG RESULTS" is other than "0", perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1310, "MAIN POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-1278, "DIAGNOSTIC WORK SHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the DTC and the freeze frame data, then erase the DTC and the freeze frame data. (Refer to EC-1272, "HOW TO ERASE DTC" .) The DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. See EC-1284, "Symptom Matrix Chart" .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the DTC and freeze frame data by using CONSULT-II. During the DTC verification, be sure to connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The NG result of the Overall Function Check is the same as the DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1280, "Basic Inspection" .)Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1284, "Symptom Matrix Chart" .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1293, "ECM Terminals And Reference Value" , EC-1306, "CONSULT-II Reference Value in Data Monitor Mode" . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to “Circuit Inspection” in GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM. (Refer to EC-1272, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORK SHEET

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 an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one shown below 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
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion when engine is cool ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ 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		☐ Turned on ☐ Not turned on	

MTBL0533

DTC Inspection Priority Chart

EBS014ST

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to **EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .**

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0016 Crankshaft position - camshaft position correlation ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P2135 Accelerator pedal position sensor ● P0182 P0183 Fuel pump temperature sensor ● P0192 P0193 Fuel rail pressure sensor ● P0237 P0238 Turbocharger boost sensor ● P0335 P0336 Crankshaft position sensor ● P0340 P0341 Camshaft position sensor ● P0563 Battery voltage ● P0605 P0606 ECM ● P0642 P0643 P0652 P0653 Sensor power supply ● P1260 - P1267 Fuel injector adjustment resistor ● P1610 - P1617 NATS ● P2228 P2229 Barometric pressure sensor
2	● P0089 P0628 P0629 P1272 - P1275 Fuel pump ● P0200 - P0204 P1268 - P1271 P2146 - P2149 Fuel injector ● P0686 ECM relay ● P1212 TCS communication line
3	● P0088 P0093 Fuel system ● P0217 Engine over temperature (OVERHEAT) ● P0234 Turbocharger system ● P1211 TCS control unit

Basic Inspection

EBS014SU

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

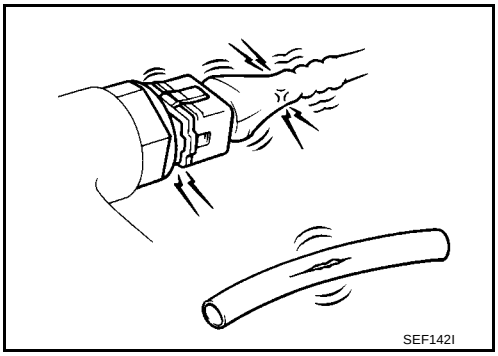
- **Headlamp switch is OFF.**
- **On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.**
- **Air conditioner switch is OFF.**
- **Rear defogger switch is OFF.**
- **Steering wheel is in the straight-ahead position, etc.**

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-4, “PERIODIC MAINTENANCE (EXCEPT FOR EUROPE)”.
3. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts

4. Start engine and warm it up to the normal operating temperature.



>> GO TO 2.

2. PREPARATION FOR CHECKING IDLE SPEED

With CONSULT-II

Connect CONSULT-II to the data link connector.

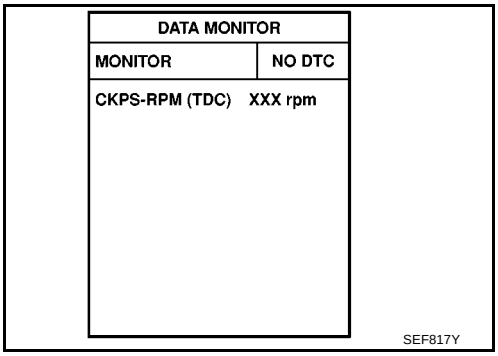
>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-II

1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
2. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to EC-1270, "AIR BLEEDING" .

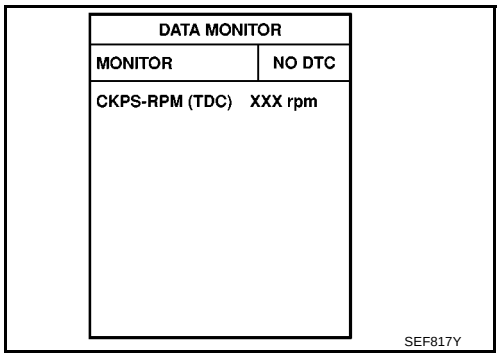
>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

Drain water from fuel filter. Refer to EC-1270, "WATER DRAINING" .

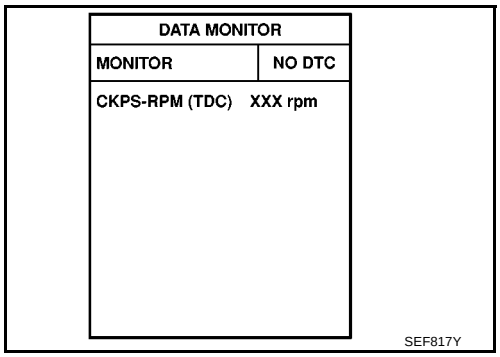
>> GO TO 8.

8. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK AIR CLEANER FILTER

Check air cleaner filter for clogging or breaks.

OK or NG

OK >> GO TO 10.
NG >> Replace air cleaner filter.

10. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK BATTERY

Refer to SC-3, “BATTERY”.

OK or NG

OK >> Check charging system. Refer to SC-24, “CHARGING SYSTEM”.
NG >> Repair or replace.

12. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-186, "CHECKING COMPRESSION PRESSURE" .

OK or NG

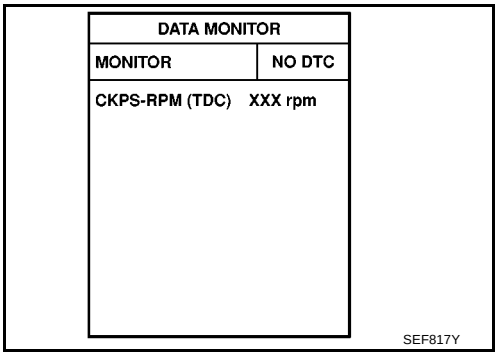
OK >> GO TO 11.
NG >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



OK or NG

OK >> **INSPECTION END**
NG >> 1. Replace fuel injector.
2. GO TO 3.

Symptom Matrix Chart

EBS014SV

SYSTEM — Basic engine control system		SYMPTOM: HARD/NO START/RESTART (EXCP. HA)				SYMPTOM: ENGINE STALL			SYMPTOM						Reference page
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
Fuel pump		5	5	5	5	5	5	5	5		5	5		5	—
Fuel injector		3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1450
Glow control system		1	1	1	1					1					EC-1495
Engine body		3	3	3	3	3	3	3		3	4	4		3	EM-197
EGR system											3	3			EC-1502
Air cleaner and duct											3	3			EM-119
Fuel rail pressure relief valve															EC-1327
ENGINE CONTROL	Fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1425
	Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1358
	Mass air flow sensor circuit								1		1	1			EC-1330
	Engine coolant temperature circuit			1		1		1						1	EC-1339
	Vehicle speed signal circuit											1			EL-110
	Accelerator pedal position sensor circuit								1		1	1			EC-1343, EC-1378 , EC-1477
	Fuel rail pressure sensor circuit														EC-1352

SYSTEM — Basic engine control system		SYMPTOM: HARD/NO START/RESTART (EXCP. HA)				SYMPTOM: ENGINE STALL			SYMPTOM						Reference page
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1396
	Camshaft position sensor circuit			3	3										EC-1407
	Turbocharger boost sensor circuit								1		1	1			EC-1391
	Turbocharger boost control solenoid valve circuit								1		1	1			EC-1510
	Start signal circuit	1	1	1	1	1		1	1		1	1			EC-1526
	Ignition switch circuit		1			1	1	1							EC-1310
	Power supply for ECM circuit		1			1	1	1							EC-1310
	Cooling fan relay circuit														EC-1364
	EGR volume control valve circuit								1		1	1			EC-1502
	Glow relay circuit	1	1	1	1										EC-1495
	ECM relay (Self-shutoff) circuit		1				1	1	1						EC-1440
	ECM, connector circuit	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1421, EC-1423
NATS (Nissan Anti-theft System)			1												EC-962

1 - 5: The numbers refer to the order of inspection.

(continued on next page)

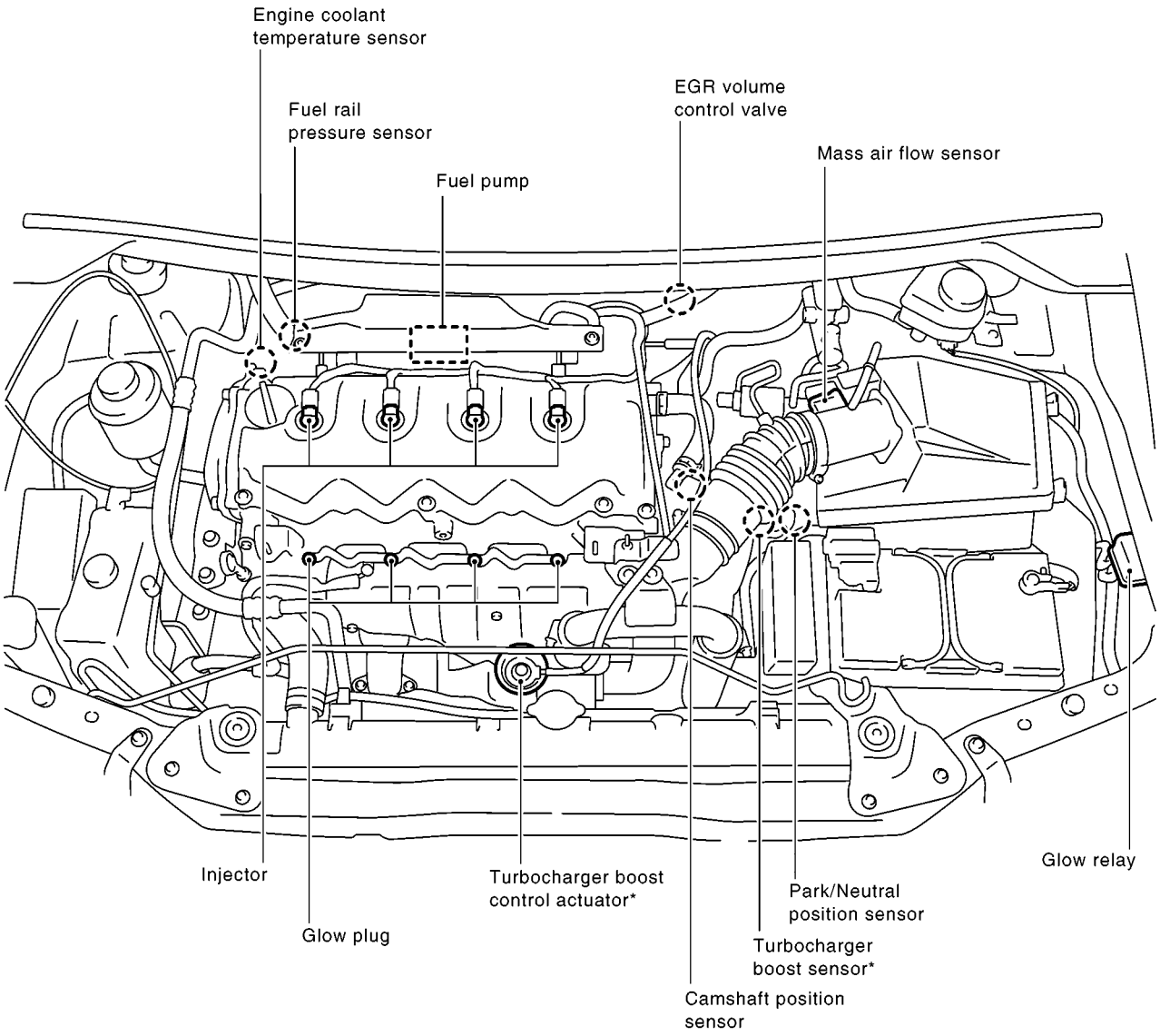
SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
Fuel pump		5	5	5		5					1	1	—
Fuel injector		3	3	3		4		4	4		1	1	EC-1450
Glow control system									1				EC-1495
Engine body			3	3	3	3	1		3				EM-197
EGR system								3					EC-1502
Air cleaner and duct								3					EM-119
Fuel rail pressure relief valve													EC-1327
ENGINE CONTROL	Fuel pump circuit	4	4	4		4					1	1	EC-1425
	Fuel injector circuit	1	1	1		1		1	1		1	1	EC-1358
	Mass air flow sensor circuit							1			1	1	EC-1330
	Engine coolant temperature circuit	1	1		1						1	1	EC-1339
	Vehicle speed signal circuit										1	1	EL-110
	Accelerator pedal position sensor circuit			1							1	1	EC-1343, EC-1378 , EC-1477
	Fuel rail pressure sensor circuit										1	1	EC-1352

SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
ENGINE CONTROL	Crankshaft position sensor circuit	1	1								1	1	EC-1396
	Camshaft position sensor circuit										1	1	EC-1407
	Turbocharger boost sensor circuit										1	1	EC-1391
	Turbocharger boost control solenoid valve circuit							1	1				EC-1510
	Start signal circuit												EC-1526
	Ignition switch circuit												EC-1310
	Power supply for ECM circuit										1	1	EC-1310
	Cooling fan relay circuit				2								EC-1364
	EGR volume control valve circuit							1					EC-1502
	Glow relay circuit								1				EC-1495
	ECM relay (Self-shutoff) circuit											1	EC-1440
	ECM, connector circuit	2	2	2	2	2	2	2	2	2	2	2	EC-1421, EC-1423
NATS (Nissan Anti-theft System)												1	EC-962

1 - 5: The numbers refer to the order of inspection.

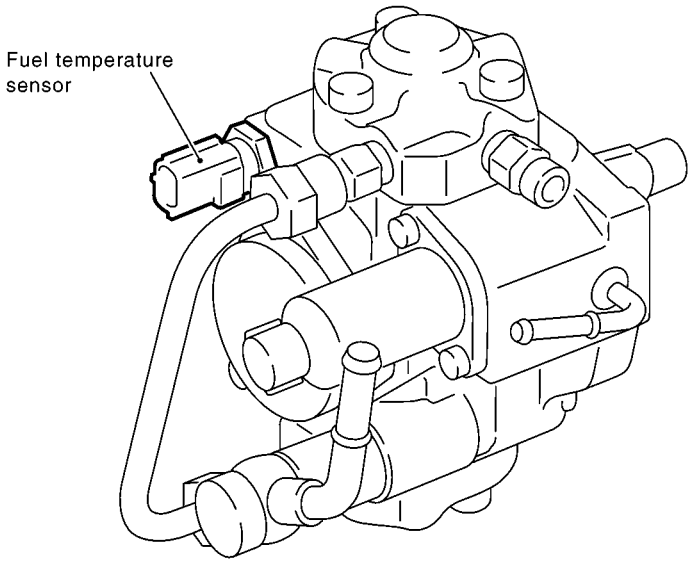
Engine Control Component Parts Location

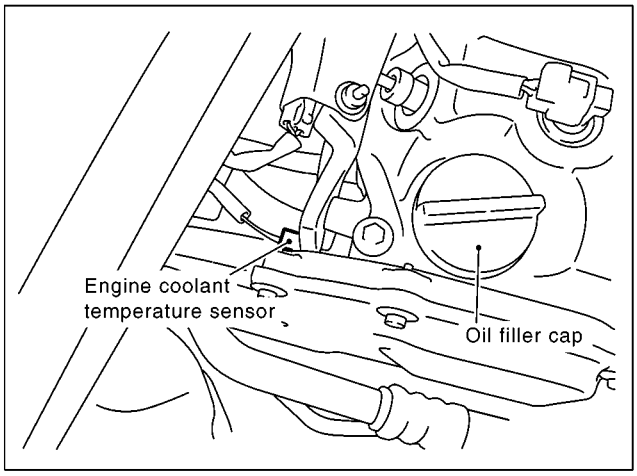
EBS014SW

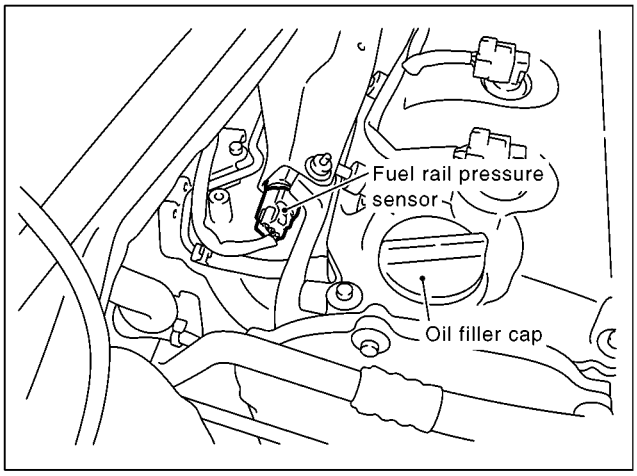


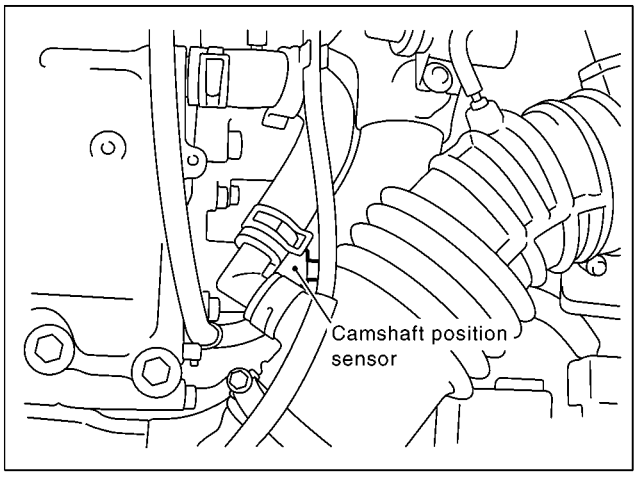
*: YD22DDTi engine models

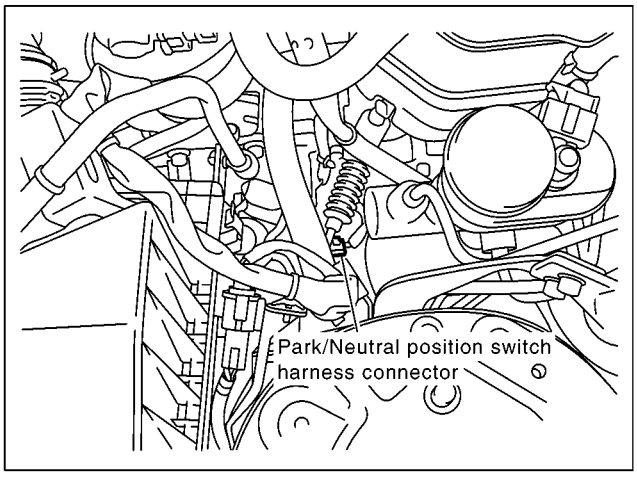
MBIB0918E


Fuel temperature
sensor

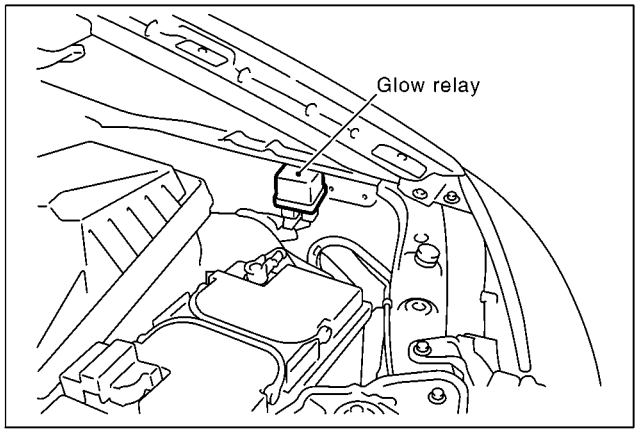

Engine coolant
temperature sensor
Oil filler cap

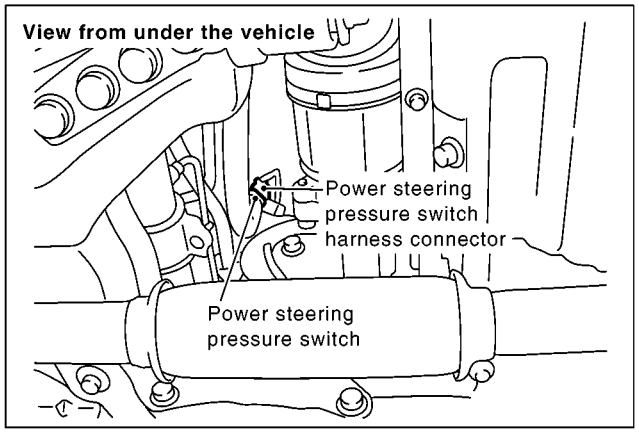

Fuel rail pressure
sensor
Oil filler cap

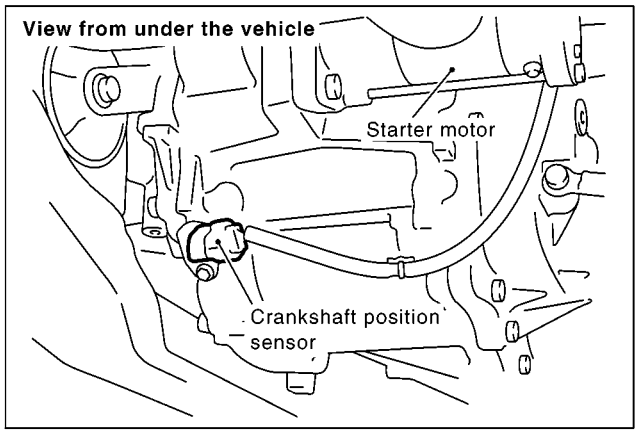

Camshaft position
sensor

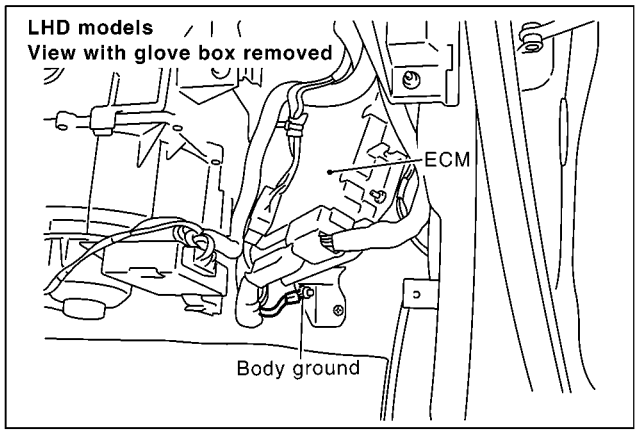

Park/Neutral position switch
harness connector

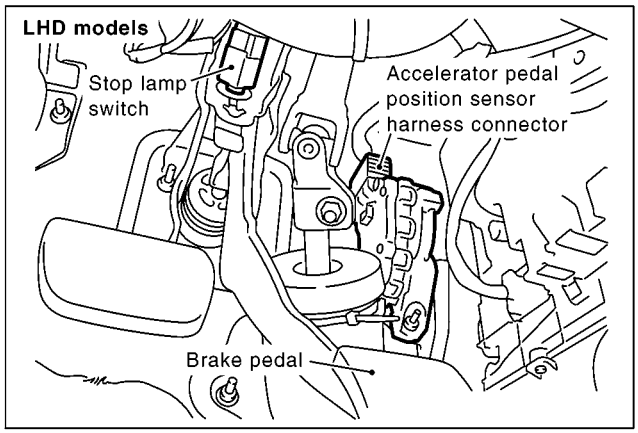
MBIB0919E

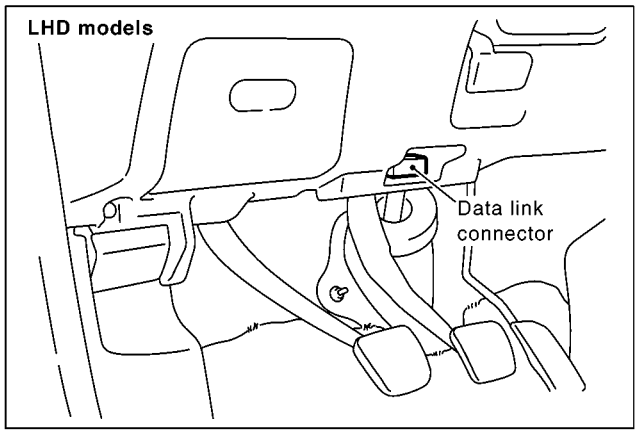

Glow relay

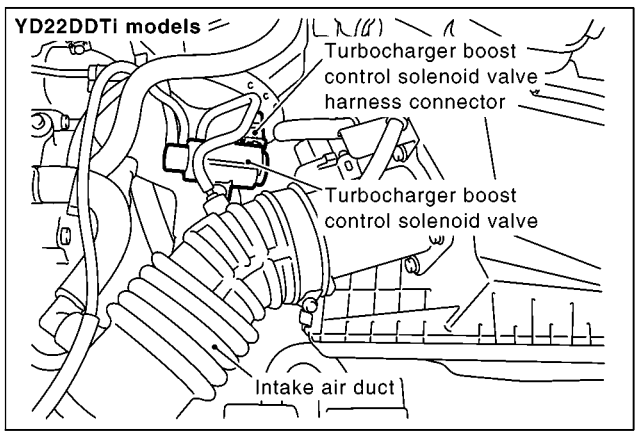

View from under the vehicle
Power steering pressure switch harness connector
Power steering pressure switch

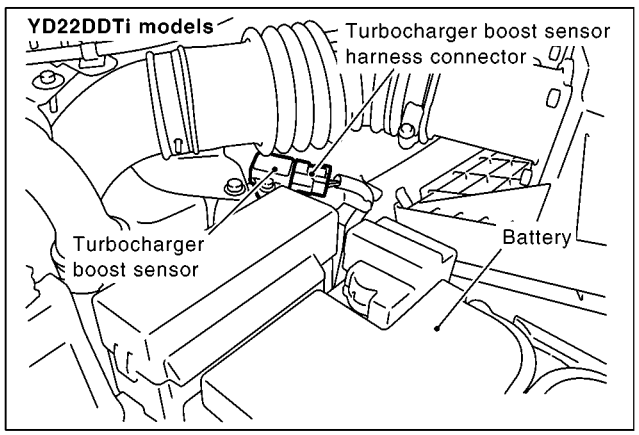

View from under the vehicle
Starter motor
Crankshaft position sensor


LHD models
View with glove box removed
ECM
Body ground


LHD models
Stop lamp switch
Accelerator pedal position sensor harness connector
Brake pedal


LHD models
Data link connector

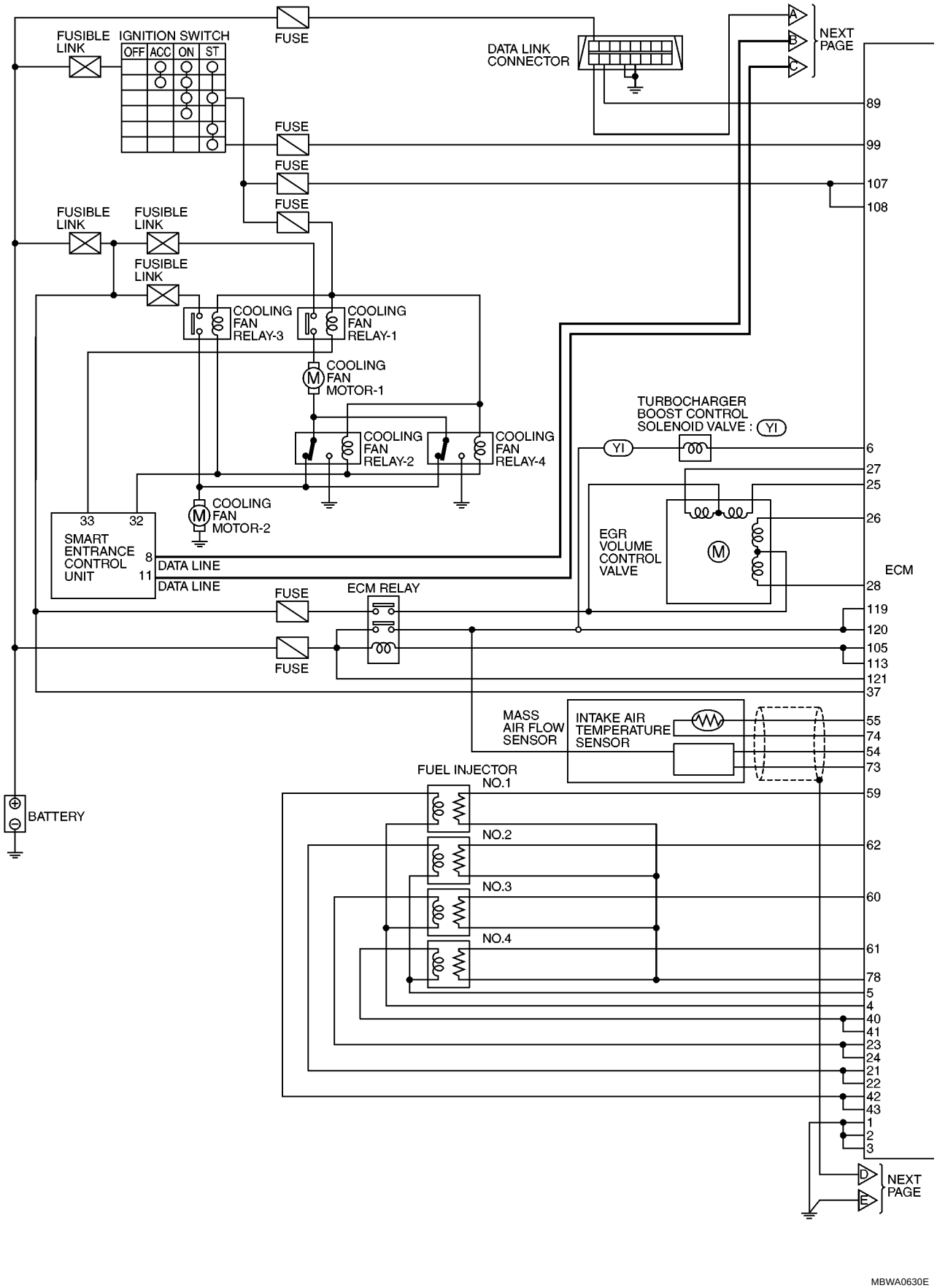

YD22DDTi models
Turbocharger boost control solenoid valve harness connector
Turbocharger boost control solenoid valve
Intake air duct


YD22DDTi models
Turbocharger boost sensor harness connector
Turbocharger boost sensor
Battery

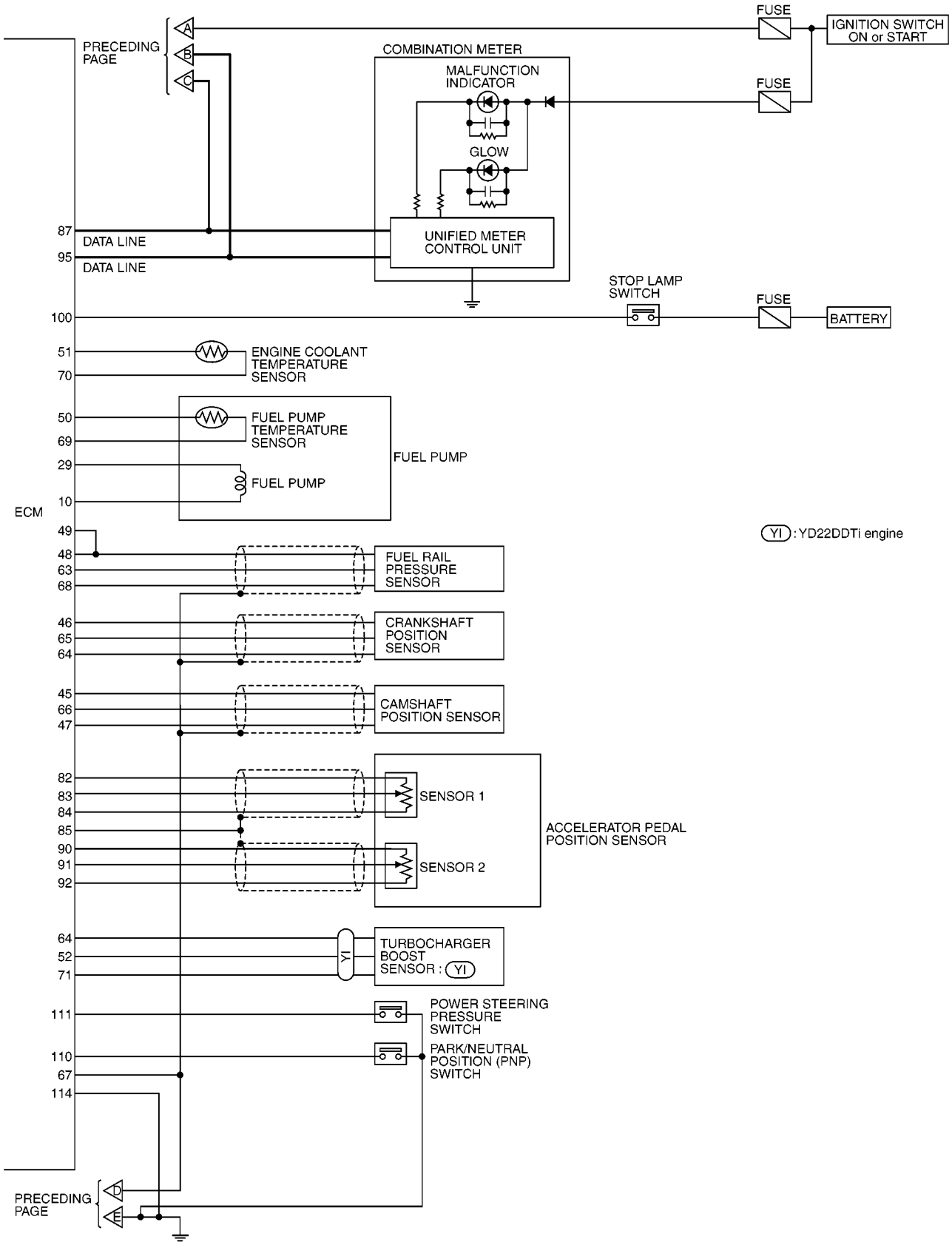
MBIB0920E

Circuit Diagram

EBS014SX



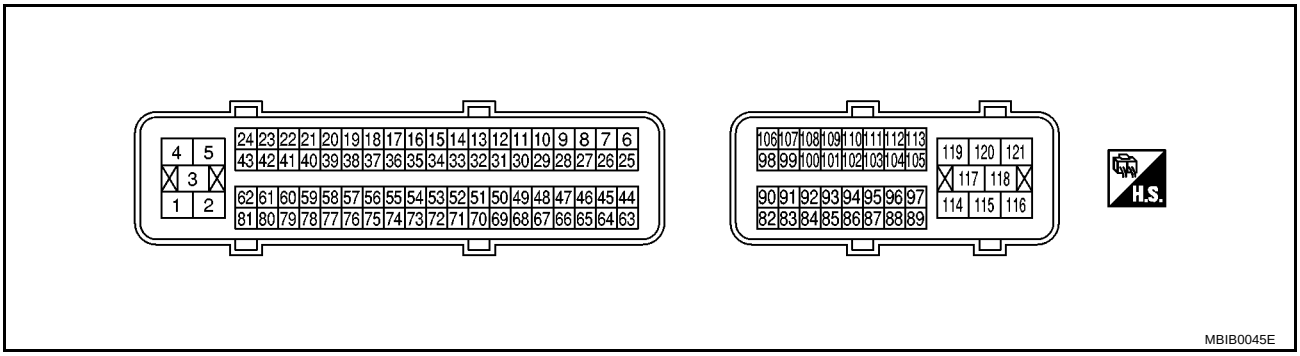
MBWA0630E


FUSE
IGNITION SWITCH ON or START
FUSE
PRECEDING PAGE
A
B
C
COMBINATION METER
MALFUNCTION INDICATOR
GLOW
87
DATA LINE
95
DATA LINE
UNIFIED METER CONTROL UNIT
STOP LAMP SWITCH
FUSE
100
BATTERY
51
70
ENGINE COOLANT TEMPERATURE SENSOR
50
69
FUEL PUMP TEMPERATURE SENSOR
29
FUEL PUMP
10
FUEL PUMP
ECM
YI : YD22DDTi engine
49
48
63
68
FUEL RAIL PRESSURE SENSOR
46
65
64
CRANKSHAFT POSITION SENSOR
45
66
47
CAMSHAFT POSITION SENSOR
82
83
84
85
90
91
92
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
64
52
71
YI
TURBOCHARGER BOOST SENSOR : YI
111
POWER STEERING PRESSURE SWITCH
110
67
PARK/NEUTRAL POSITION (PNP) SWITCH
114
PRECEDING PAGE
D
E

YEC493A

ECM Harness Connector Terminal Layout

EBS014SY

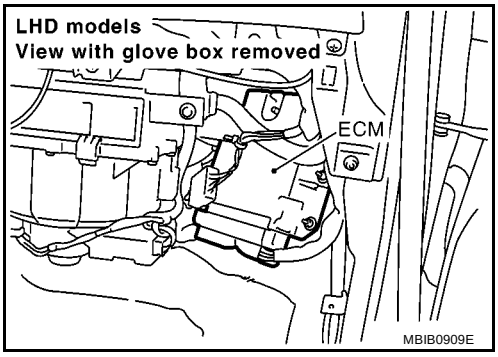


ECM Terminals And Reference Value

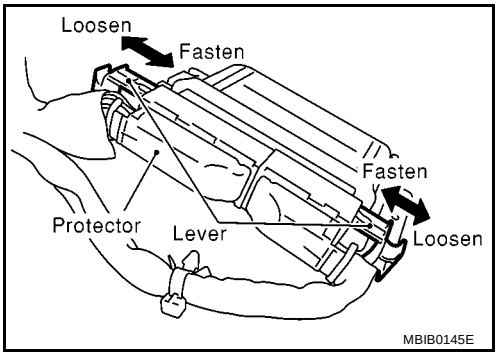
EBS014SZ

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



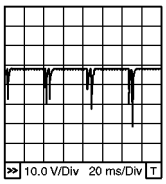
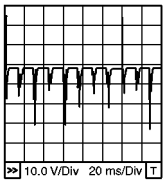
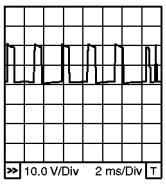
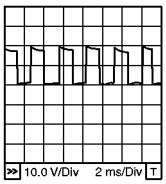
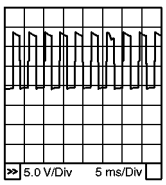
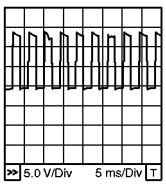
ECM INSPECTION TABLE

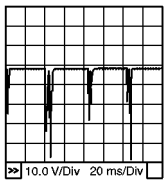
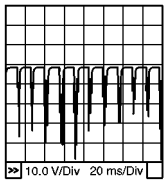
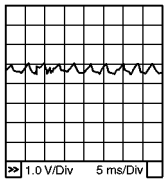
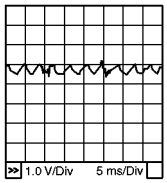
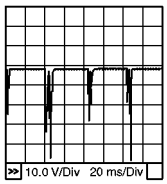
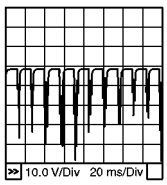
Remarks: Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

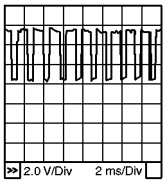
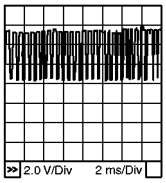
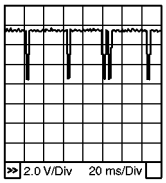
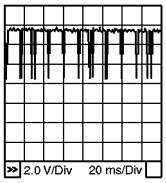
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4 5	O/B B	Fuel injector power supply (For cylinder No. 1 and 4) Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E
6	L	Turbocharger boost control solenoid valve*2	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E
37	N/R	Glow relay	Refer to EC-1495, "GLOW CONTROL SYSTEM" .	
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
48 49	R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.0 - 2.3V
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
51	L/OR	Engine coolant temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with engine coolant temperature

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
52	Y	Turbocharger boost sensor*2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 2.8V
54	W/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.8 - 2.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 3.0V
55	L/Y	Intake air temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.2V Output voltage varies with intake air temperature
59	L/G	Fuel injector adjustment resistor No. 1	**[Ignition switch ON]**	0.5 - 5.1V (There are individual differences between fuel injector adjustment resistors.)
60	L/R	Fuel injector adjustment resistor No. 3		
61	R/Y	Fuel injector adjustment resistor No. 4		
62	LG/W	Fuel injector adjustment resistor No. 2		
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	W	Turbocharger boost sensor power supply*2	**[Ignition switch ON]**	Approximately 5.3V
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
70	B	Engine coolant temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
71	B	Turbocharger boost sensor ground*2	**[Ignition switch ON]**	Approximately 0.3V
73	O/L	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
74	L/G	Intake air temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V
78	R	Fuel injector adjustment resistor ground	**[Ignition switch ON]**	Approximately 0.3V
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
87	R	CAN communication line	**[Ignition switch ON]**	Approximately 2.0 - 2.6V Output voltage varies with the communication status.
89	LG	Data link connector	**[Ignition switch ON]** ● CONSULT-II is disconnected.	Approximately 0V - Battery voltage (11 - 14V)
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V
95	L	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
99	B/Y	Start signal	**[Ignition switch ON]**	Approximately 0.3V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
100	R/G	Stop lamp switch	**[Ignition switch ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Gear position: Neutral	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
111	R/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

CONSULT-II Function

EBS014T0

FUNCTION

Diagnostic test mode	Function
Self-diagnostic results	Self-diagnostic results such as DTC and 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-II 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.
ECM 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
- Freeze frame data

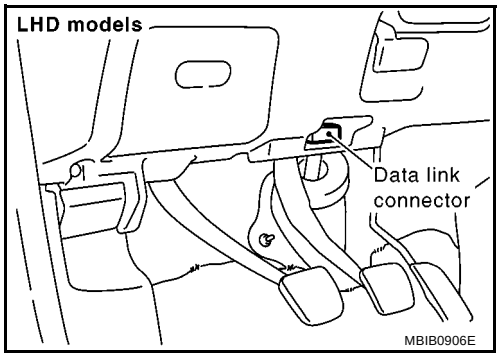
ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE			
			SELF-DIAG RESULTS		DATA MONITOR	ACTIVE TEST
			DTC	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor	×	×	×	
		Camshaft position sensor	×			
		Engine coolant temperature sensor	×	×	×	×
		Vehicle speed sensor		×	×	
		Fuel pump temperature sensor	×		×	
		Accelerator pedal position sensor 1	×		×	
		Accelerator pedal position sensor 2	×		×	
		Fuel rail pressure sensor	×		×	
		Mass air flow sensor	×		×	
		Intake air temperature sensor	×			
		Turbocharger boost sensor*	×	×	×	
		Battery voltage	×		×	
		Park/neutral position (PNP) switch			×	
		Power steering pressure switch			×	
		Stop lamp switch			×	
		Barometric pressure sensor (built-into ECM)	×		×	
		Fuel injector adjustment resistor	×			
	OUTPUT	Fuel pump	×		×	×
		Fuel injector	×		×	×
		Glow relay			×	×
		Cooling fan relay	×		×	×
		EGR volume control valve			×	×

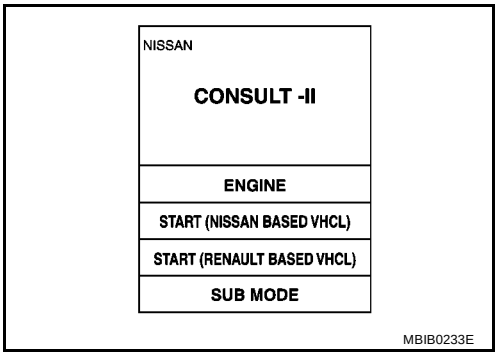
X: Applicable
*: For YD22DDTi engine models

INSPECTION PROCEDURE

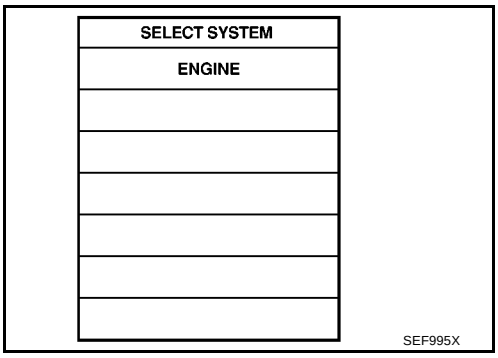
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

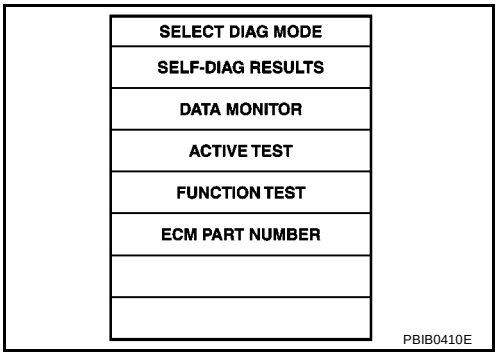


5. Touch “ENGINE”.
If “ENGINE” is not indicated, go to GI-37, “CONSULT-II Data Link Connector (DLC) Circuit”.



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC, refer to — EC-1252, "INDEX FOR DTC" .

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-1252, "INDEX FOR DTC" .)
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.
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.
INT MANI PRES* [kPa]	● The intake manifold pressure at the moment a malfunction is detected is displayed.

*: For YD22DDTi engine models

DATA MONITOR MODE

MONITOR ITEM	ECM INPUT SIG-NAL	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	CONDITION	SPECIFICATION
CKPS·RPM (TDC) [rpm]	×	×		● The engine speed computed from the crankshaft position sensor signal is displayed.	
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 circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE [km/h] or [mph]	×	×		● The vehicle speed computed form the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	×	×		● The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN [V]	×	×		● The accelerator pedal position sensor 1 signal voltage is displayed.	
ACCEL SEN 2 [V]	×	×		● The accelerator pedal position sensor 2 signal voltage is displayed.	
ACT CR PRESS [MPa]	×	×		● The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT [V]	×	×		● The power supply voltage of ECM is displayed.	
P/N POSI SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from the park/neutral position switch signal.	
START SIGNAL [ON/OFF]	×	×		● indicates [ON/OFF] condition from the starter signal.	
PW/ST SIGNAL [ON/OFF]	×			● indicates [ON/OFF] condition from the power steering pressure switch signal.	[OFF] is always displayed for models without power steering pressure switch.
BRAKE SW [ON/OFF]	×	×		● indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN SW [ON/OFF]	×	×		● Indicates [ON/OFF] condition from ignition switch signal.	
MAS AIR/FL SE [V]	×	×		● The signal voltage of the mass air flow sensor is displayed.	
MAIN INJ WID [msec]		×		● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT [mA]		×		● Indicates the fuel pump power supply current from the ECM.	

MONITOR ITEM	ECM INPUT SIG-NAL	MAIN SIG-NALS	CAN DIAG SUP-PORT MNTR	CONDITION	SPECIFICATION
GLOW RLY [ON/OFF]		×		● The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN [LOW/HI/OFF]		×		● Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW ... Operates at low speed. HI ... Operates at high speed. OFF ... Stopped	
EGR VOL CON/V [step]		×		● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/A VOLUME [mg/]				● The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN [kPa]	×	×		● The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
INT/M PRES SE [kPa]*				● Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	
CYL COUNT [1/2/3/4]				● The cylinder being injected is displayed. 1 ... Cylinder No.1 is injected. 2 ... Cylinder No.2 is injected. 3 ... Cylinder No.3 is injected. 4 ... Cylinder No.4 is injected.	
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. [Hz] or [%]
Frequency [msec], [Hz] or [%]					
DUTY-HI					
DUTY-LOW					
PLS WIDTH-HI					
PLS WIDTH-LOW					

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	CONDITION	SPECIFICATION
CAN COMM [OK/NG]			×	● Indicates the communication condition of CAN communication line.	● These items are not displayed in “SELECTION FROM MENU” mode.
CAN CIRC 1 [OK/UNKWN]			×		
CAN CIRC 2 [OK/UNKWN]			×		
CAN CIRC 3 [OK/UNKWN]			×		
CAN CIRC 4 [OK/UNKWN]			×		
CAN CIRC 5 [OK/UNKWN]			×		
CAN CIRC 6 [OK/UNKWN]			×		
CAN CIRC 7 [OK/UNKWN]			×		

*: For YD22DDTi engine models

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

ACTIVE TEST MODE

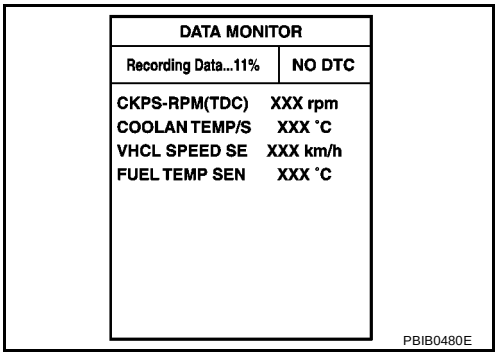
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: N ● Cut off each injector signal one at a time using CONSULT-II	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector
COOLING FAN *	● Ignition switch: ON ● Operate the cooling fan at LOW, HI speed and turn OFF using CONSULT-II.	Cooling fan moves at LOW, HI speed and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
GLOW RLY	● Ignition switch: ON (Engine stopped) ● Turn the glow relay ON and OFF using CONSULT-II and listen to operating sound.	Glow relay makes the operating sound.	● Harness and connector ● Glow relay
EGR VOL CONT/V	● Ignition switch: ON ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
PRES REGULATOR	● Ignition switch: ON ● Change fuel rail pressure using CONSULT-II	Fuel leaks.	● Fuel line ● Fuel pressure relief valve
PUMP LEANT CLEAR	● This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .		

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

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

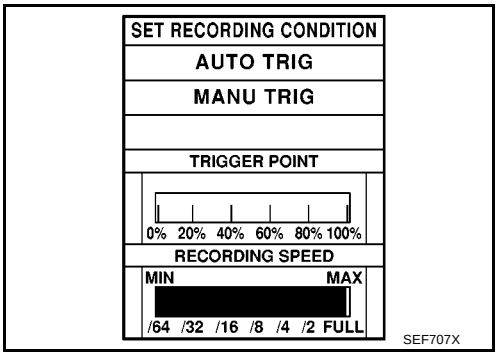
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):



– The malfunction will be identified on the CONSULT-II screen in real time.
In other words, DTC will be displayed if the malfunction is detected by ECM.
At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):



– DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

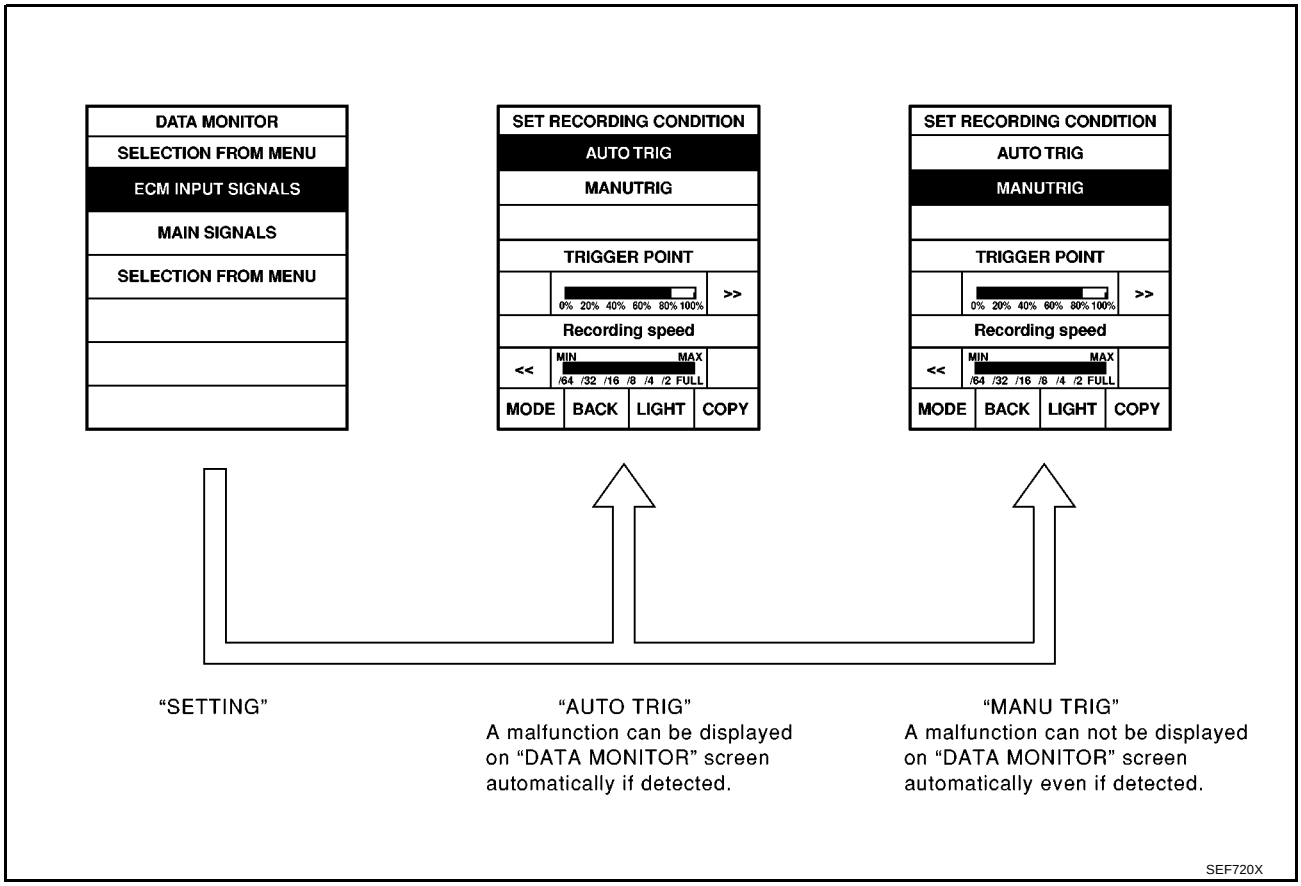
1. “AUTO TRIG”

– While trying to detect the DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.

– While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC will be displayed. Refer to GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, “Incident Simulation Tests”.

2. “MANU TRIG”

– If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



FUNCTION TEST

This mode is used to inform customers of their vehicle condition of periodic maintenance.

CONSULT-II Reference Value in Data Monitor Mode

EBS014T2

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.

MONITOR ITEM	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	● Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V
MAS AIR/FL SE*1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1.5 - 2.0V
		2,000 rpm	2.2 - 2.7V
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN SW	● Ignition switch: ON → OFF		ON → OFF
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec
GLOW RLY	Refer to EC-1495, "GLOW CONTROL SYSTEM" .		
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA
COOLING FAN	● When cooling fan is stopped.		OFF
	● When cooling fans operate at low speed.		LOW
	● When cooling fans operate at high speed.		HI
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step
INT/A VOLUME	● Engine: After warming up, idle the engine		150 - 450 mg/st
INT/M PRES SE*2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa
BARO SEN	● Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2 , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2 , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2 , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2 , 11.36 psi)
CYL COUNT	● Engine is running		1 → 3 → 4 → 2

*1: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.
*2: For YD22DDTi engine models

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

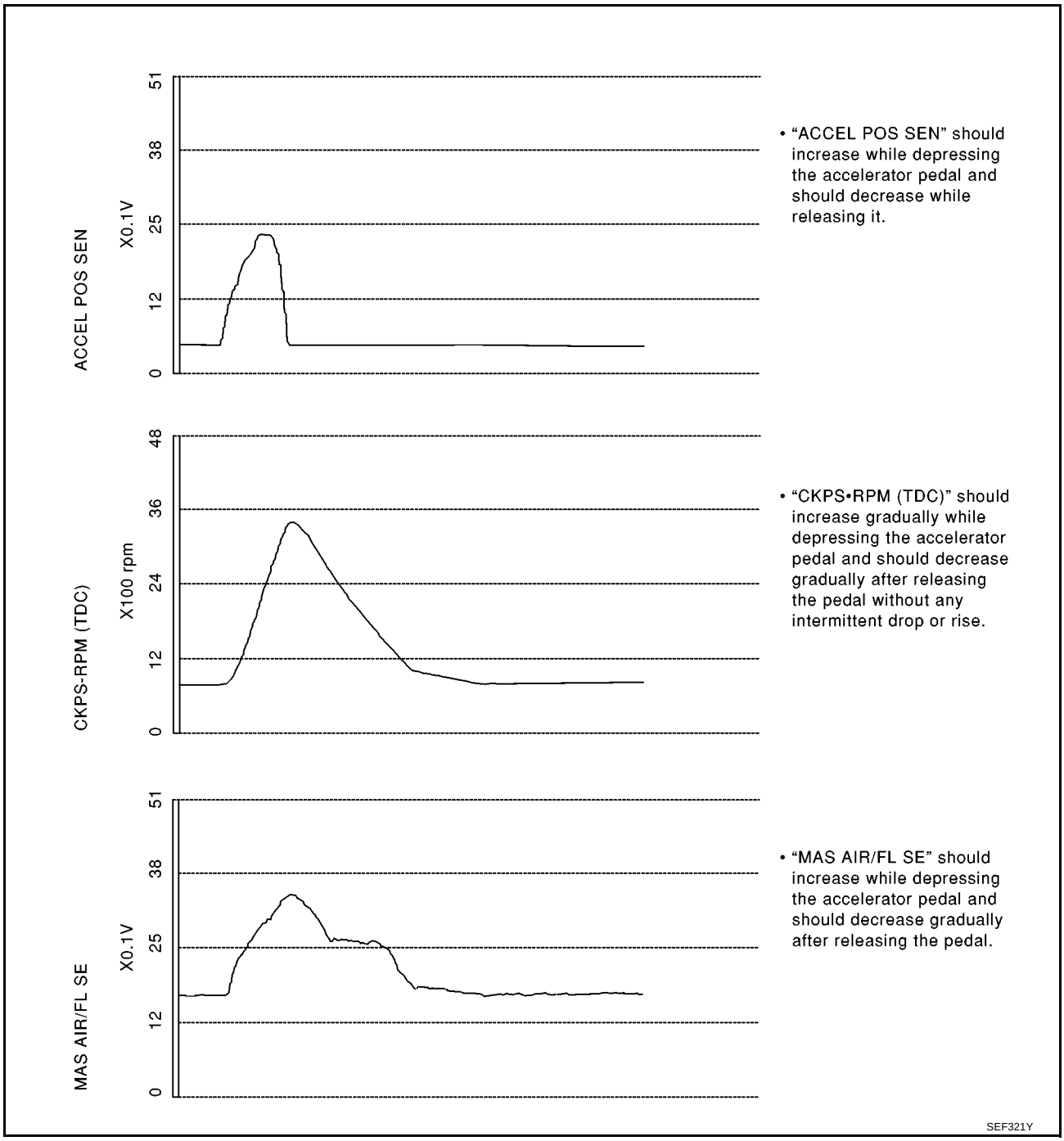
Major Sensor Reference Graph in Data Monitor Mode

EBS014T3

The following are the major sensor reference graphs in “DATA MONITOR” mode.

ACCEL POS SEN, "CKPS·RPM (TDC)", "MAS AIR/FL SE"

Below is the data for "ACCEL POS SEN", "CKPS·RPM (TDC)" and "MAS AIR/FL SE" when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature.
Each value is for reference, the exact value may vary.



TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

EBS014T4

Intermittent incidents (I/I) may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0”.
III	The symptom described by the customer does not recur.
IV	DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.

Diagnostic Procedure

EBS014T5

1. INSPECTION START

Erase DTCs. Refer to EC-1272, "HOW TO ERASE DTC" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, “Circuit Inspection”, “GROUND INSPECTION”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-21, “HOW TO PERFORM EFFICIENT DIAGNOSES FOR AN ELECTRICAL INCIDENT”, “Incident Simulation Tests”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

MAIN POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

ECM Terminals and Reference Value

EBS014T6

Remarks: Specification data are reference values and are measured between each terminal and ground.

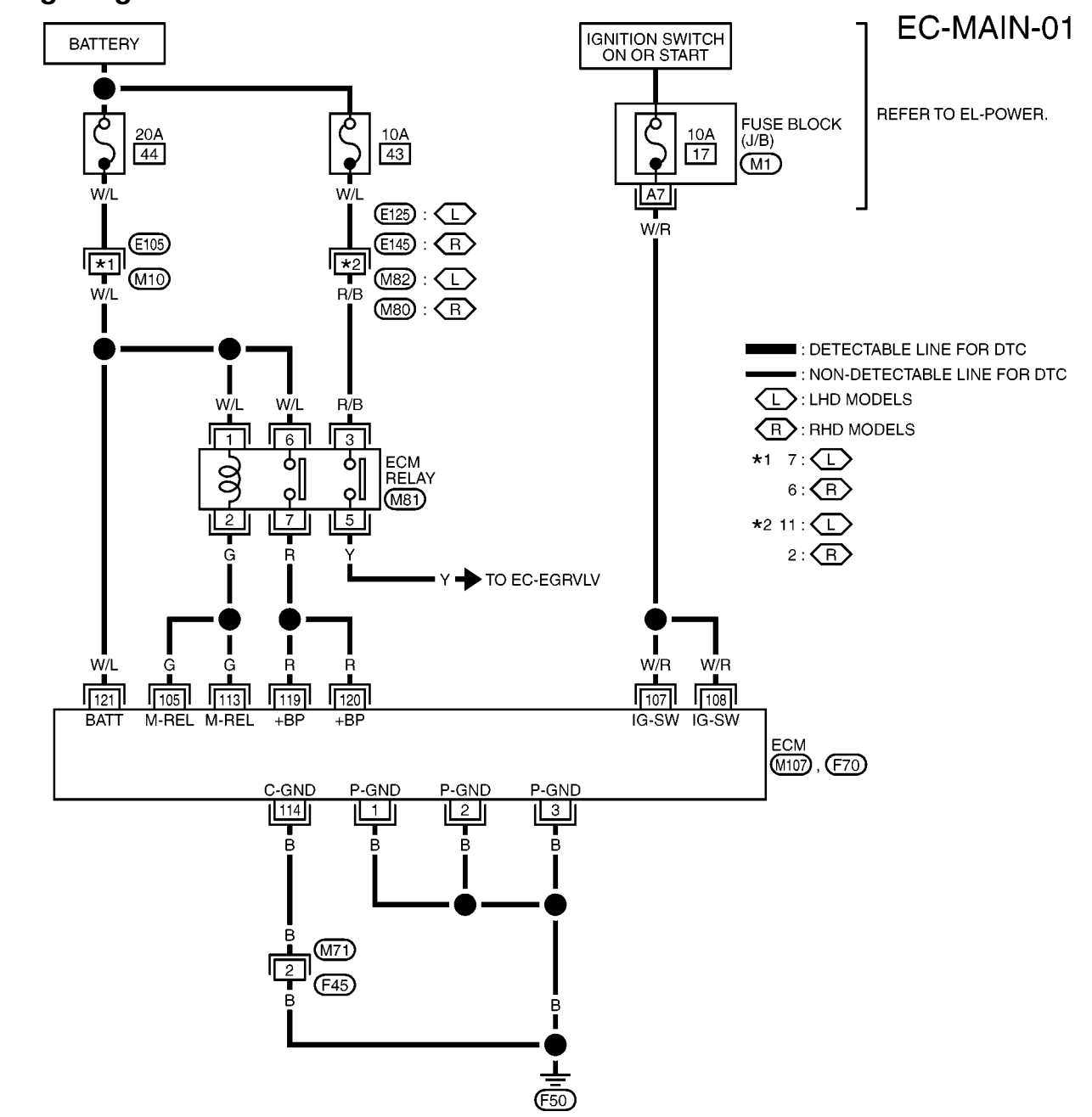
CAUTION:

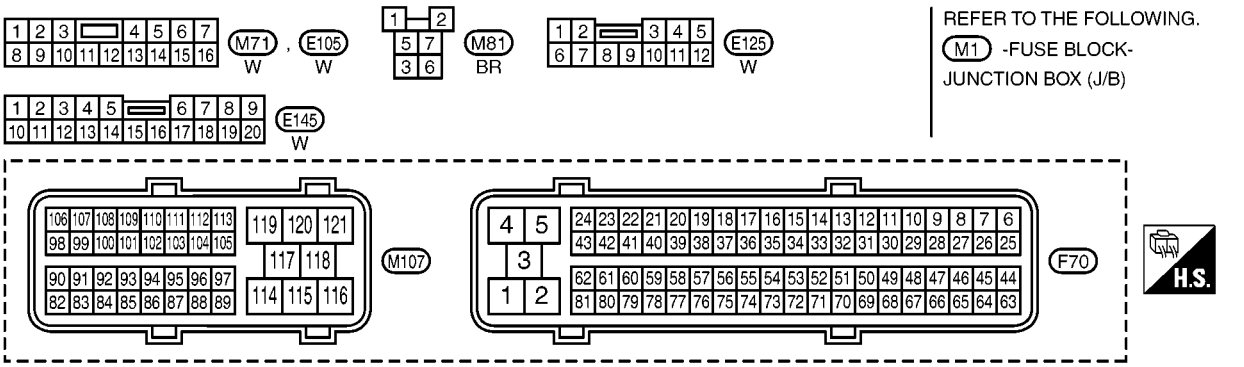
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1 2 3	B B B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● Idle speed	Approximately 0V
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS014T7





MBWA0653E

Diagnostic Procedure

EBS014T8

1. INSPECTION START

Start engine.
Is engine running?

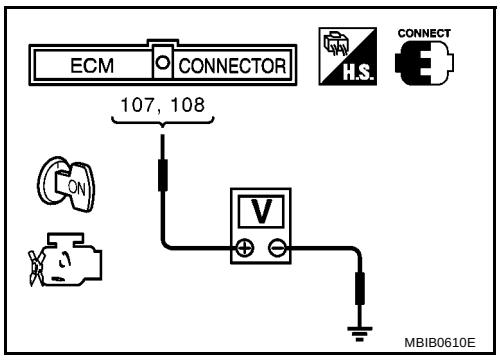
Yes or No

Yes >> GO TO 7.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 107, 108 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

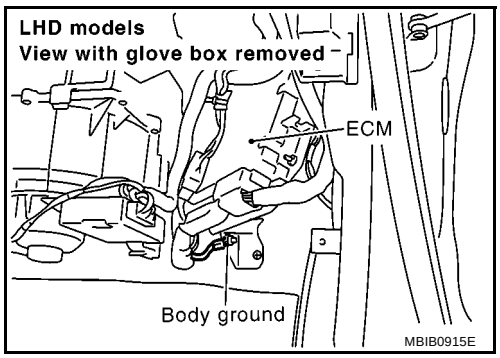
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- 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 CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connection.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

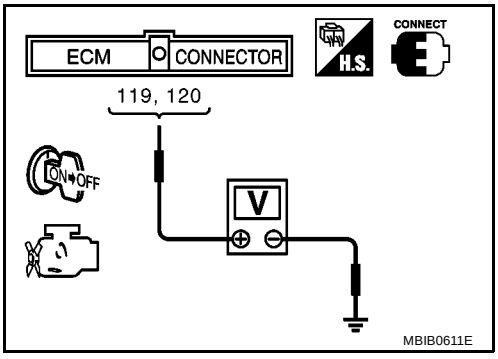
- Harness connectors M71, F45
- Harness for open or short between ECM and body ground

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

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

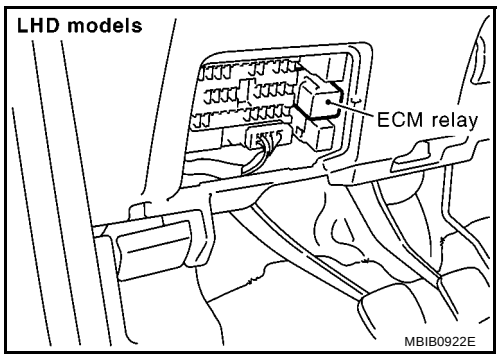


OK or NG

OK >> GO TO 13.
NG (Battery voltage does not exist)>>GO TO 8.
NG (Battery voltage exists for more then a few seconds)>>GO TO 10.

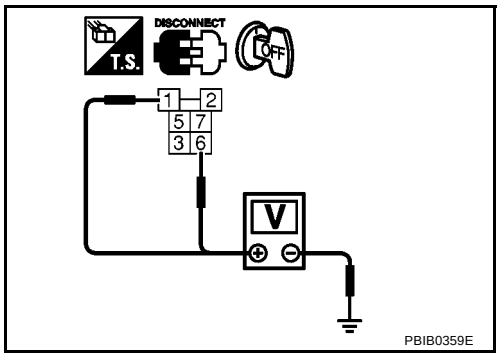
8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.



2. Check voltage between relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M10
- 20A fuse
- Harness for open or short between ECM relay and battery

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

10. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

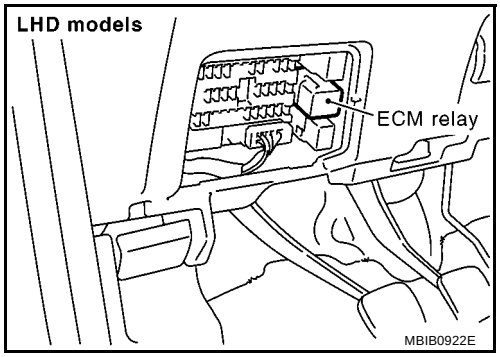
1. Disconnect ECM relay.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ECM RELAY

Refer to EC-1316, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace ECM relay.

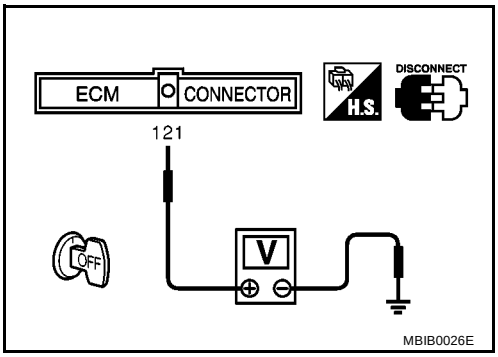
13. CHECK ECM POWER SUPPLY CIRCUIT-V

Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.



14. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse
- Harness connectors E105, M10
- Harness for open or short between ECM and fuse

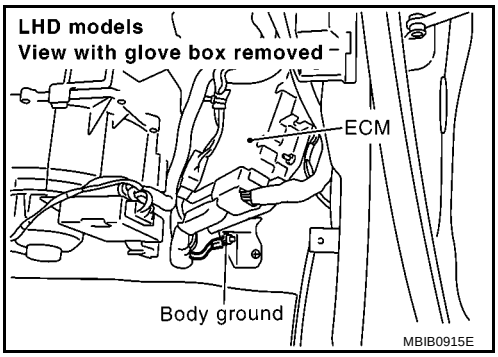
>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace ground connection.



16. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

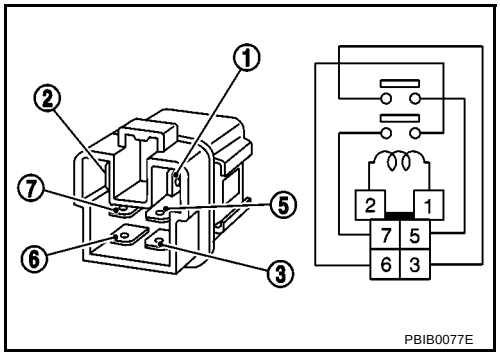
EBS014T9

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



Ground Inspection

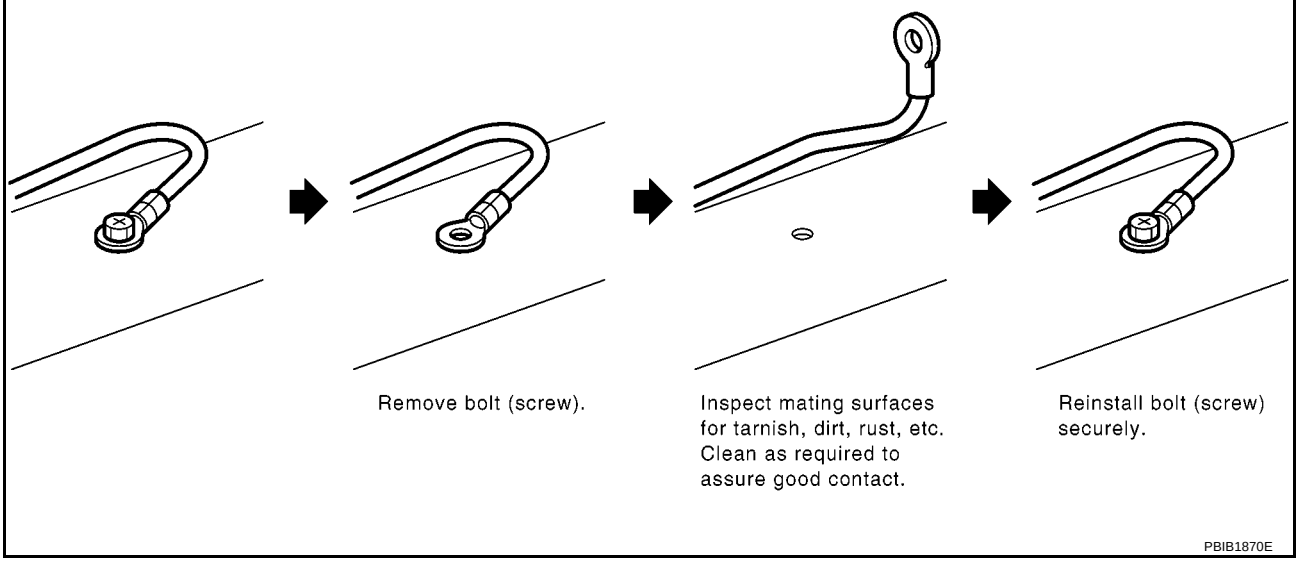
EBS014TA

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to EL-23, “GROUND”.

Ground Inspection



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

EBS014TB

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.

On Board Diagnosis Logic

EBS014TC

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication line	● ECM can not communicate to other control unit. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

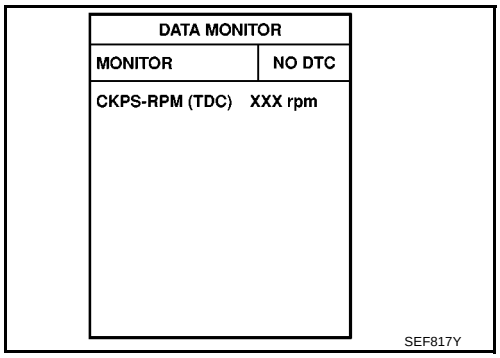
DTC Confirmation Procedure

EBS014TD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1320, "Diagnostic Procedure" .

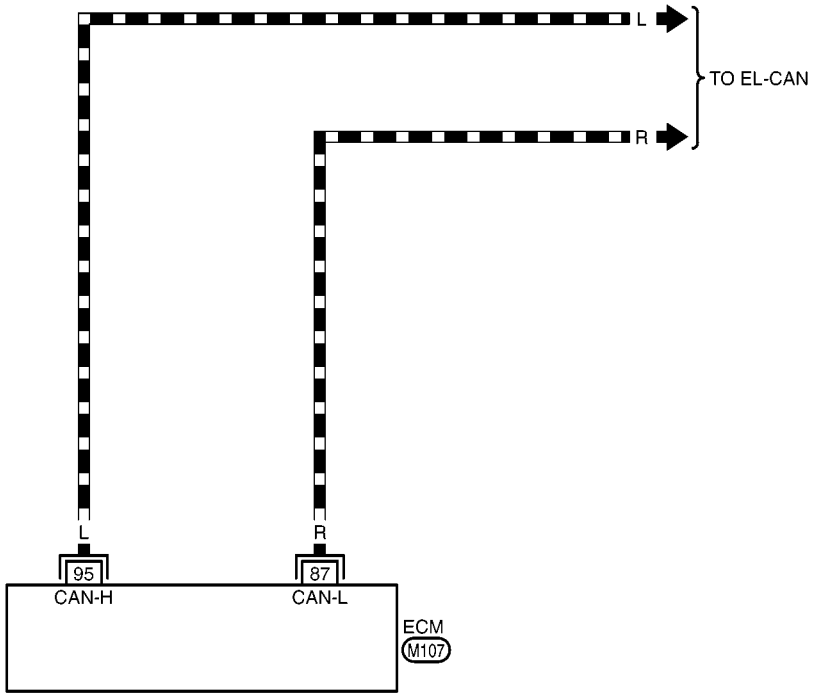


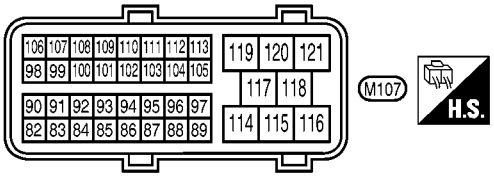
Wiring Diagram

EBS014TE

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





YEC495A

Diagnostic Procedure

EBS014TF

1. INSPECTION START

1. Turn ignition switch ON.
2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II.
3. Print out the CONSULT-II screen.

Models with ESP

OK data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	OK
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0868E

Models without ESP

OK data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	OK
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	OK
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

NG data

DATA MONITOR	
MONITOR	
CAN COMM	OK
CAN CIRC 1	UNKWN
CAN CIRC 2	UNKWN
CAN CIRC 3	UNKWN
CAN CIRC 4	UNKWN
CAN CIRC 5	UNKWN
CAN CIRC 6	UNKWN
CAN CIRC 7	UNKWN

MBIB0009E

>> Go to EL-459, “CAN COMMUNICATION”.

DTC P0016 CKP - CMP CORRELATION

PFP:10328

On Board Diagnosis Logic

EBS014TG

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0016	Crankshaft position - camshaft position correlation	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	● Camshaft position sensor ● Crankshaft position sensor ● Timing chain ● Signal plate

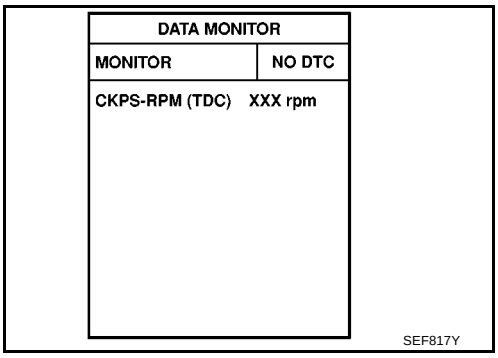
DTC Confirmation Procedure

EBS014TH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1321, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014TI

1. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1411, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 3.
NG >> Remove debris and clean the signal plate or replace sprocket.

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1400, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor.

4. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 5.
NG >> Replace the signal plate.

5. CHECK TIMING CHAIN

Refer to EM-171, "SECONDARY TIMING CHAIN" , EM-176, "PRIMARY TIMING CHAIN" and EM-143, "VACUUM PUMP" .

OK or NG

OK >> GO TO 6.
NG >> Replace timing chain.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0088 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

EBS014TJ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	● Fuel pump ● Fuel injector ● Fuel rail pressure sensor

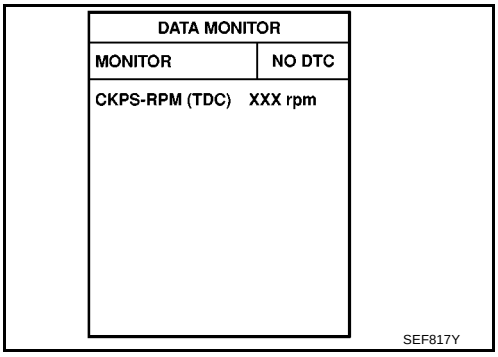
DTC Confirmation Procedure

EBS014TK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 20 seconds.
4. If DTC is detected, go to EC-1323, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014TL

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-1363, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel injector.

3. CHECK FUEL PUMP

Refer to EC-1429, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

EBS014TM

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR"

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0089 FUEL PUMP

PFP:16700

On Board Diagnosis Logic

EBS014TN

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0089	Fuel pump performance	Fuel pressure is too much higher than the target value.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

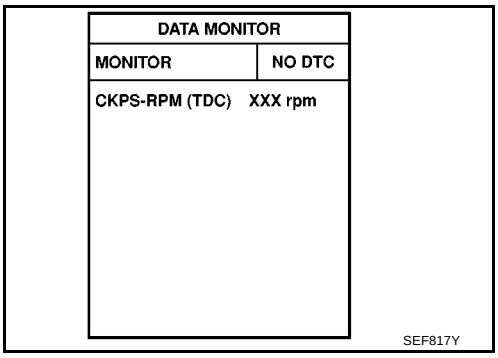
DTC Confirmation Procedure

EBS014TO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 30 seconds.
4. If DTC is detected, go to EC-1325, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014TP

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1325, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace fuel rail.

3. CHECK FUEL PUMP

Perform EC-1426, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace Fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

EBS014TQ

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0093 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

EBS014TR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0093	Fuel system leak	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	● Fuel pump ● Fuel rail ● Fuel pipe ● Fuel rail pressure relief valve ● Air mixed with fuel ● Lack of fuel

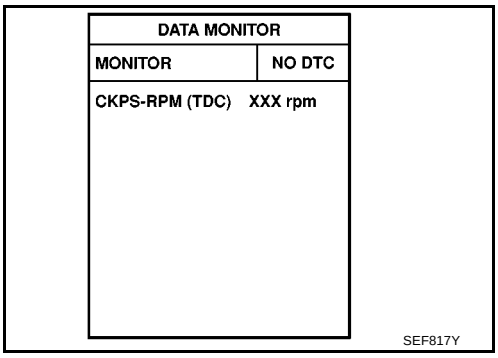
DTC Confirmation Procedure

EBS014TS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
4. If DTC is detected, go to EC-1327, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014TT

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1327, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.
- Fuel tube from fuel pump to fuel rail
- Fuel rail
- Fuel tube from fuel rail to fuel injector
3. Also check for improper connection or pinches.

OK or NG

OK >> GO TO 3.
NG >> Repair malfunctioning part.

3. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

EBS014TU

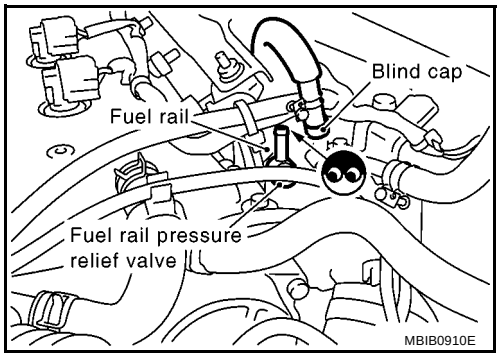
FUEL RAIL PRESSURE RELIEF VALVE

With CONSULT-II

WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.



5. Select “PRES REGULATOR” in “ACTIVE TEST MODE” with CONSULT-II.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 160 MPa with touching “UP” or “Qu” on the CONSULT-II screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

WARNING:

- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

ACTIVE TEST	
PRES REGULATOR	XXX MPa
MONITOR	
CKPS-RPM (TDC)	XXX rpm
ACT CR PRESS	XXX MPa

PBIB0587E

Removal and Installation

EBS014TV

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

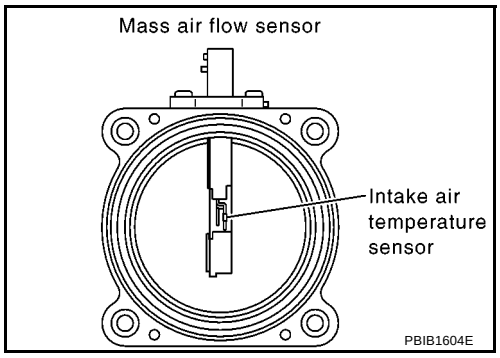
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

EBS014TW

The mass air flow sensor 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.



CONSULT-II Reference Value in Data Monitor Mode

EBS014TX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1.5 - 2.0V
		2,000 rpm	2.2 - 2.7V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS014TY

Specification data are reference values, and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W/L	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.8 - 2.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 3.0V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
73	O/L	Mass air flow sensor ground	**[Ignition switch ON]**	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

EBS014TZ

The MI will not light up for these self-diagnoses.

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.) ● Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

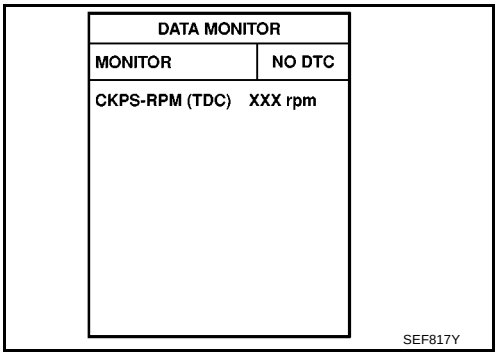
DTC Confirmation Procedure

EBS014U0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

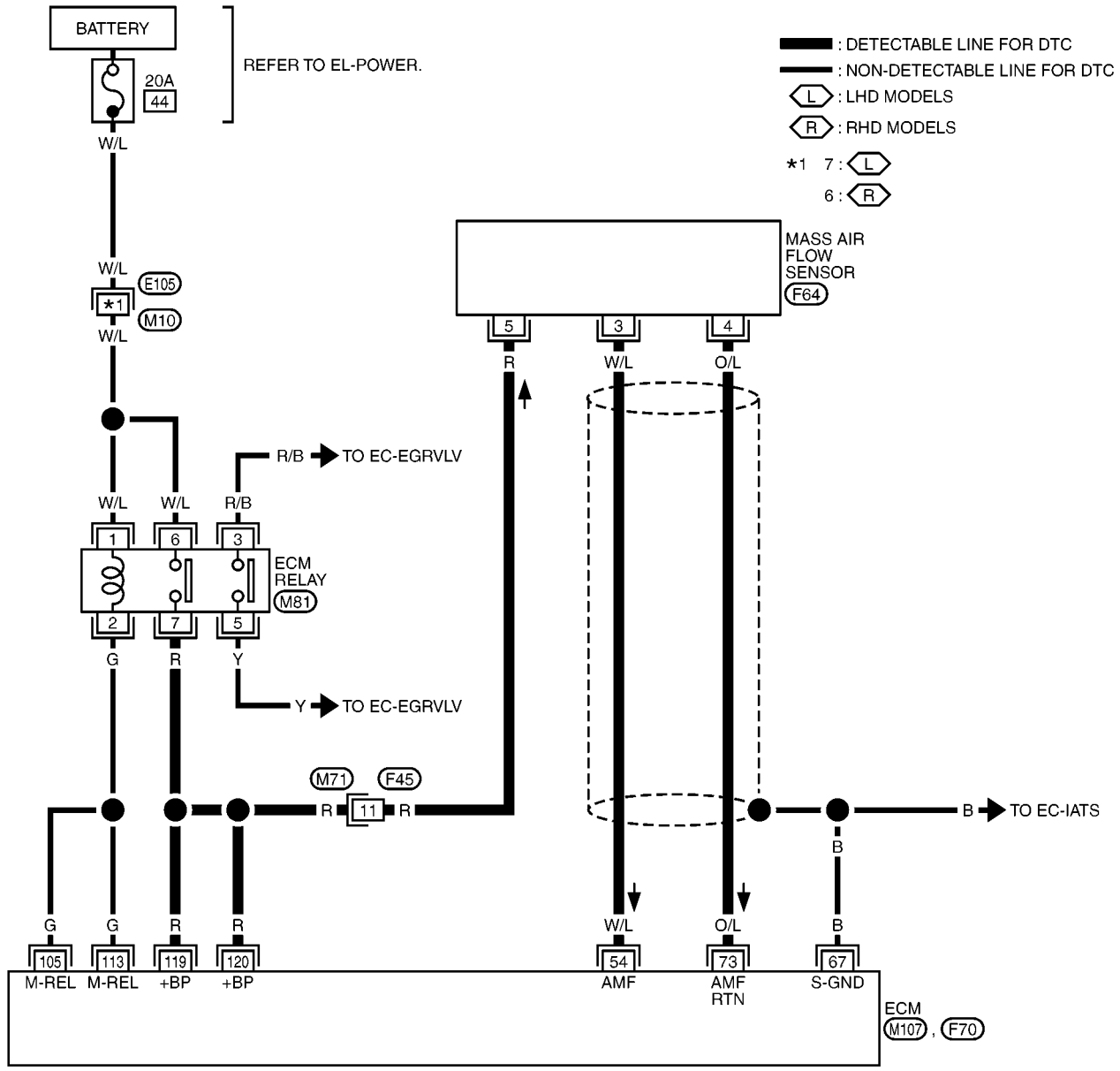
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1333, "Diagnostic Procedure" .

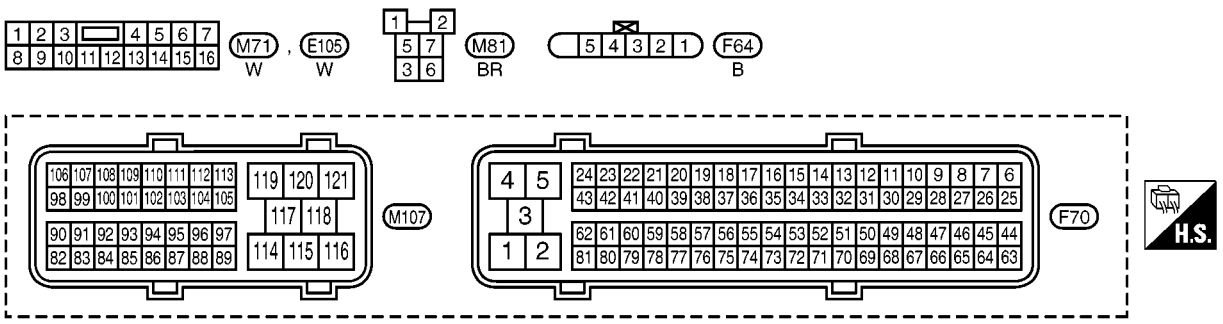


Wiring Diagram

EBS014U1

EC-MAFS-01





MBWA0654E

Diagnostic Procedure

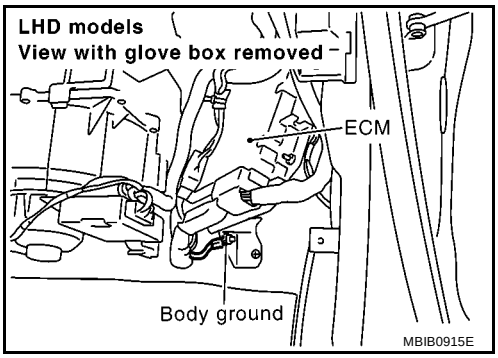
EBS014U2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

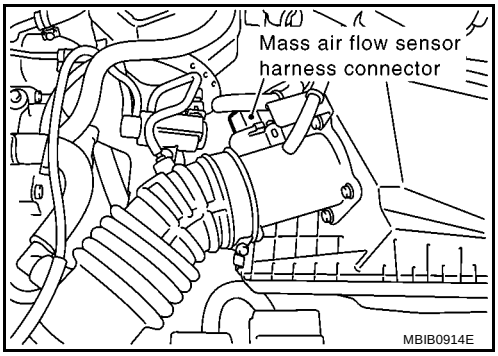
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.

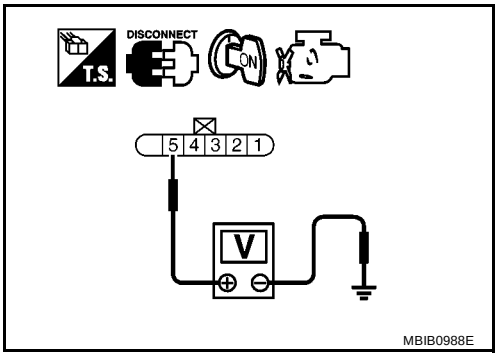


3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM

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

4. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1334, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

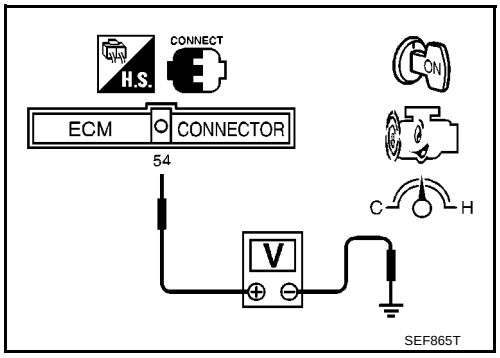
Component Inspection

EBS014U3

MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed up to normal operating temperature.)	1.8 - 2.3
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.5 - 3.0



4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

Removal and Installation

EBS014U4

MASS AIR FLOW SENSOR

Refer to EM-119, "AIR CLEANER AND AIR DUCT" .

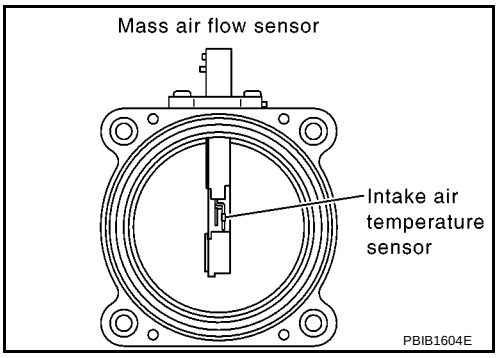
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

EBS014U5

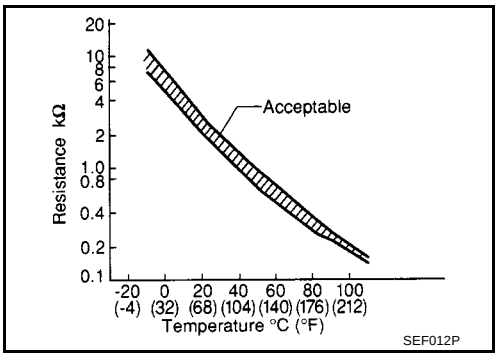
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.73	7.9 - 9.3
25 (77)	3.62	1.9 - 2.1
80 (176)	1.53	0.31 - 0.37

*: This data is reference value and is measured between ECM terminal 55 (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.

On Board Diagnosis Logic

EBS014U6

The MI will not light up for these self-diagnoses.

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.	

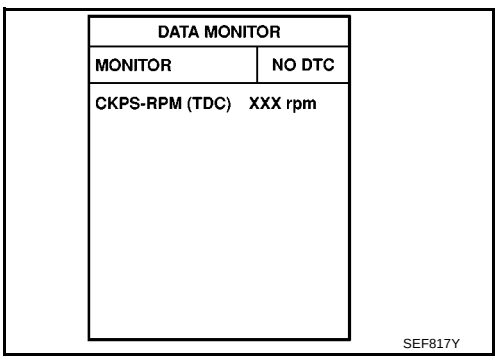
DTC Confirmation Procedure

EBS014U7

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

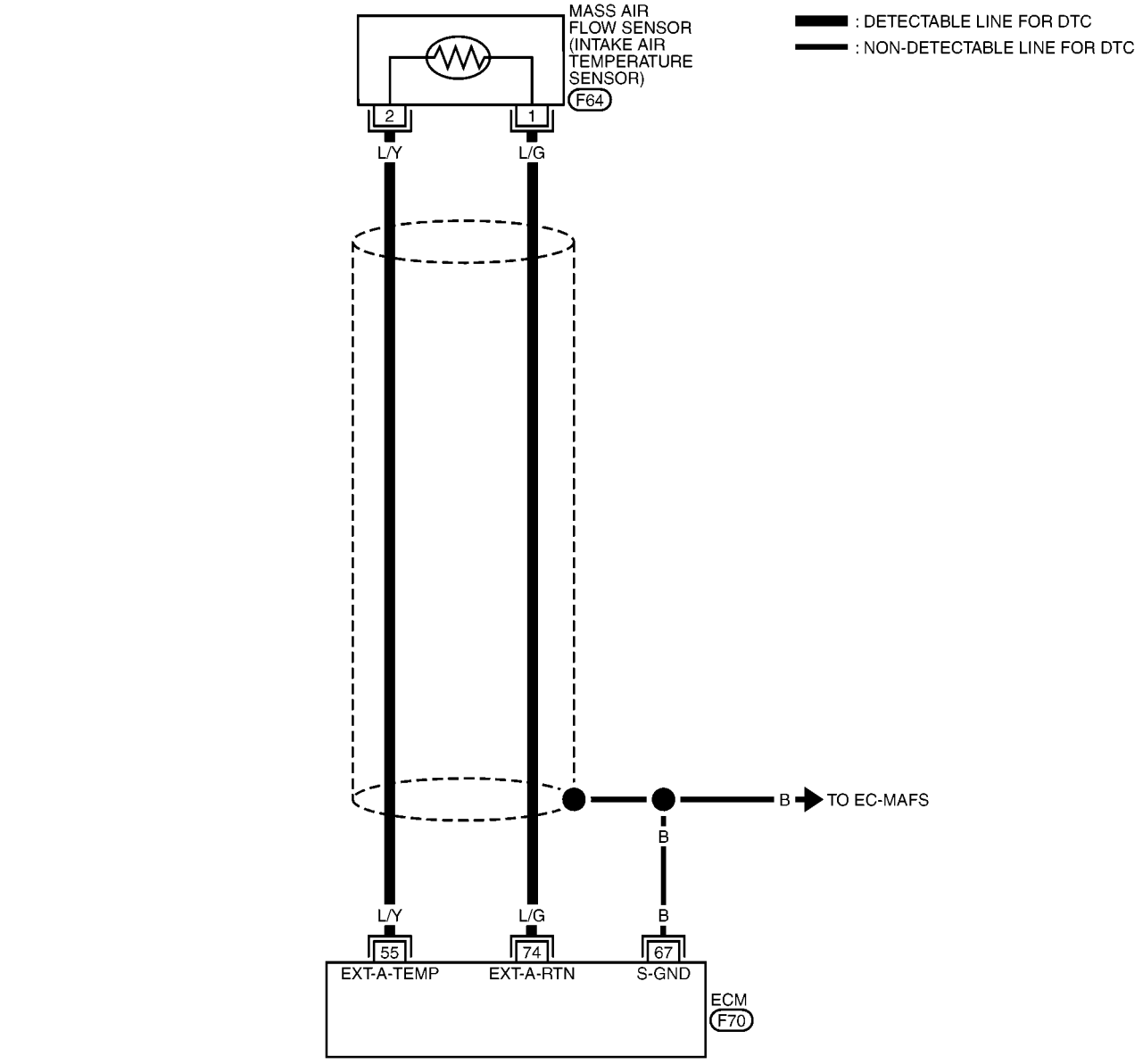
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1337, "Diagnostic Procedure" .

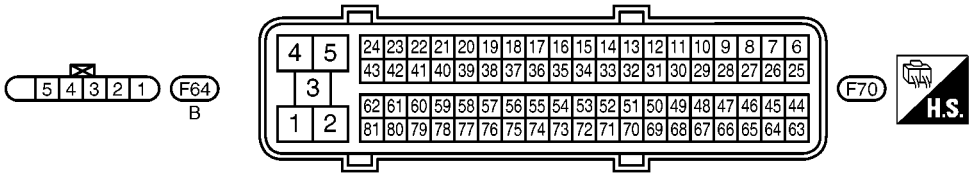


Wiring Diagram

EBS014U8

EC-IATS-01





YEC497A

Diagnostic Procedure

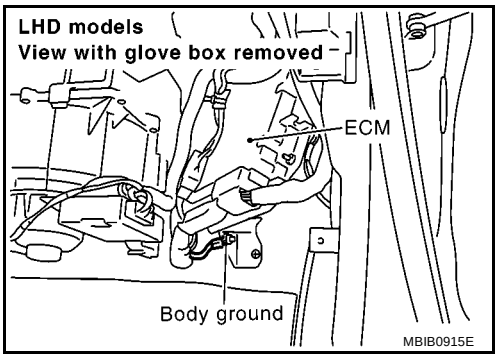
EBS014U9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

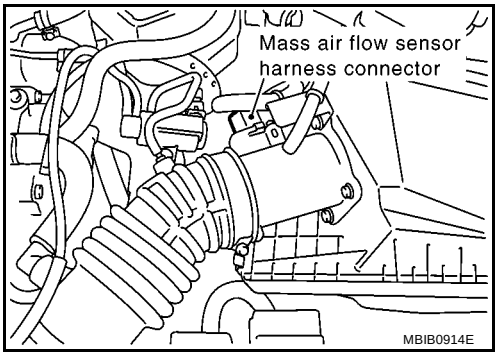
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.

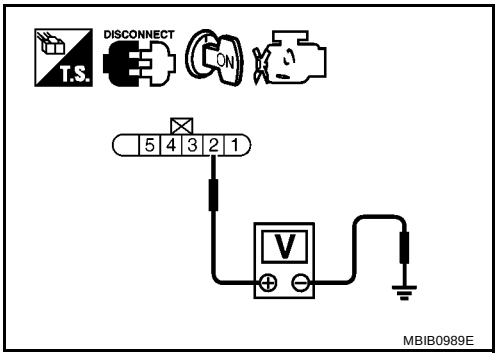


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between MAF sensor terminal 1 and ECM terminal 74. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1338, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

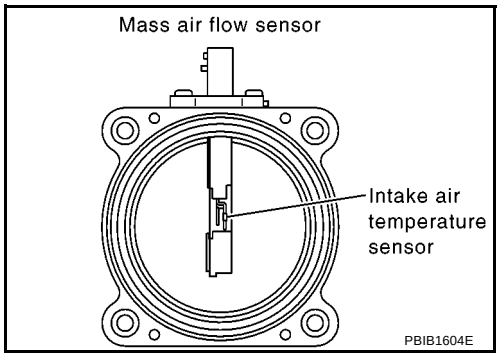
EBS014UA

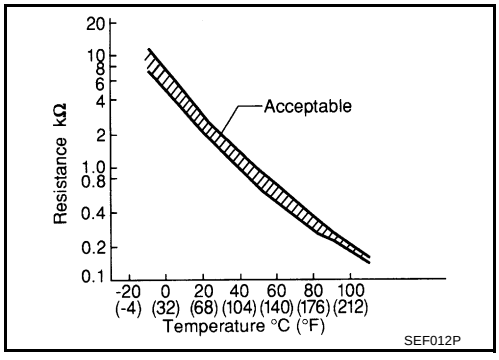
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

EBS014UB

MASS AIR FLOW SENSOR

Refer to EM-119, "AIR CLEANER AND AIR DUCT" .

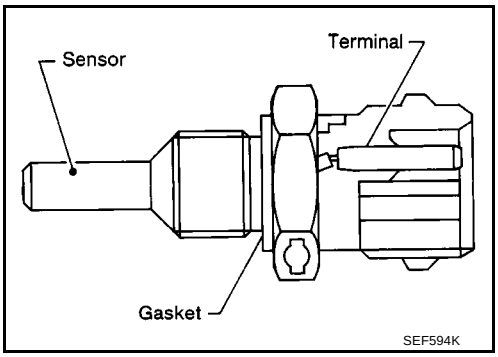
DTC P0117, P0118 ECT SENSOR

PFP:22630

Description

EBS014UC

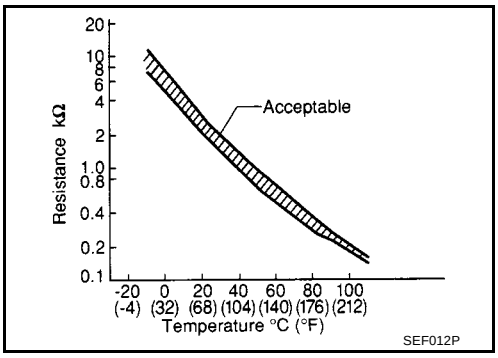
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 51 (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.

On Board Diagnosis Logic

EBS014UD

The MI will not light up for these self-diagnoses.

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

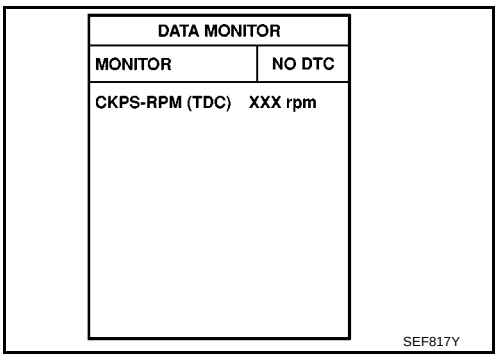
EBS014UE

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

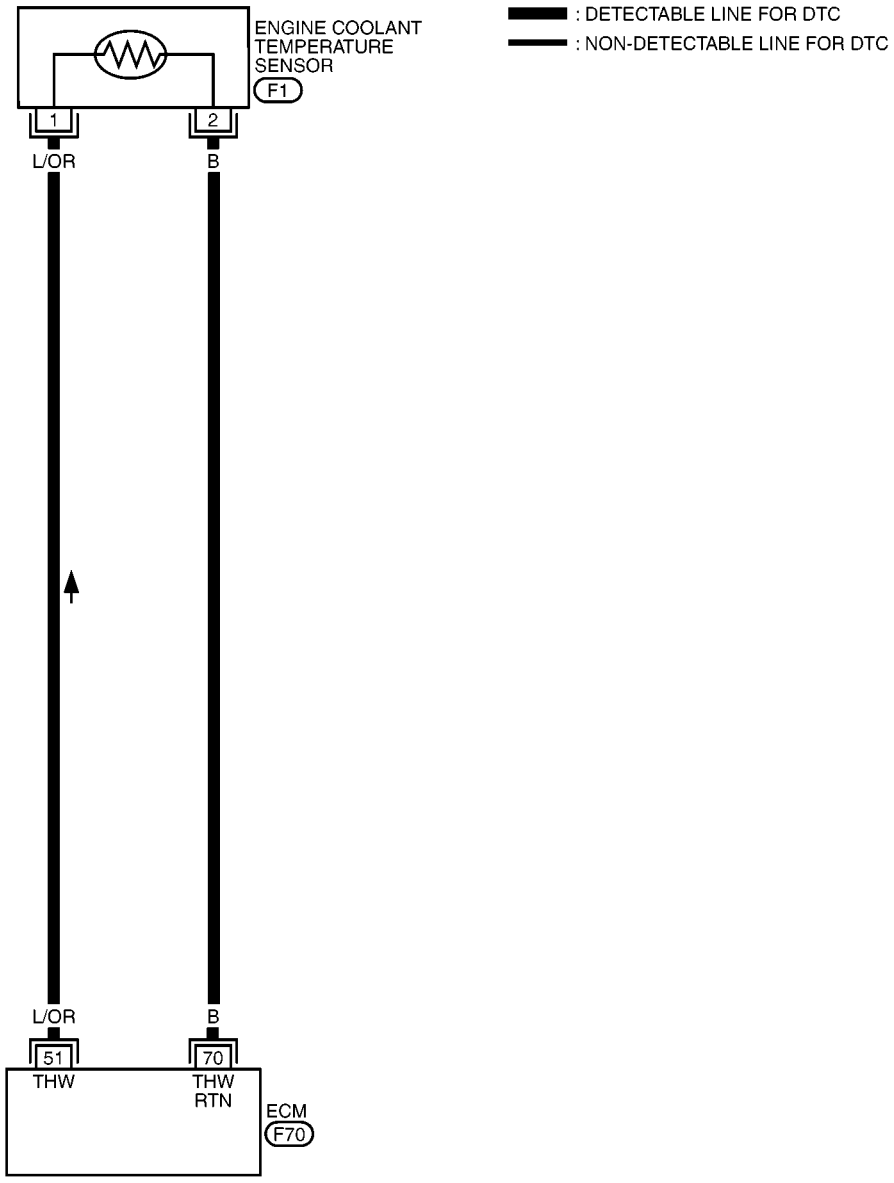
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1341, "Diagnostic Procedure" .

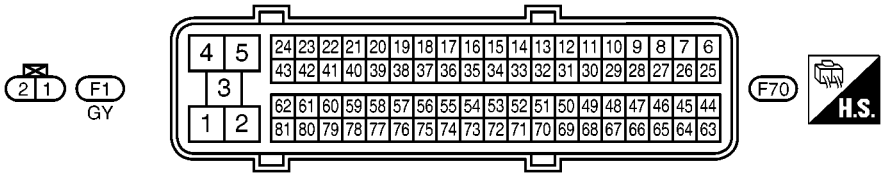


Wiring Diagram

EBS014UF

EC-ECTS-01





YEC498A

Diagnostic Procedure

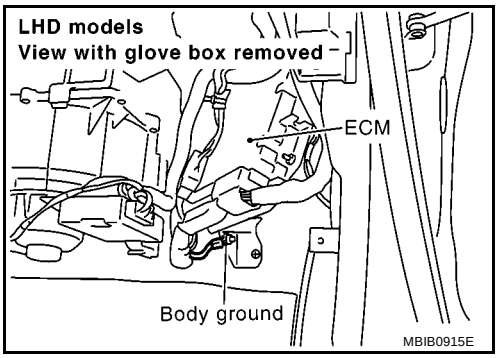
EBS014UG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

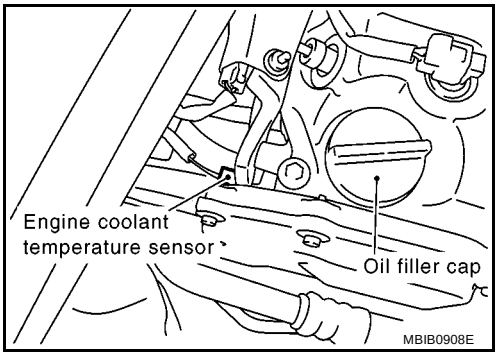
OK or NG

OK >> GO TO 2.
NG >> 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.

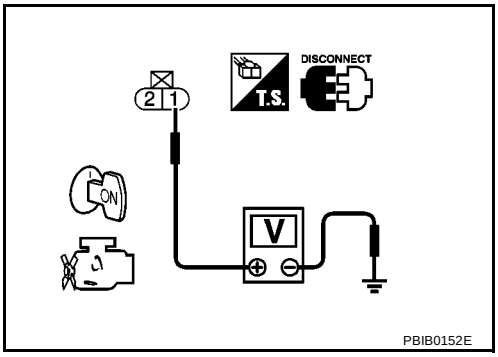


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between ECT sensor terminal 2 and ECM terminal 70. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1342, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

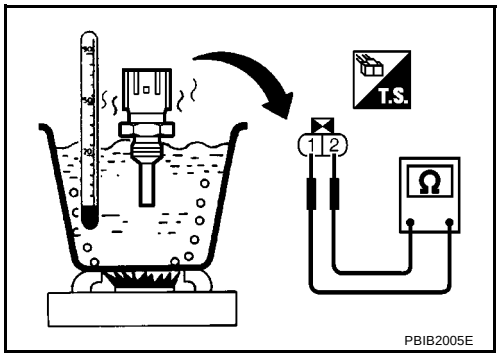
>> **INSPECTION END**

Component Inspection

EBS014UH

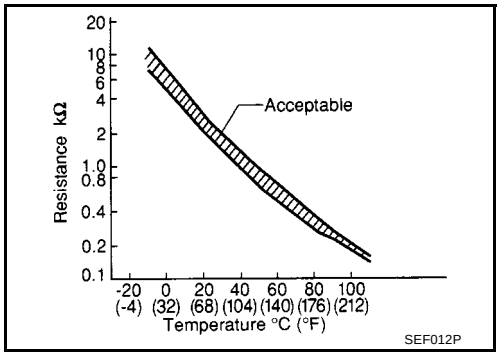
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

EBS014UI

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-186, "CYLINDER HEAD" .

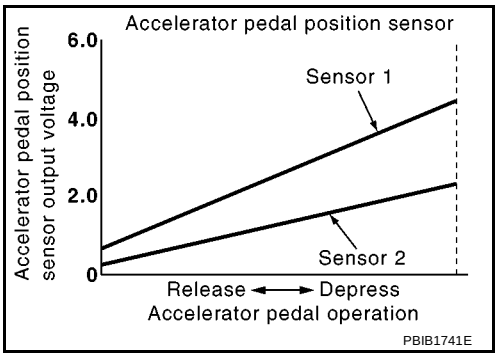
DTC P0122, P0123 APP SENSOR

PFP:18002

Description

EBS014UJ

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

EBS014UK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS014UL

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014UM

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

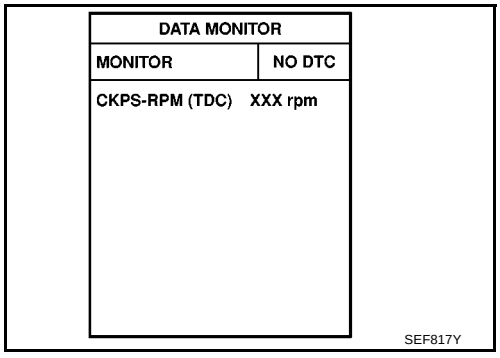
DTC Confirmation Procedure

EBS014UN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

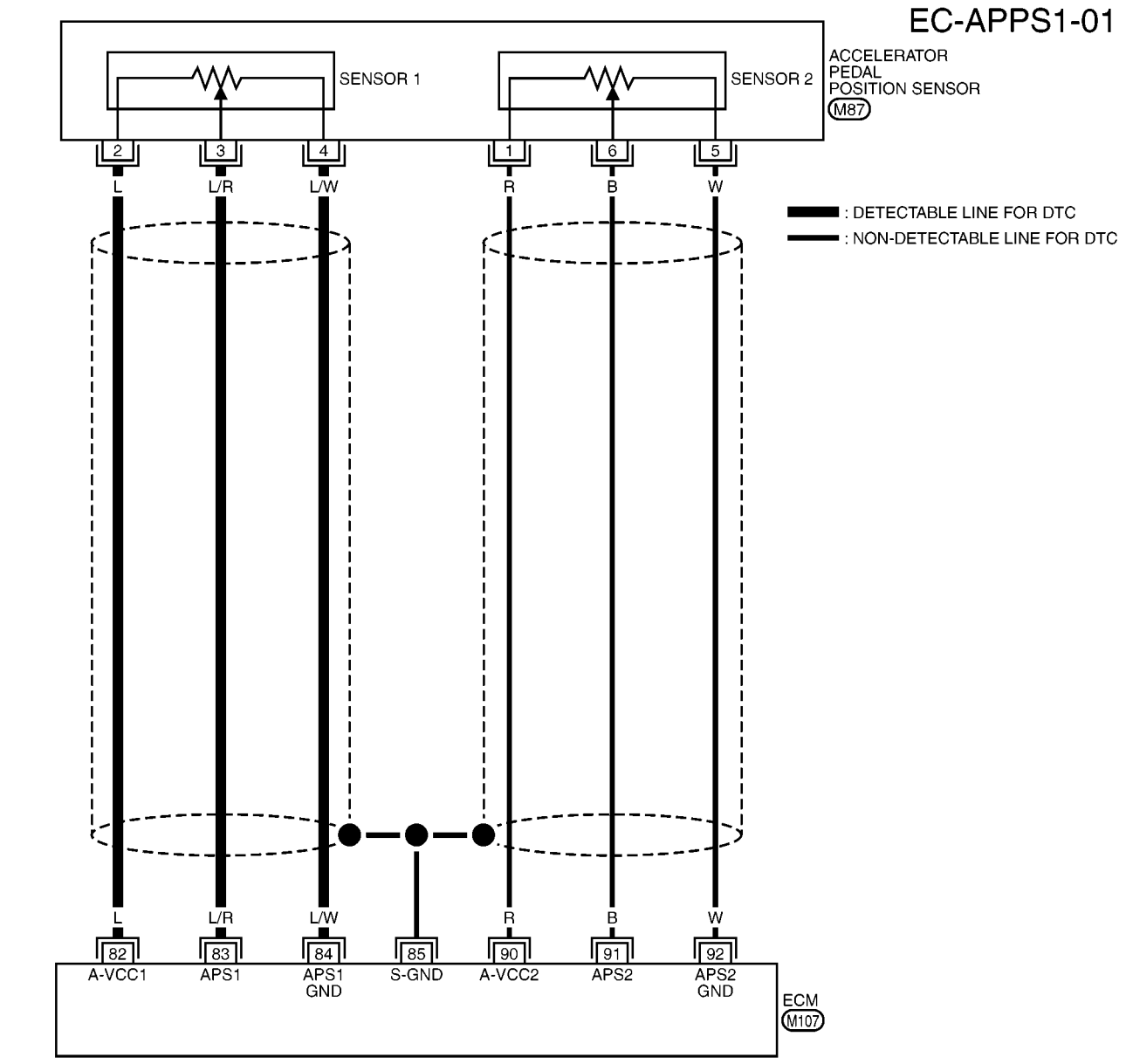
WITH CONSULT-II

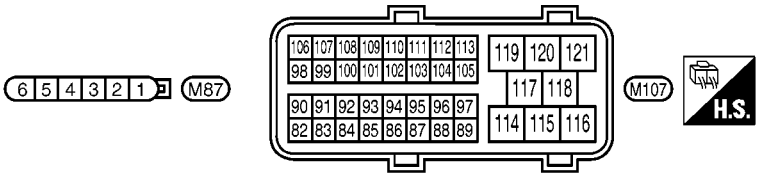
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1346, "Diagnostic Procedure" .



Wiring Diagram

EBS014UO





YEC499A

Diagnostic Procedure

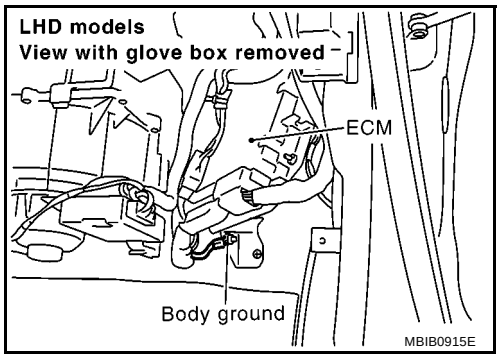
EBS014UP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

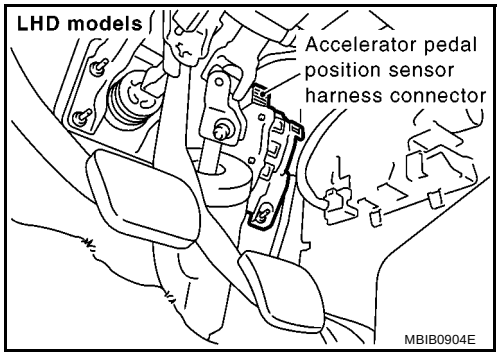
OK or NG

OK >> GO TO 2.
NG >> 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.

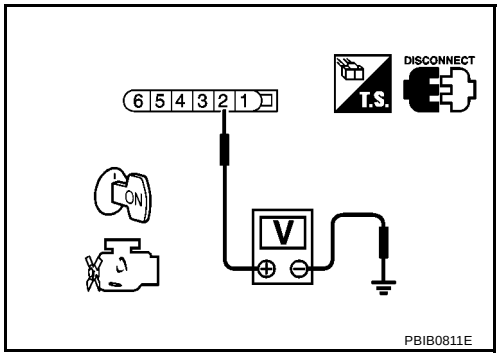


3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between APP sensor terminal 4 and ECM terminal 84. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 83 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1347, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

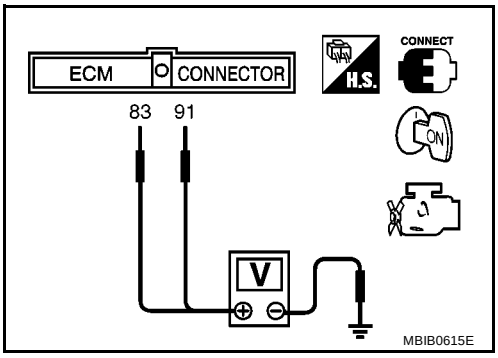
Component Inspection

EBS014UQ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS014UR

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

PFP:16700

Description

EBS014US

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.

CONSULT-II Reference Value in Data Monitor Mode

EBS014UT

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL TEMP SEN	● Engine: After warming up	More than 40°C (104°F)

ECM Terminals and Reference Value

EBS014UU

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
69	B	Fuel pump temperature sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014UV

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel pump 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.) ● Fuel pump temperature sensor
P0183	Fuel pump temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

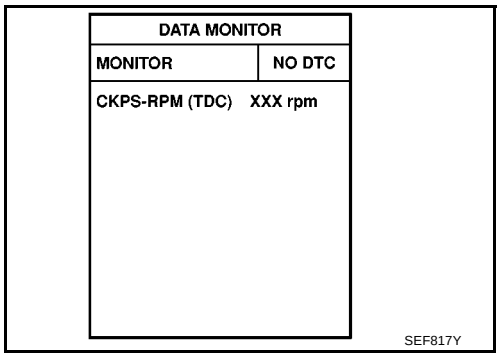
EBS014UW

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

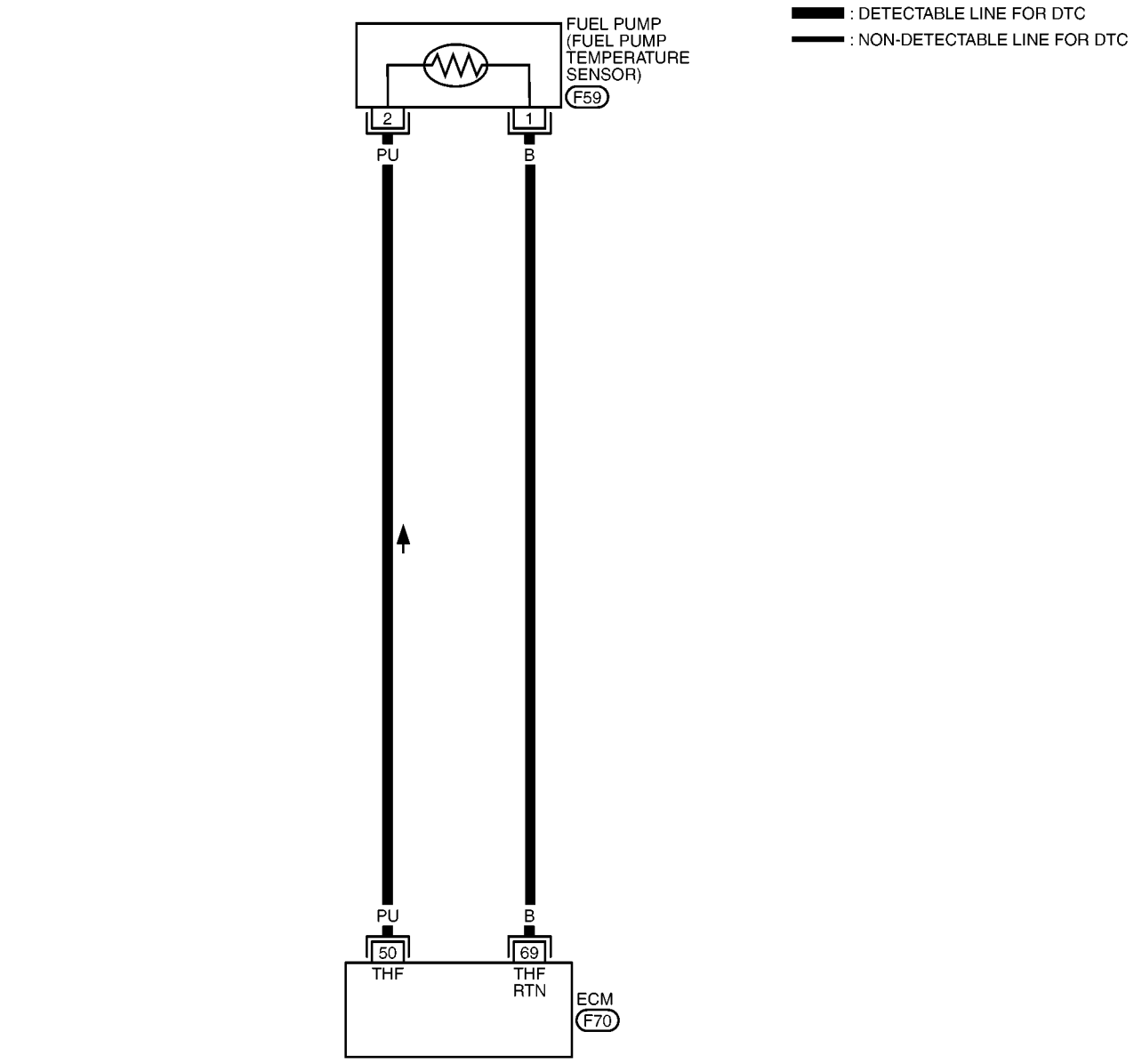
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1350, "Diagnostic Procedure" .

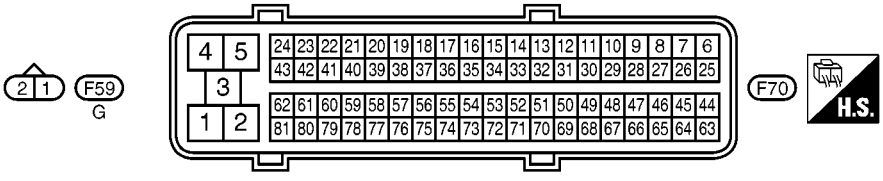


Wiring Diagram

EBS014UX

EC-FTS-01





YEC506A

Diagnostic Procedure

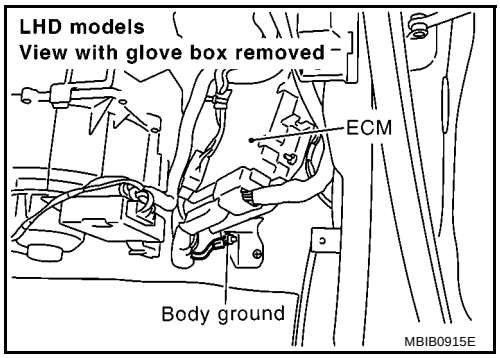
EBS014UY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

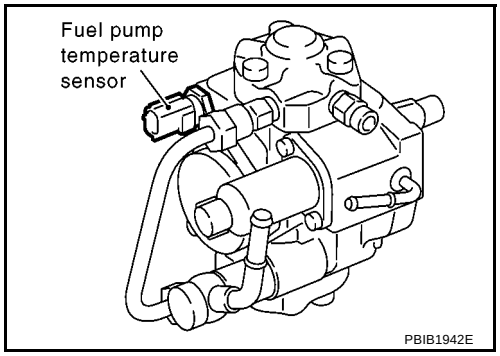
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.

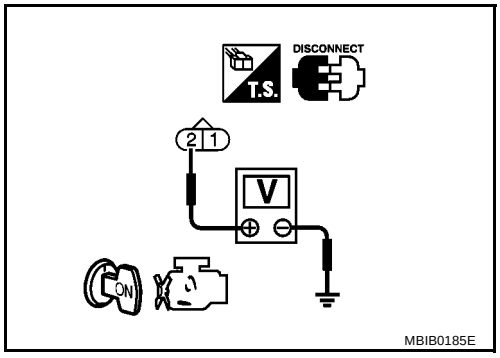


3. Check voltage between fuel pump temperature sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair 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 harness continuity between fuel pump temperature sensor terminal 1 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Removal and Installation

EBS014UZ

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P0192, P0193 FRP SENSOR

PFP:16638

Description

EBS014V0

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 by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-II Reference Value in Data Monitor Mode

EBS014V1

Specification data are reference values.

MONITOR	CONDITION		SPECIFICATOIN
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa

ECM Terminals and Reference Value

EBS014V2

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48 49	R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.0 - 2.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014V3

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0192	Fuel rail pressure 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.) ● Fuel rail pressure sensor
P0193	Fuel rail pressure sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

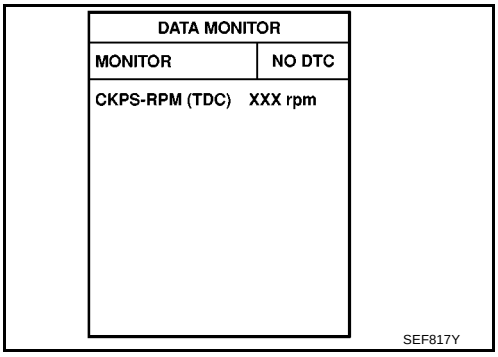
DTC Confirmation Procedure

EBS014V4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

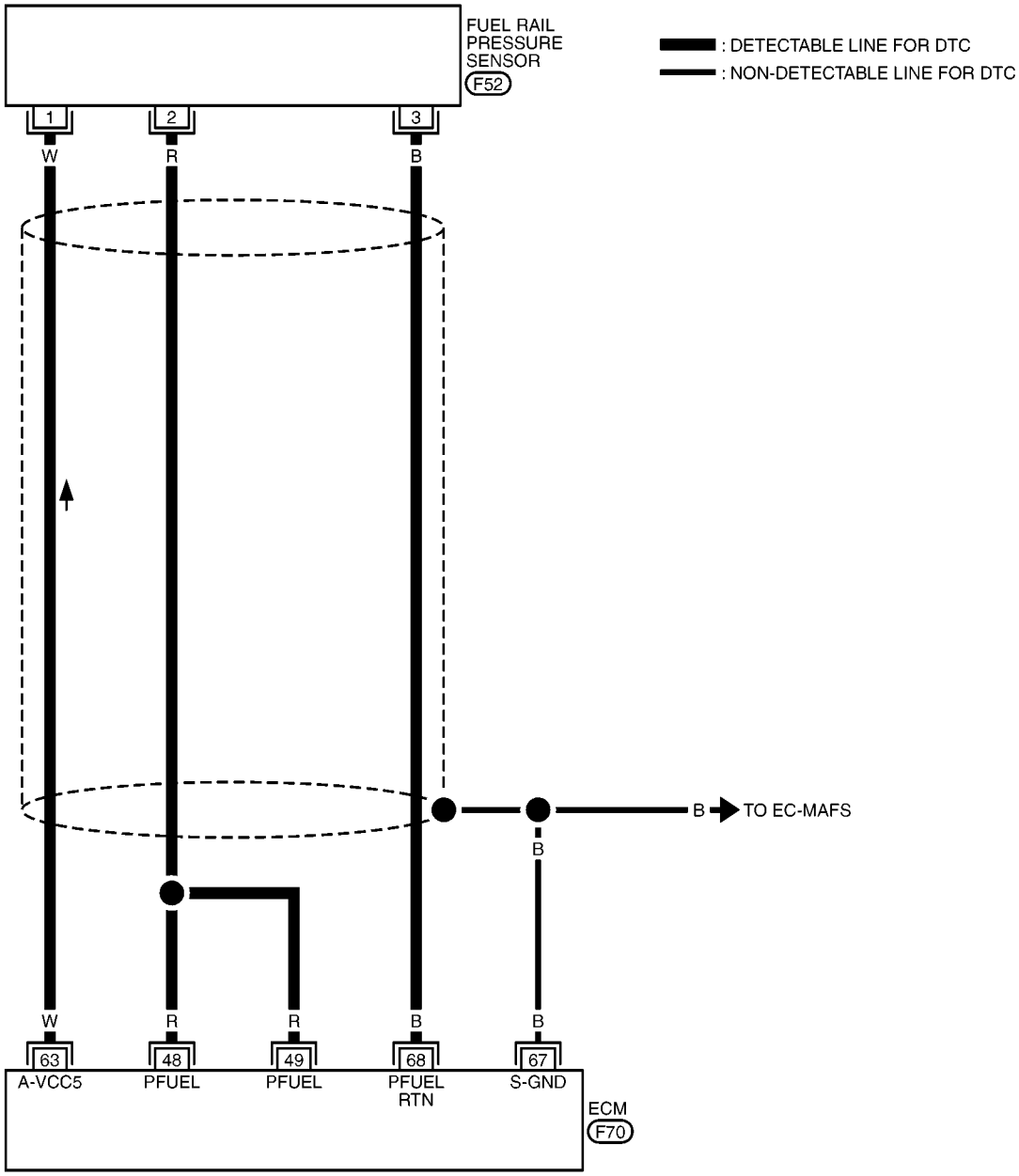
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1355, "Diagnostic Procedure" .

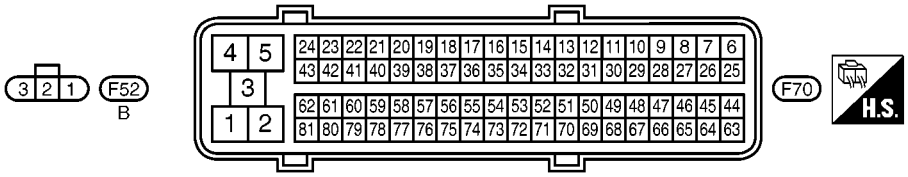


Wiring Diagram

EBS014V5

EC-FRPS-01





YEC500A

Diagnostic Procedure

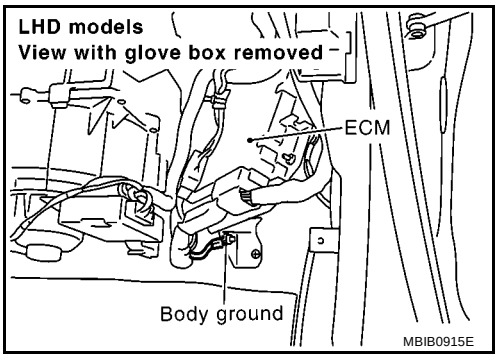
EBS014V6

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

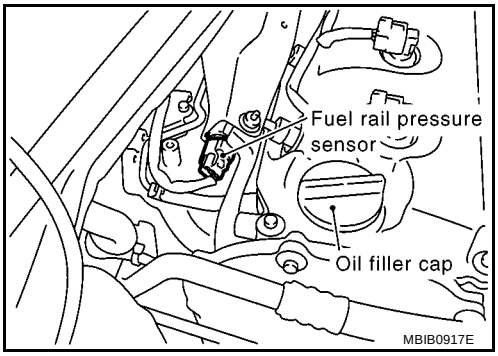
OK or NG

OK >> GO TO 2.
NG >> 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.

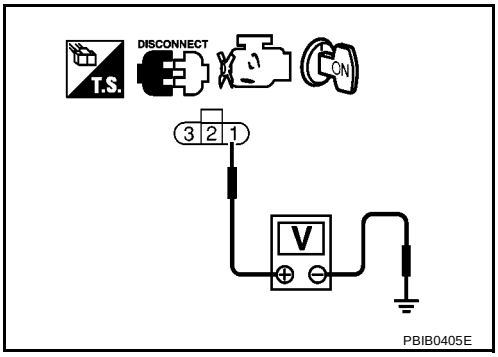


3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

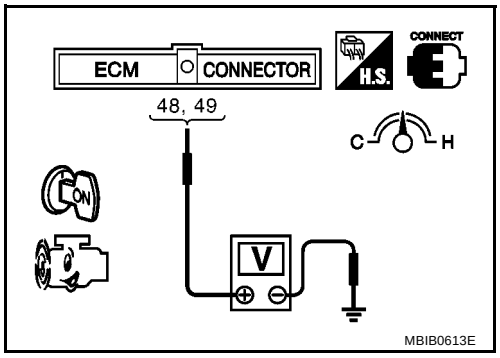
Component Inspection

EBS014V7

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminals 48, 49 (Fuel rail pressure sensor signal) and ground under the following conditions.

Condition	Voltage V
Idle	1.7 - 2.0
2,000 rpm	2.0 - 2.3



4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.
5. If NG, replace fuel rail.

Removal and Installation

EBS014V8

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0200 FUEL INJECTOR

PFP:16600

On Board Diagnosis Logic

EBS014V9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0200	Fuel injector power supply circuit	ECM detects a voltage of power source for the fuel injector is excessively high or low.	● ECM

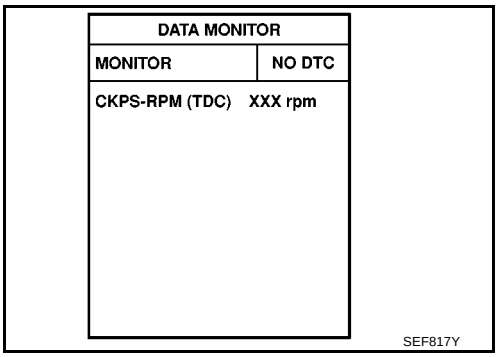
DTC Confirmation Procedure

EBS014VA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1357, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014VB

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1357, "DTC Confirmation Procedure" , again.
5. Is DTC P0200 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-1273, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

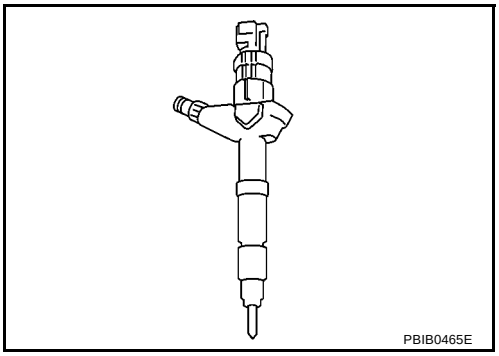
DTC P0201 - P0204 FUEL INJECTOR

PFP:16600

Component Description

EBS014VC

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS014VD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

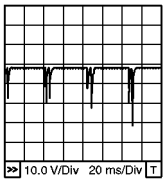
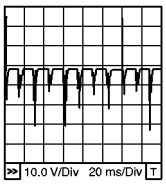
ECM Terminals and Reference Value

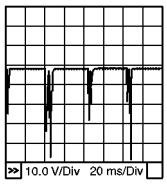
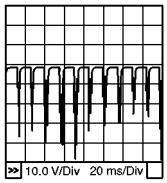
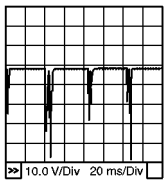
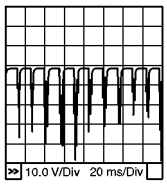
EBS014VE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014VF

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201	No. 1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.) ● Fuel injector
P0202	No. 2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203	No. 3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204	No. 4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC Confirmation Procedure

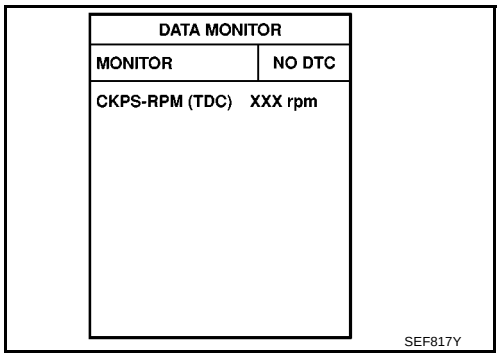
EBS014VG

NOTE:
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 the ambient temperature is more than -20°C (-4°F).

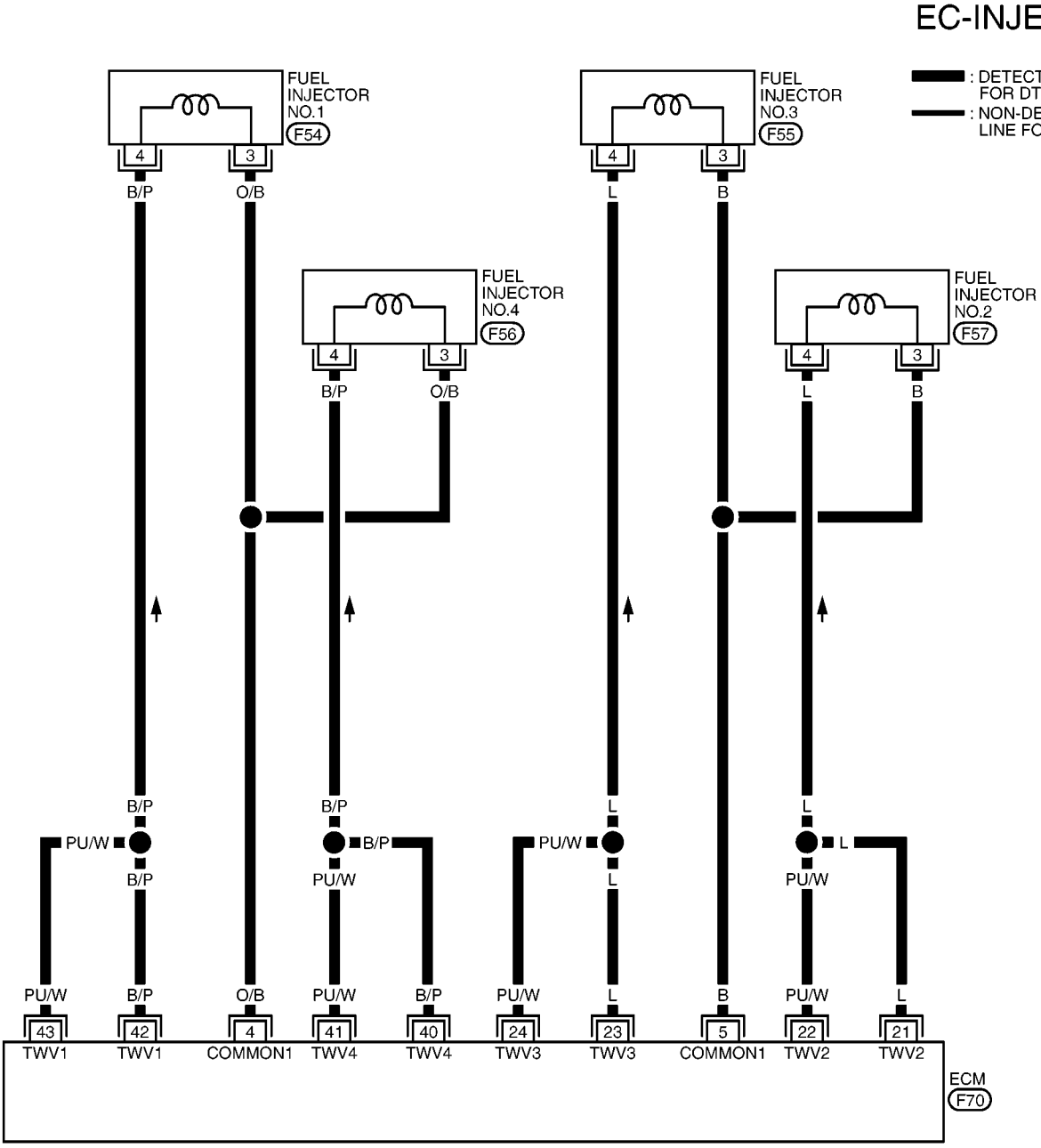
WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1362, "Diagnostic Procedure" .

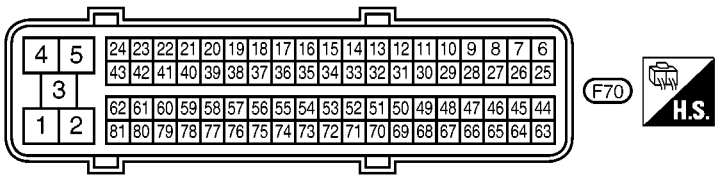


Wiring Diagram

EBS014VH







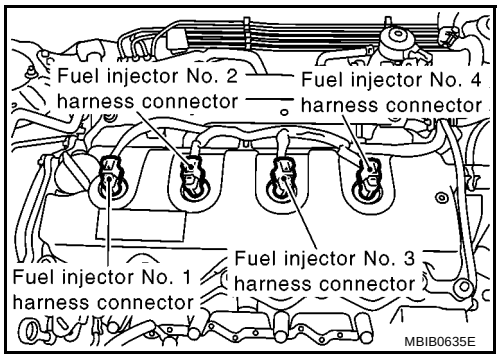
MBWA0633E

Diagnostic Procedure

EBS014VI

1. CHECK FUEL INJECTOR POWER SUPPLY FOR OPEN AND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	4	3	No.1
P0202	5	3	No.2
P0203	5	3	No.3
P0204	4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	42, 43	4	No.1
P0202	21, 22	4	No.2
P0203	23, 24	4	No.3
P0204	40, 41	4	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1363, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select “SELF DIAG RESULTS” mode with CONSULT-II.
6. Touch “ERASE”.
7. Perform EC-1360, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

Yes or No

Yes >> Replace fuel injector of malfunctioning cylinder.
No >> GO TO 5.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

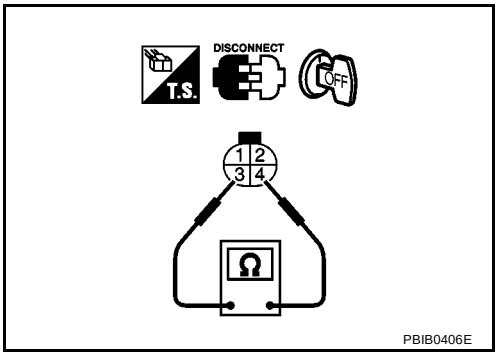
EBS014VJ

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS014VK

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0217 ENGINE OVER TEMPERATURE

PFP:21481

System Description

EBS014VL

NOTE:
If DTC P0217 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .

COOLING FAN CONTROL

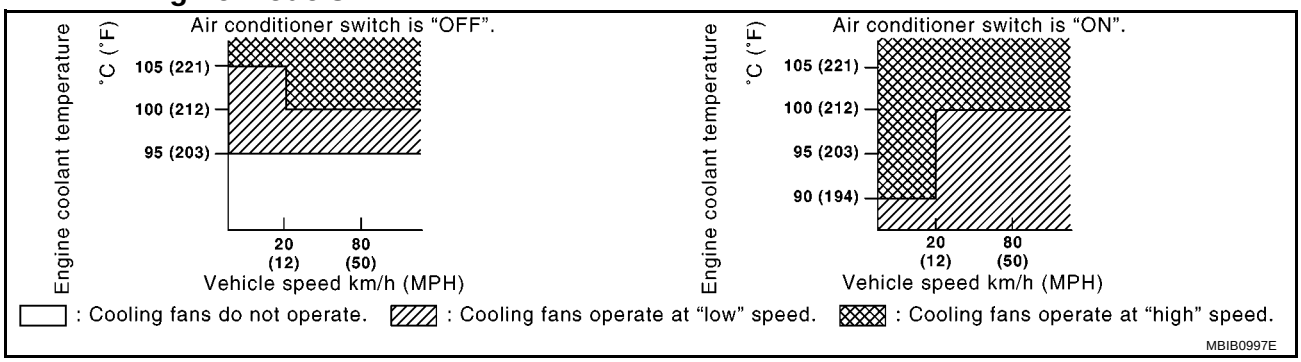
Sensor	Input signal to ECM	ECM function	Actuator
Vehicle speed sensor*1	Vehicle speed	Cooling fan control	Cooling fan relay *2
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch*1	Air conditioner ON signal		

*1: This input signal is sent to the ECM through CAN communication line.
*2: This output signal is sent from the ECM through CAN communication line.

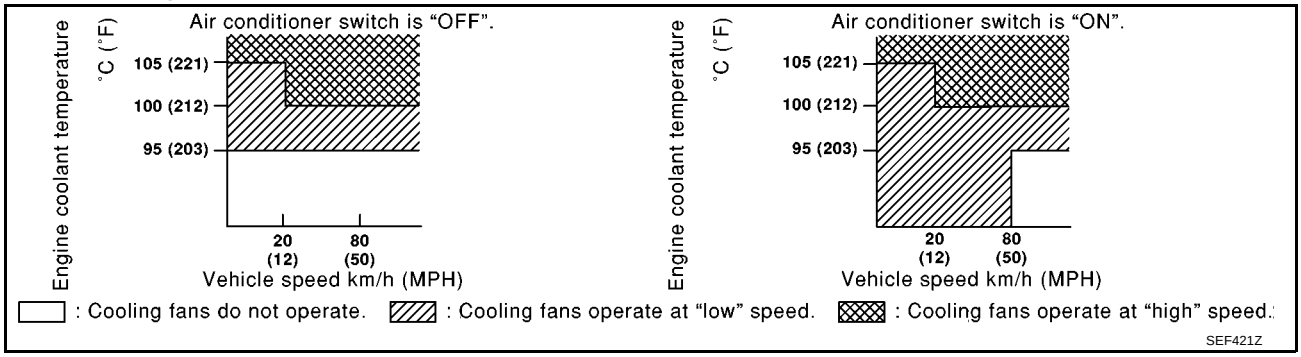
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

YD22DDTi Engine Models



YD22DDT Engine Models



CONSULT-II Reference Value in Data Monitor Mode

EBS014VM

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	● When cooling fan is stopped.	OFF
	● When cooling fans operate at low speed.	LOW
	● When cooling fans operate at high speed.	HI

On Board Diagnosis Logic

EBS014VN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217	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.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1376, "Main 12 Causes of Overheating" .

Overall Function Check

EBS014VO

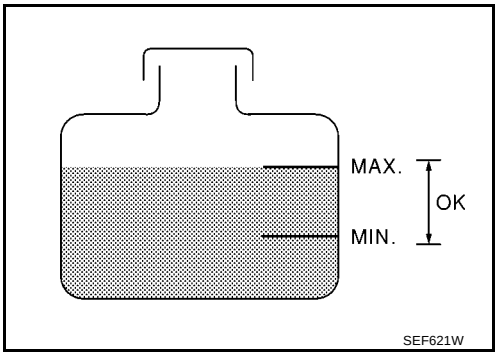
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

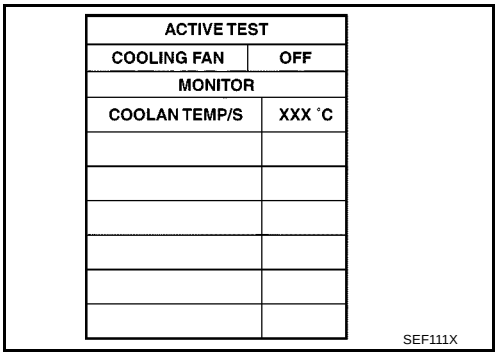
- **Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.**
- **Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1368, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1368, "Diagnostic Procedure" .
3. Turn ignition switch ON.

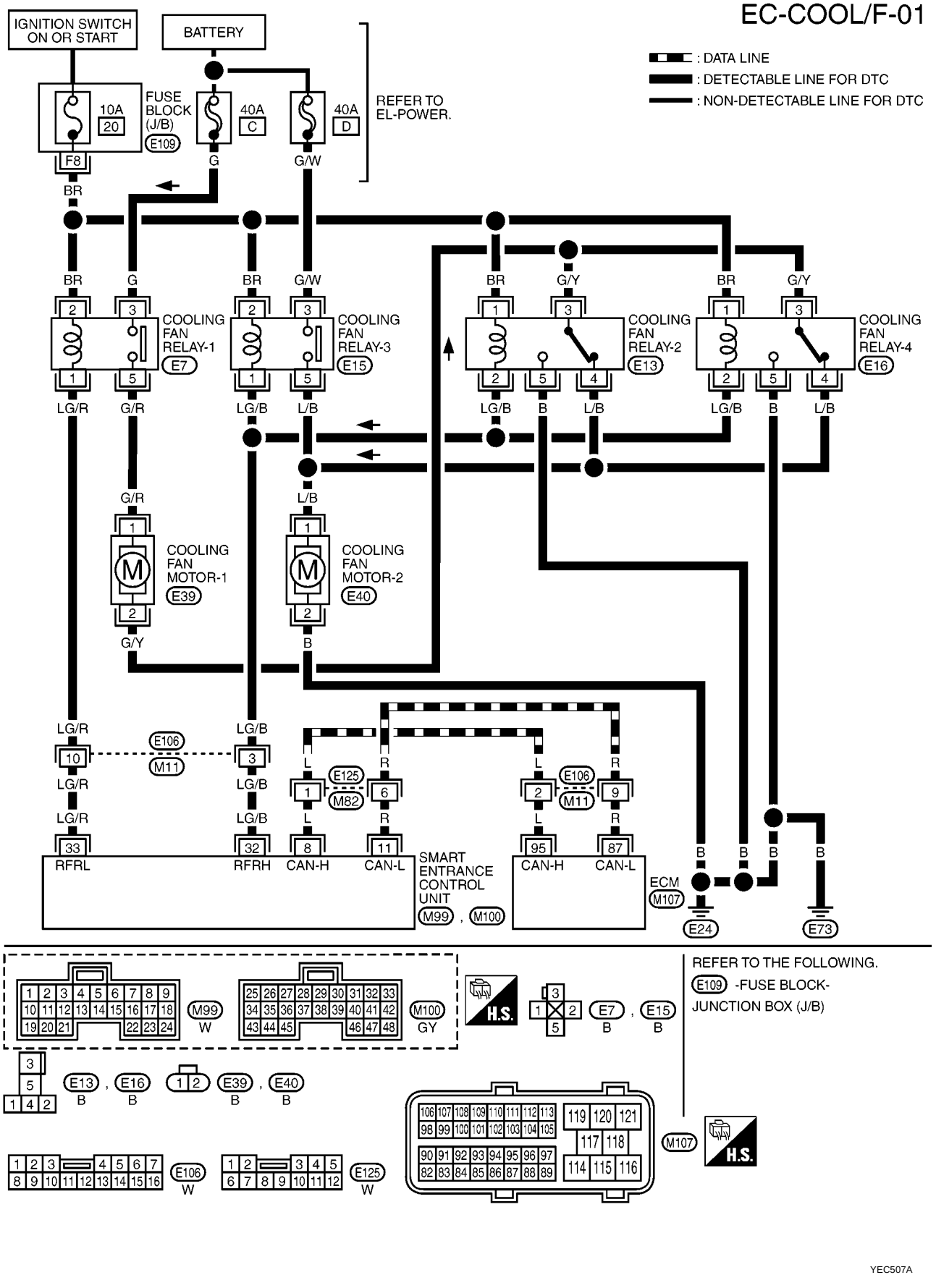


4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1368, "Diagnostic Procedure" .



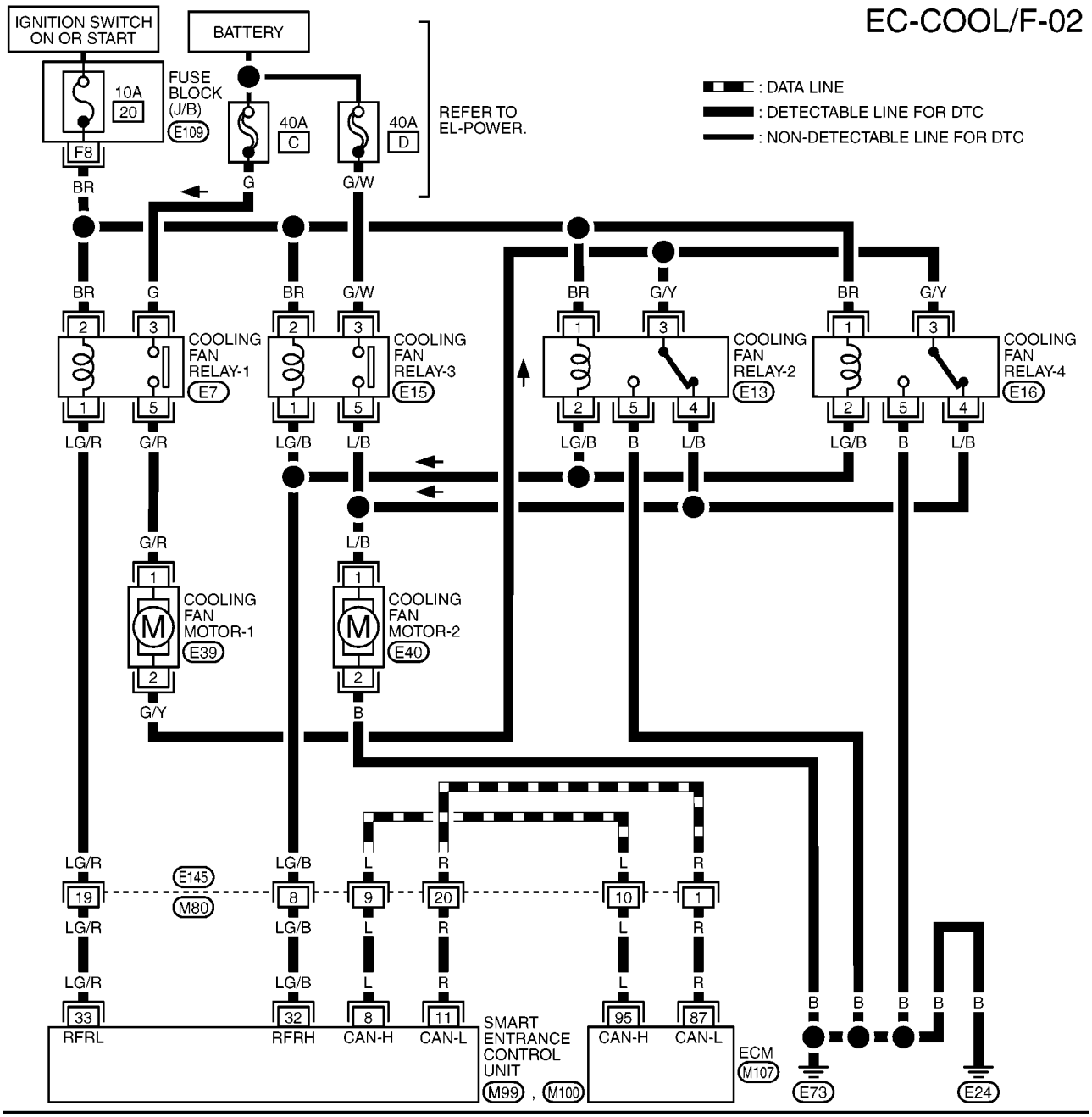
Wiring Diagram
LHD MODELS

EBS014VP



YEC507A

RHD MODELS


EC-COOL/F-02
IGNITION SWITCH ON OR START
BATTERY
FUSE BLOCK (J/B) E109
10A 20
40A C
40A D
F8
REFER TO EL-POWER.
: DATA LINE
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
COOLING FAN RELAY-1 E7
COOLING FAN RELAY-3 E15
COOLING FAN RELAY-2 E13
COOLING FAN RELAY-4 E16
COOLING FAN MOTOR-1 E39
COOLING FAN MOTOR-2 E40
E145
M80
SMART ENTRANCE CONTROL UNIT M99, M100
ECM M107
E73
E24
RFRL
RFRH
CAN-H
CAN-L
REFER TO THE FOLLOWING.
E109 -FUSE BLOCK-
JUNCTION BOX (J/B)
YEC508A

Diagnostic Procedure

EBS014VQ

1. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 2.
NG >> Check cooling fan low speed control circuit. (Go to EC-1370, "PROCEDURE A" .)

ACTIVE TEST	
COOLING FAN	LOW
MONITOR	
COOLAN TEMP/S	XXX °C

SEF784Z

2. CHECK COOLING FAN HIGH SPEED OPERATION-I

With CONSULT-II

1. Touch “HIGH” on the CONSULT-II screen.
2. Make sure that cooling fan-1 operates at higher speed than low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan high speed control circuit-1. (Go to EC-1372, "PROCEDURE B" .)

ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

3. CHECK COOLING FAN HIGH SPEED OPERATION-II

With CONSULT-II

Make sure that cooling fan-2 operates at higher speed than low speed.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan high speed control circuit-2. (Go to EC-1374, "PROCEDURE C" .)

4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

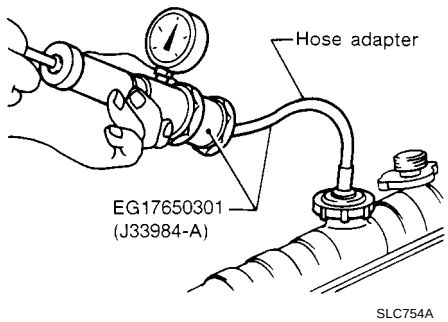
Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



SLC754A

5. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to LC-35, “Water Pump”.)

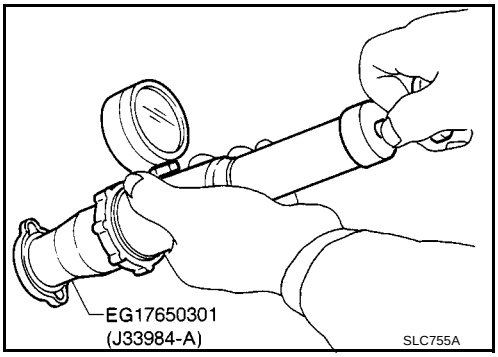
>> Repair or replace.

6. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure:

59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 7.
NG >> Replace radiator cap.

7. CHECK THERMOSTAT

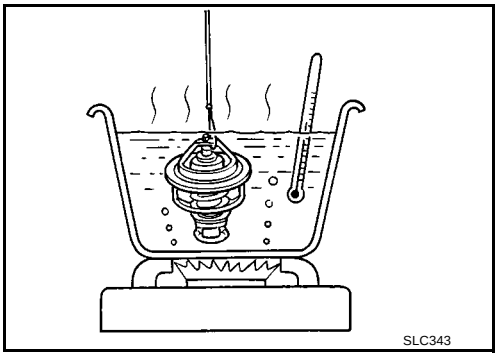
1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

Valve opening temperature:

80.5 - 83.5 °C (177 - 182 °F)

Valve lift:

More than 8 mm/95 °C (0.31 in/203 °F)



4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-37, “Thermostat”.

OK or NG

OK >> GO TO 8.
NG >> Replace thermostat.

8. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1342, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace engine coolant temperature sensor.

9. CHECK MAIN 12 CAUSES

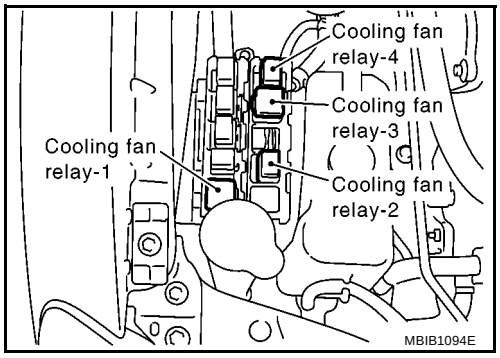
If the cause cannot be isolated, go to EC-1376, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

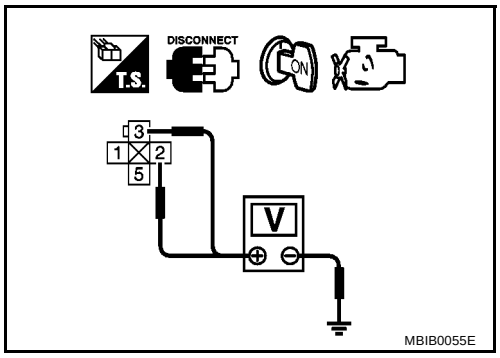
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-1 terminals 2, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

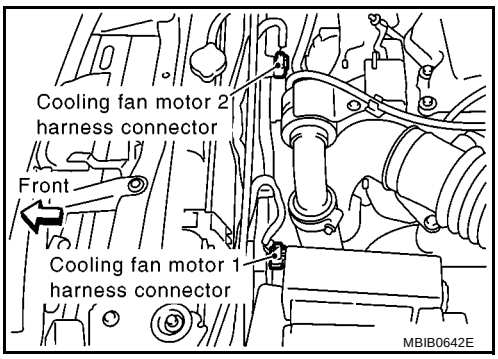
- Fuse block (J/B) connector E109
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Disconnect cooling fan relay-2 and cooling fan relay-4.
4. Check harness continuity between the following.

- Cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1
- Cooling fan motor-1 terminal 2 and cooling fan relay-2 terminal 3
- Cooling fan motor-1 terminal 2 and cooling fan relay-4 terminal 3
- Cooling fan relay-2 terminal 4 and cooling fan motor-2 terminal 1
- Cooling fan relay-4 terminal 4 and cooling fan motor-2 terminal 1
- Cooling fan motor-2 terminal 2 and body ground
  Refer to Wiring Diagram.



Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

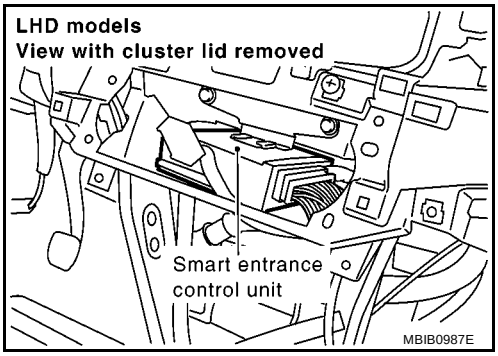
1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 1 and smart entrance control unit terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-1 and smart entrance control unit

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

6. CHECK COOLING FAN RELAYS-1, -2 AND 4

Refer to EC-1377, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1377, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motor.

8. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 9.
NG >> Replace smart entrance control unit.

9. CHECK INTERMITTENT INCIDENT

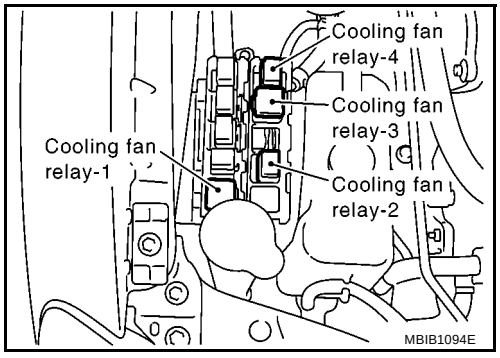
Perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

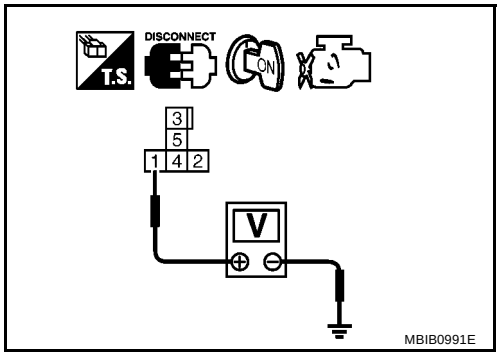
1. CHECK COOLING FAN RELAYS-2 AND -4 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2 and -4.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relays-2, -4 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- Harness for open or short between cooling fan relays-2, -4 and fuse

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

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between cooling fan relay-2 terminal 5 and body ground, cooling fan relay-4 terminal 5 and body ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

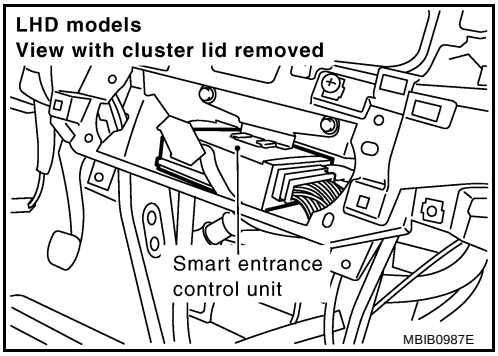
OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-2 terminal 2 and smart entrance control unit terminal 32, cooling fan relay-4 terminal 2 and smart entrance control unit terminal 32.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-2 and smart entrance control unit
- Harness for open or short between cooling fan relay-4 and smart entrance control unit

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

6. CHECK COOLING FAN RELAYS-2 AND -4

Refer to EC-1377, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 8.
NG >> Replace smart entrance control unit.

8. CHECK INTERMITTENT INCIDENT

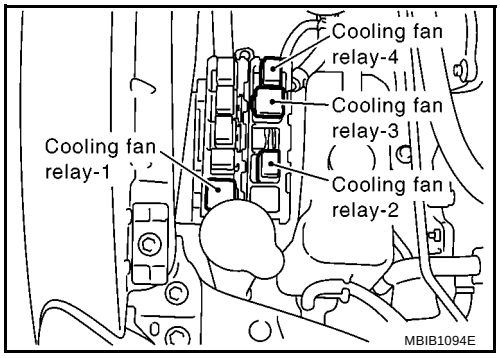
Perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE C

1. CHECK COOLING FAN MOTOR-2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.

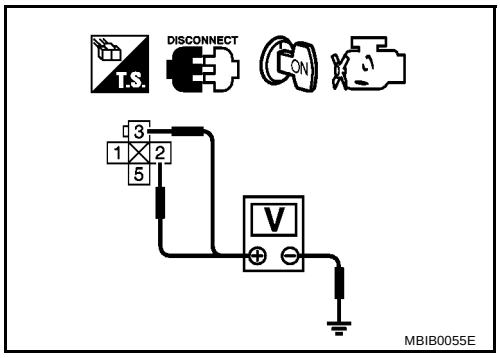


4. Check voltage between cooling fan relay-3 terminals 2, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E109
- 40A fusible link
- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

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

3. CHECK COOLING FAN MOTOR CONTROL CIRCUIT FOR OPEN AND SHORT

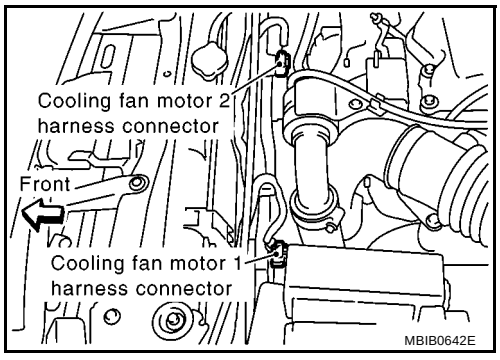
1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground short to power in harness or connectors.



4. CHECK COOLING FAN MOTOR CONTROL CIRCUIT FOR SHORT TO GROUND

Check harness continuity between cooling fan relay-3 terminal 5 or cooling fan motor-2 terminal 1 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Cooling fan relays-2 and -4 (Refer to EC-1377, "Component Inspection")
- Harness for short to ground between cooling fan relay-2 and cooling fan motor-2
- Harness for short to ground between cooling fan relay-3 and cooling fan motor-2
- Harness for short to ground between cooling fan relay-4 and cooling fan motor-2

>> Repair or replace.

6. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

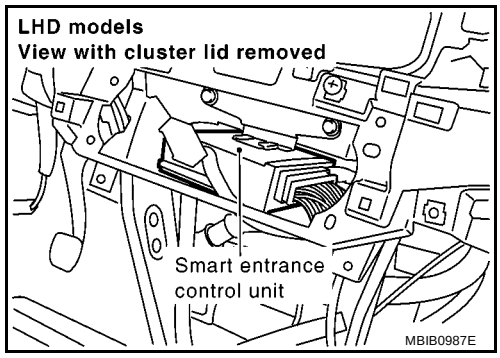
1. Disconnect smart entrance control unit harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 1 and smart entrance control unit terminal 32. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M11 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between cooling fan relay-3 and smart entrance control unit

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

8. CHECK COOLING FAN RELAY-3

Refer to EC-1377, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace cooling fan relay.

9. CHECK SMART ENTRANCE CONTROL UNIT

Refer to EL-350, “Trouble Diagnoses”.

OK or NG

OK >> GO TO 10.
NG >> Replace smart entrance control unit.

10. CHECK INTERMITTENT INCIDENT

Perform EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

EBS014VR

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	See MA-22, “Engine Coolant Mixture Ratio”.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See LC-41, “Changing Engine Coolant”.
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See LC-34, “CHECKING RADIATOR CAP”.
ON*2	5	● Coolant leaks	● Visual	No leaks	See LC-35, “CHECKING TRADIATOR SYSTEM FOR LEAKS”.
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-37, “Thermostat”, and LC-39, “Radiator”.
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1364).
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	See LC-35, “CHECKING TRADIATOR SYSTEM FOR LEAKS”.
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See LC-41, “Changing Engine Coolant”.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-186, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-201, "CYLINDER BLOCK" .

*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 LC-42, “Overheating Cause Analysis”.

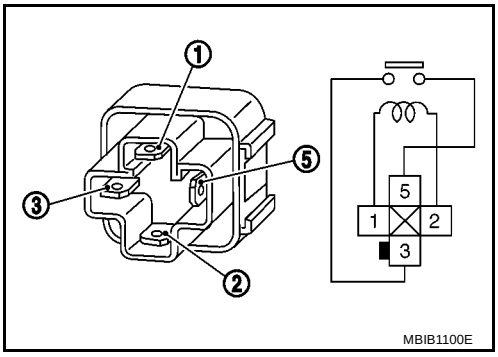
Component Inspection

EBS014VS

COOLING FAN RELAYS-1 AND -3

Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

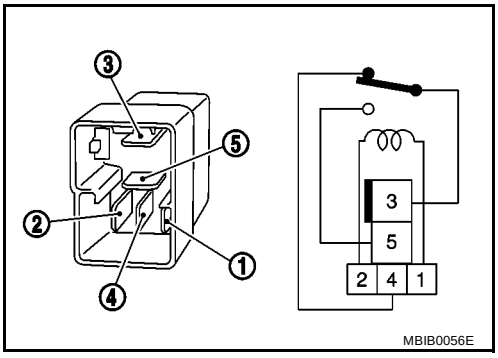


MBIB1100E

COOLING FAN RELAYS-2 AND -4

Check continuity between terminals 3 and 4, 3 and 5 under the following conditions.

Conditions	Terminals	Continuity
12V direct current supply between terminals 1 and 2	3 and 4	No
	3 and 5	Yes
No current supply	3 and 4	Yes
	3 and 5	No

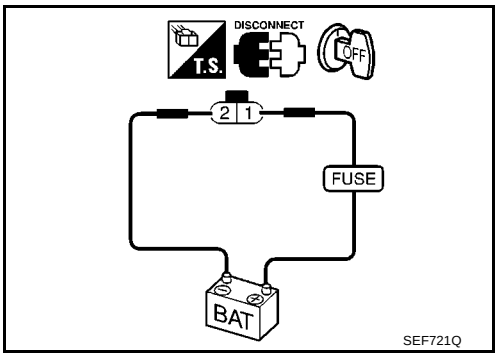


MBIB0056E

COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2



SEF721Q

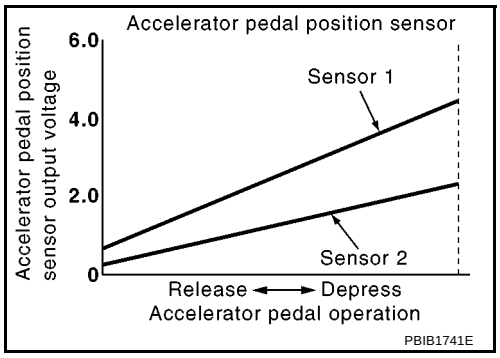
DTC P0222, P0223 APP SENSOR

PFP:18002

Description

EBS014VT

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS014VU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS014VV

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014VW

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

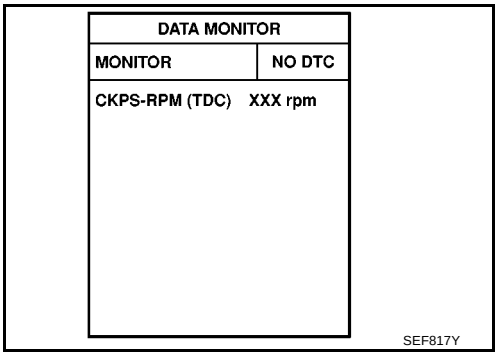
DTC Confirmation Procedure

EBS014VX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

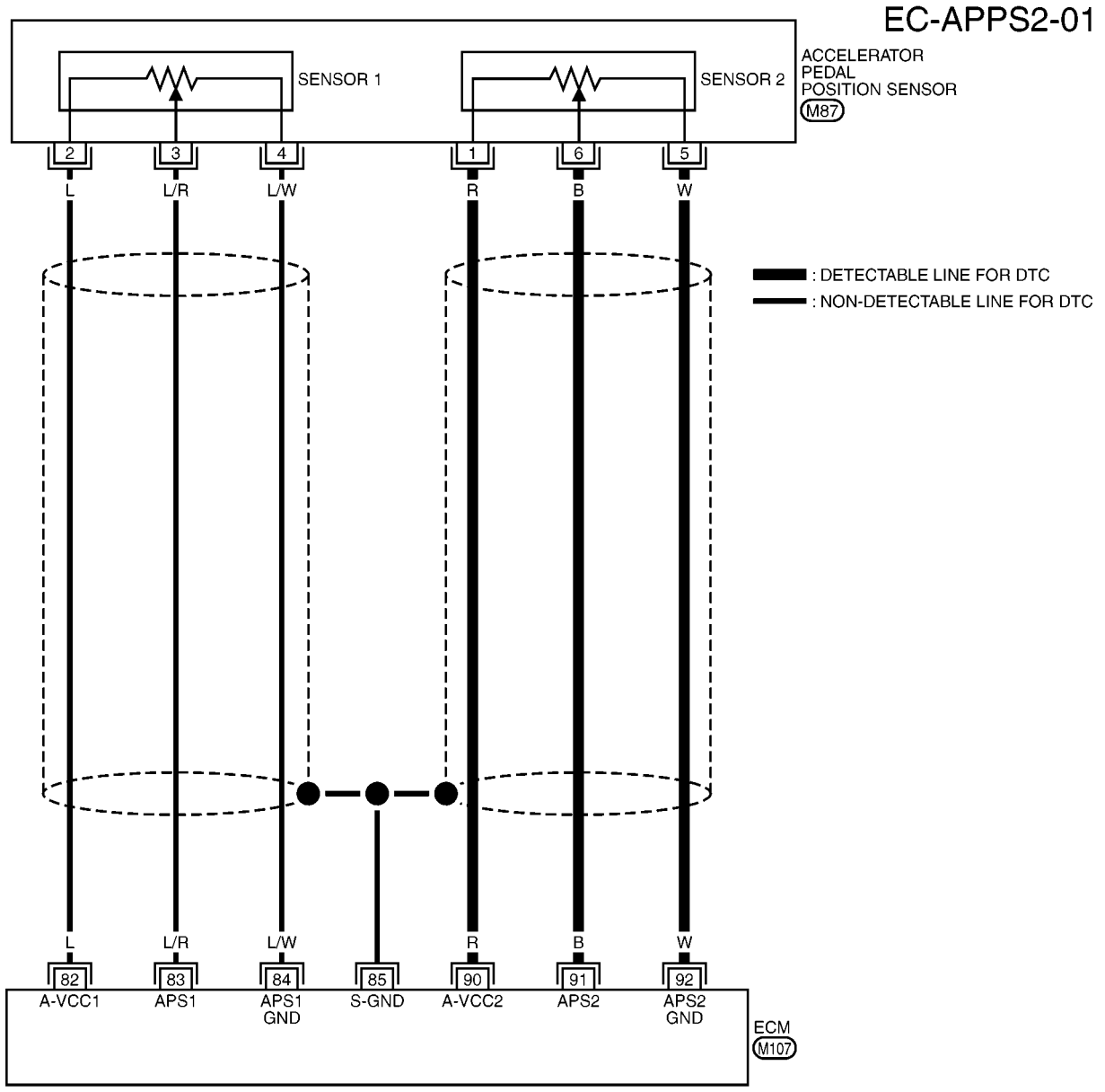
WITH CONSULT-II

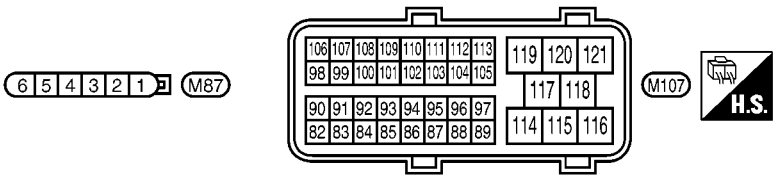
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1381, "Diagnostic Procedure" .



Wiring Diagram

EBS014VY





YEC520A

Diagnostic Procedure

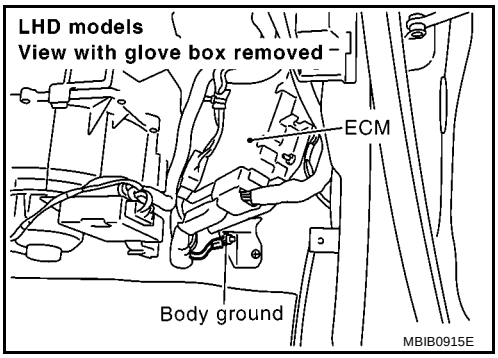
EBS014VZ

1. CHCEK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

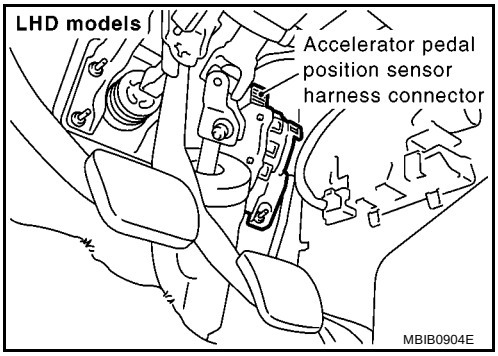
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

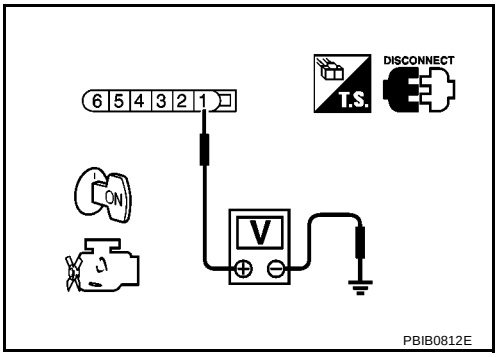


3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 92. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1382, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

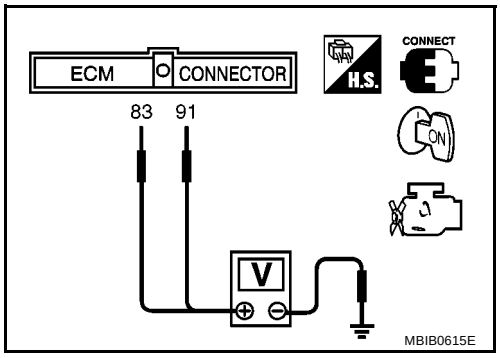
Component Inspection

EBS014W0

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.3V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS014W1

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

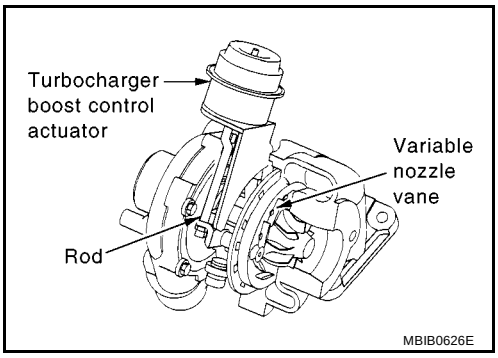
DTC P0234 TC SYSTEM

PFP:14411

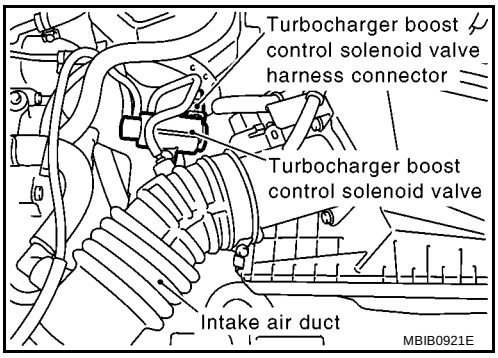
Description(YD22DDTi Engine Models)

EBS014W2

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



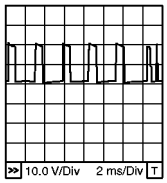
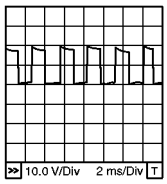
ECM Terminals and Reference Value(YD22DDTi Engine Models)

EBS014W3

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve*	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: For YD22DDTi engine models

On Board Diagnosis Logic

EBS014W4

The MI will not light up for this self-diagnosis.

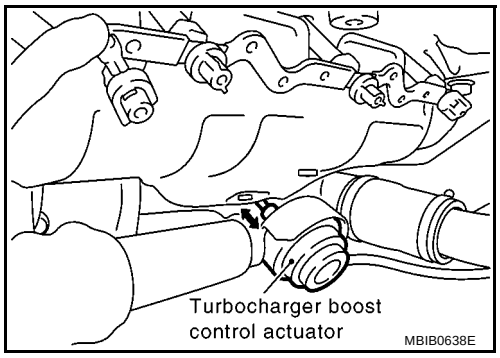
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0234	Turbocharger overboost condition	● ECM detects turbocharger boost pressure is excessively high. (YD22DDTi engine models) ● ECM detects intake air flow volume is excessively high. (YD22DDT engine models)	● Turbocharger ● Vacuum pump ● Turbocharger boost sensor (YD22DDTi engine models) ● Turbocharger boost control solenoid valve (YD22DDTi engine models) ● MAF sensor (YD22DDT engine models)

Overall Function Check(YD22DDTi Engine Models)

EBS014W5

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.
3. If NG, go to EC-1386, "Diagnostic Procedure(YD22DDTi Engine Models)" .



Overall Function Check(YD22DDT Engine Models)

EBS016LJ

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

1. Connect the handy pump to the actuator, and check that the rod strokes smoothly in compliance with the following pressure.
   Pressure to be applied at actuator part to move rod end as follows:

   Standard (Pressure/rod stroke amount):

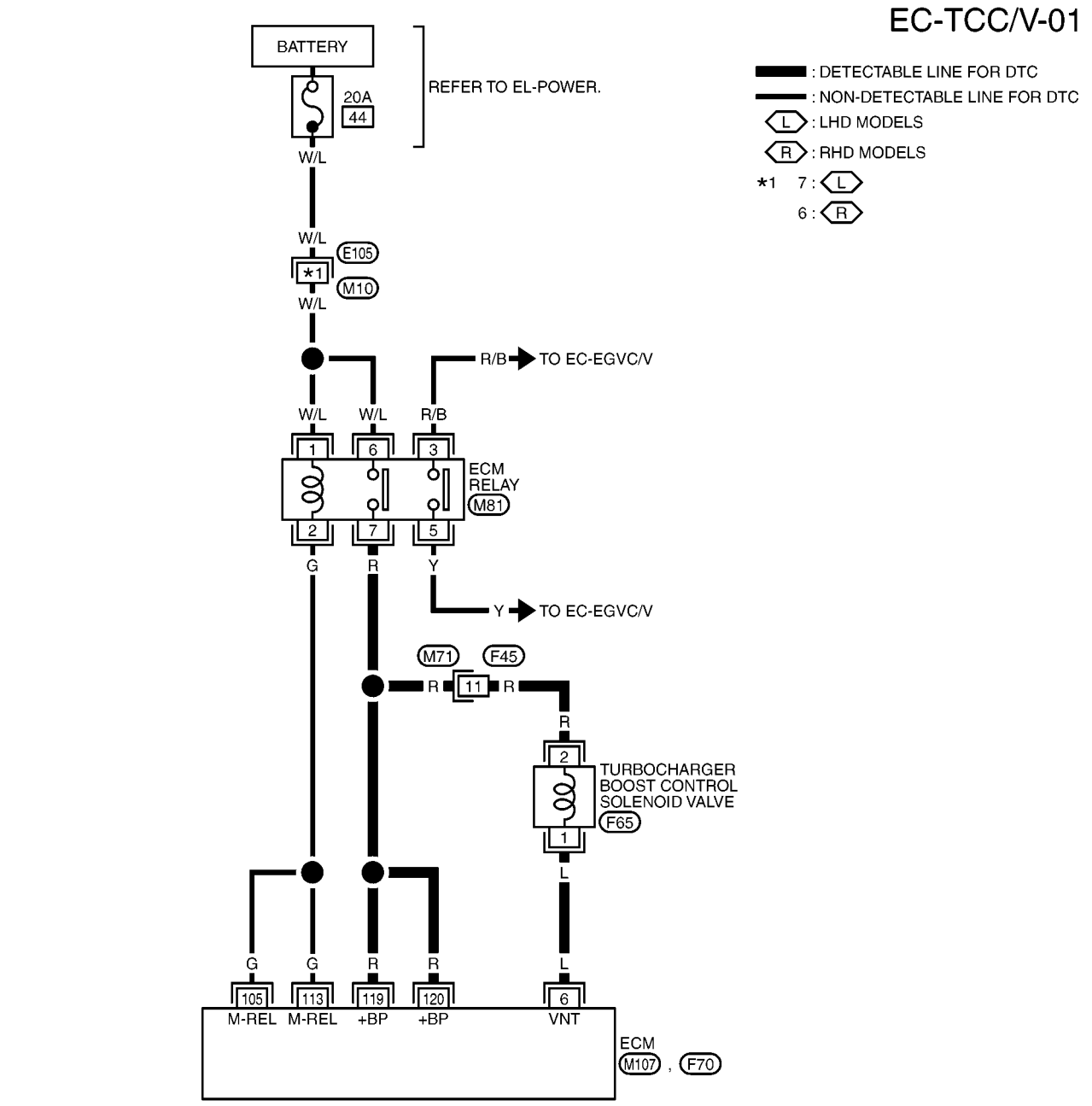
   131.24 - 136.56 kPa (1,312 - 1,366 mbar, 984.4 - 1024.3 mmHg, 38.7 - 40.3 inHg)/ 0.38 mm (0.0150 in)

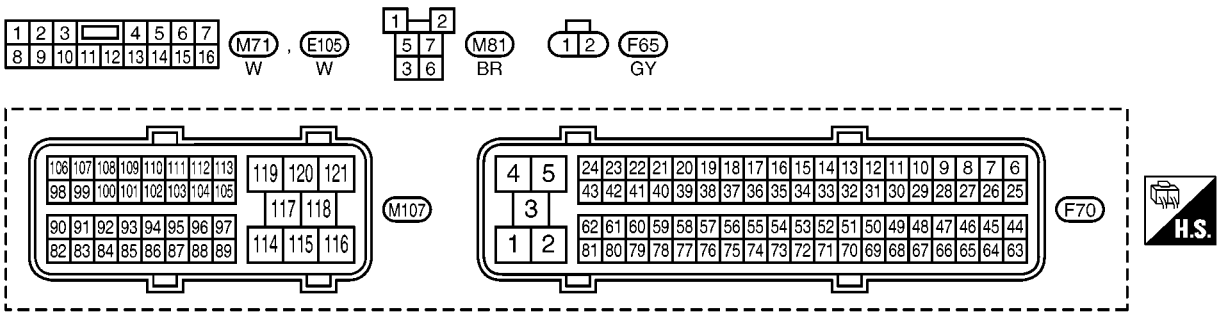
   155.44 - 164.76 kPa (1,554 - 1,648 mbar, 1,166 - 1,236 mmHg, 45.9 - 48.7 inHg)/4.0 mm (0.157 in)

2. If NG, go to EC-1386, "Diagnostic Procedure(YD22DDTi Engine Models)" .

Wiring Diagram(YD22DDTi Engine Models)

EBS014W6





MBWA0623E

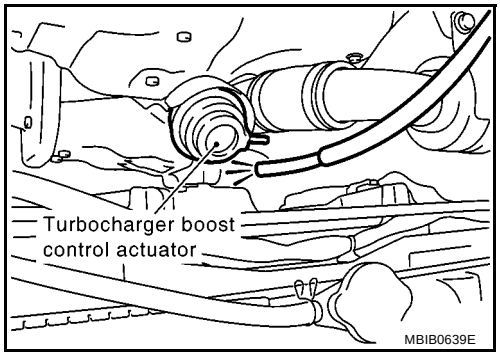
Diagnostic Procedure(YD22DDTi Engine Models)

EBS014W7

1. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to turbocharger control actuator.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum should exist.

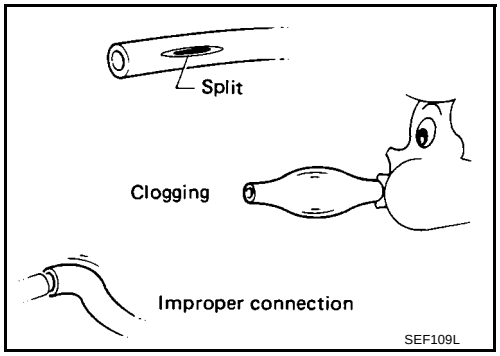


OK or NG

OK >> GO TO 8.
NG >> GO TO 2.

2. CHECK 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-1263, "Vacuum Hose Drawing(YD22DDTi Engine Models)" .

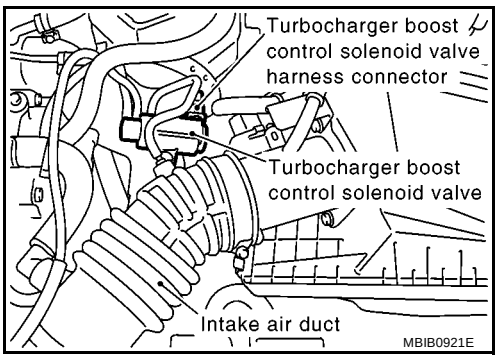


OK or NG

OK >> GO TO 3.
NG >> Repair or replace vacuum hoses and vacuum gallery.

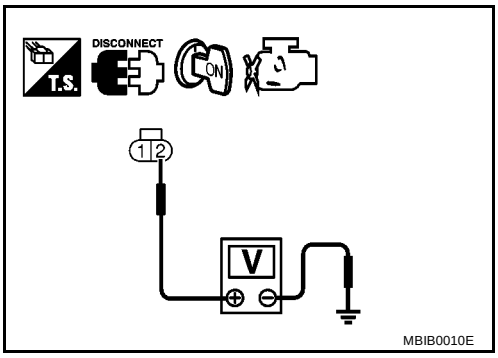
3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between turbocharger boost control solenoid valve terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay 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 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 6 and turbocharger boost control solenoid valve terminals 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TURBOCHARGE BOOST CONTROL SOLENOID VALVE

Refer to EC-1390, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace turbocharger boost control solenoid valve.

7. CHECK VACUUM PUMP

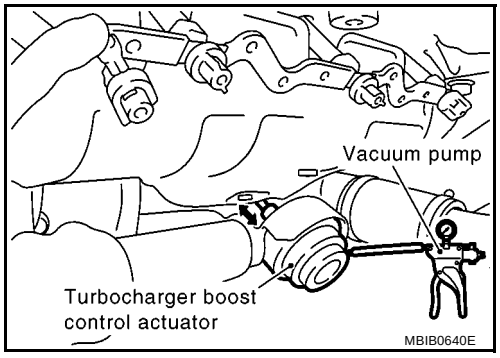
Refer to EM-143, "VACUUM PUMP" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum pump assembly.

8. CHECK TURBOCHARGER BOOST CONTROL ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump to turbocharger boost control actuator.
3. Make sure that the turbocharger boost control actuator rod moves smoothly when applying vacuum of -53.3kPa (-533mbar, -400mmHg, -15.75inHg) and releasing it.



OK or NG

OK >> GO TO 9.
NG >> Replace turbocharger assembly.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1395, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

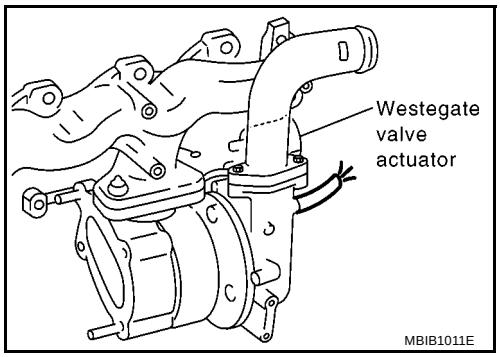
Diagnostic Procedure(YD22DDT Engine Models)

EBS016LK

1. CHECK HOSE AIR LEAKAGE

1. Turn ignition switch OFF.
2. Disconnect hose connected to wastegate valve actuator.
3. Start engine and lit it idle.
4. Check hose for air breathed out

Air should be breathed out.



OK or NG

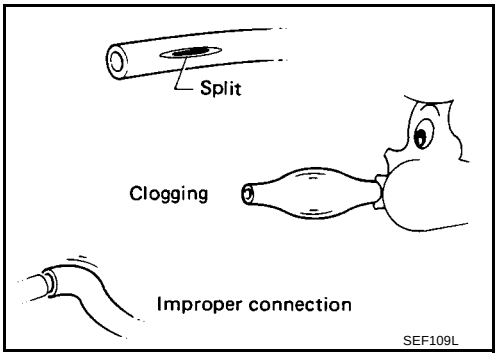
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK HOSE

1. Turn ignition switch OFF.
2. Check hose clogging, cracks or improper connection.

OK or NG

OK >> GO TO 3.
NG >> Replace turbocharger assembly.



3. CHECK MAF SENSOR

Refer to EC-1334, "Component Inspection" .

OK or NG

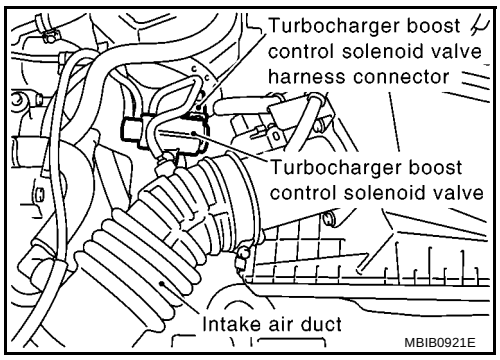
OK >> **INSPECTION END**
NG >> Replace MAF sensor.

Component Inspection

EBS014W8

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.

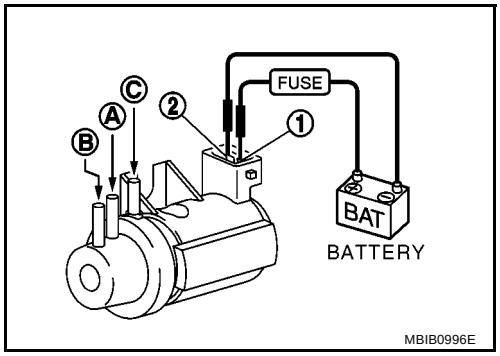


2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.
3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals **1** and **2**	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



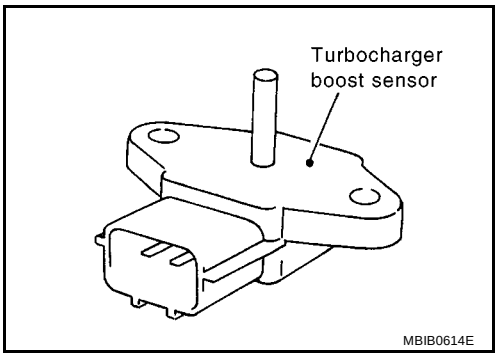
DTC P0237, P0238 TC BOOST SENSOR

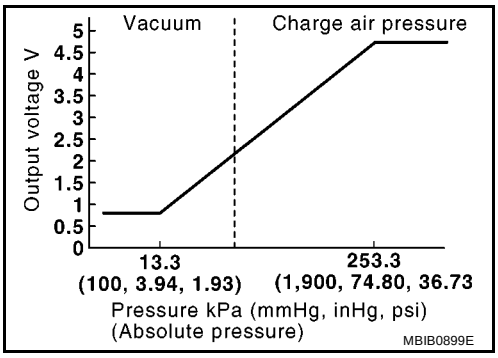
PFP:22365

Component Description

EBS014W9

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.





CONSULT-II Reference Value in Data Monitor Mode

EBS014WA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa

ECM Terminals and Reference Value

EBS014WB

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	Y	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.5 - 2.8V
64	W	Turbocharger boost sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
71	B	Turbocharger boost sensor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014WC

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237	Turbocharger boost 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.) ● Turbocharger boost sensor
P0238	Turbocharger boost sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

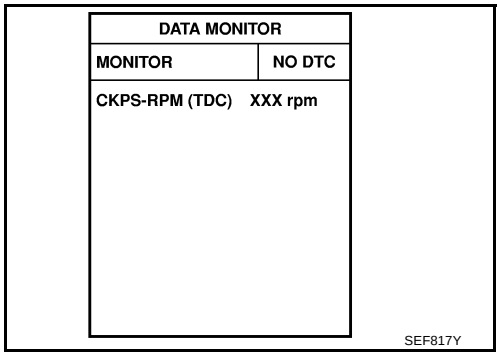
DTC Confirmation Procedure

EBS014WD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1394, "Diagnostic Procedure" .

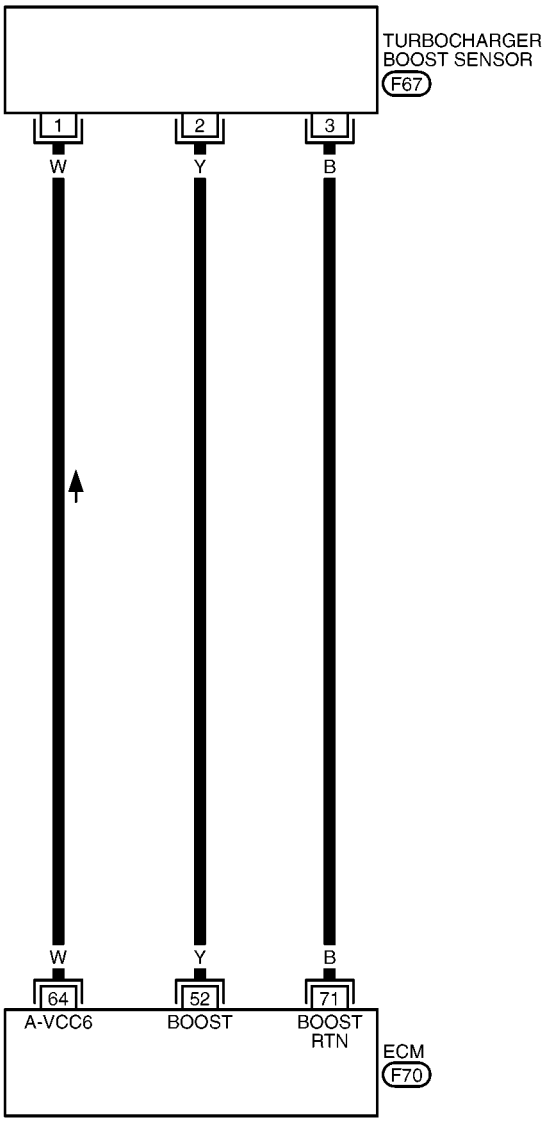


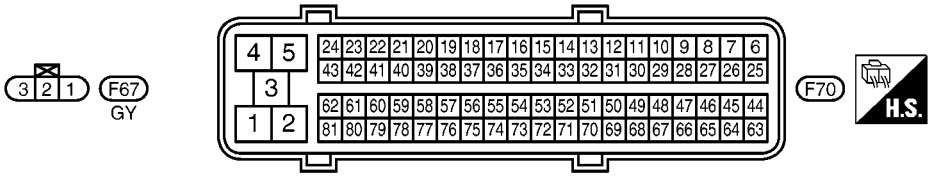
Wiring Diagram

EBS014WE

EC-BOOST-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





YEC503A

Diagnostic Procedure

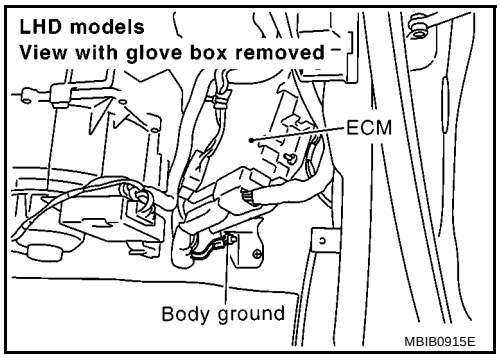
EBS014WF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

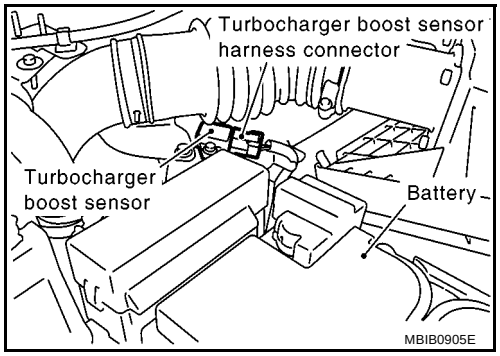
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharge boost sensor harness connector.
2. Turn ignition switch ON.

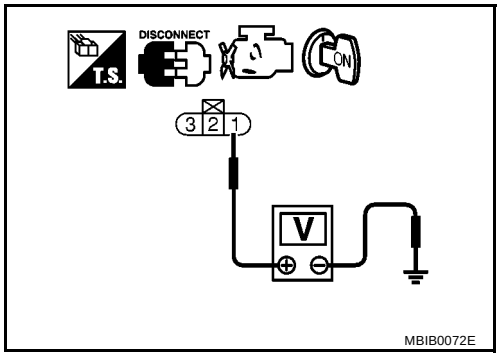


3. Check voltage between turbocharge boost sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK TURBOCHAGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHAGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 52 and turbocharger boost sensor terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1395, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

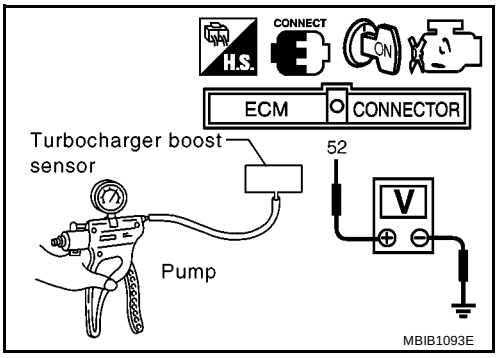
Component Inspection

EBS014WG

TURBOCHARGER BOOST SENSOR

1. Remove turbocharger boost sensor with its harness connector connected.
2. Turn ignition switch ON.
3. Use pump to apply pressure to turbocharger boost sensor as shown in the figure.

   CAUTION:
   - **Always calibrate the pressure pump gauge when using it.**
   - **Inspection should be done at room temperature [10-30°C (50-86°F)].**
4. Check the output voltage between turbocharger boost sensor terminal 2 and body ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approximately 2.3V
+40 kPa (400 mbar, 300mmHg, 11.81 inHg)	Approximately 2.9V

Removal and Installation

EBS014WH

TURBOCHARGER BOOST SENSOR

Refer to EM-121, "CHARGE AIR COOLER" .

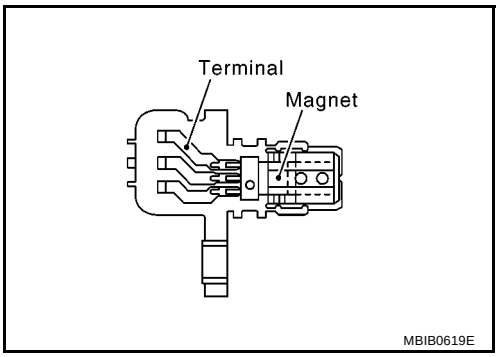
DTC P0335 CKP SENSOR

PFP:23731

Description

EBS014WI

The crankshaft position sensor monitors engine speed by means of signals from the sensing plate (with 56 protrusions) installed to the fly wheel. The datum signal output is detected 6° signal and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.



CONSULT-II Reference Value in Data Monitor Mode

EBS014WJ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (TDC)	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication

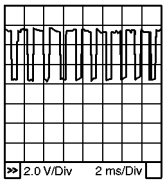
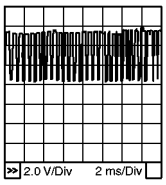
ECM Terminals and Reference Value

EBS014WK

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

On Board Diagnosis Logic

EBS014WL

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor

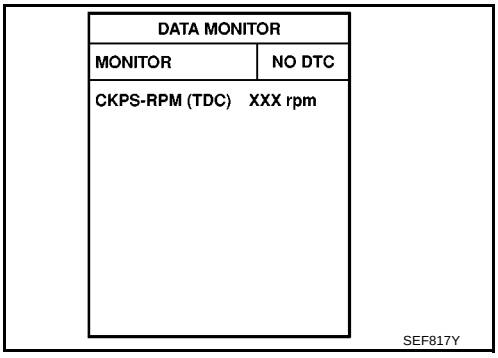
DTC Confirmation Procedure

EBS014WM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

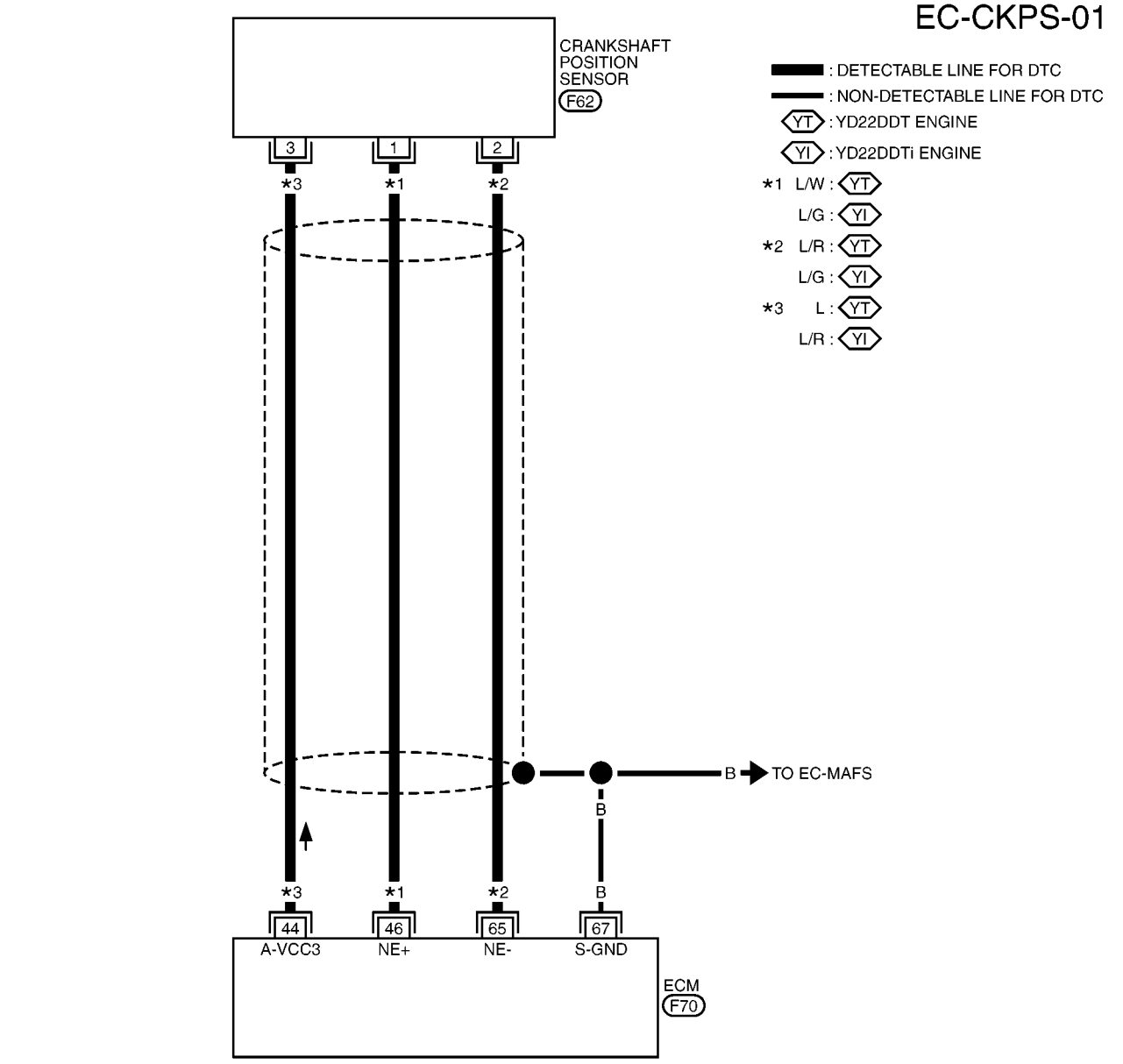
WITH CONSULT-II

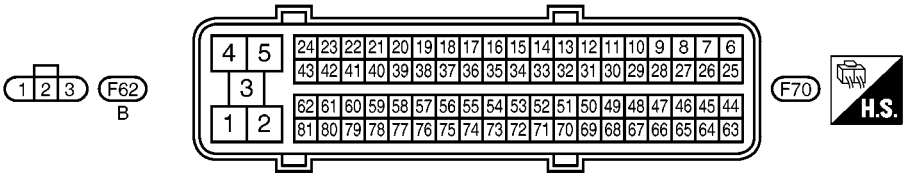
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1399, "Diagnostic Procedure" .



Wiring Diagram

EBS014WN





YEC504A

Diagnostic Procedure

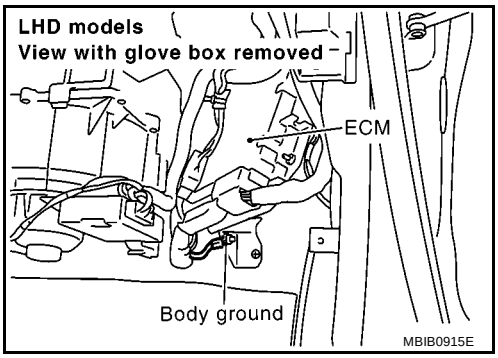
EBS014WO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

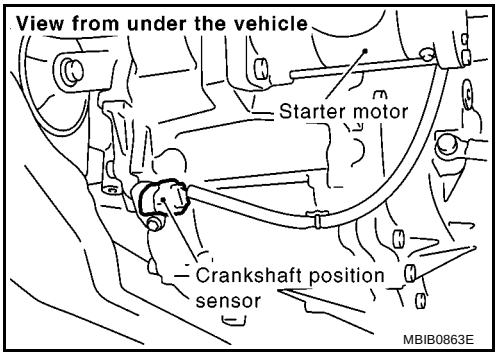
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor harness connector.
2. Turn ignition switch ON.

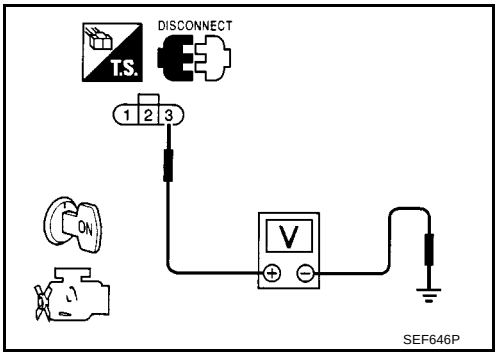


3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1400, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

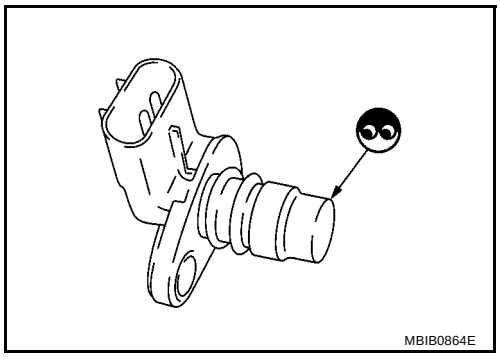
>> **INSPECTION END**

Component Inspection

EBS014WP

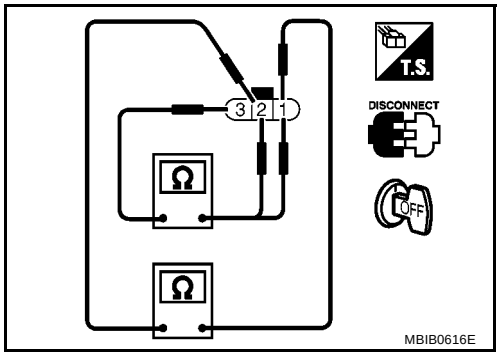
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	Except 0 or ∞
2 (+) - 1 (-)	Except 0



MBIB0616E

6. If NG, replace crankshaft position sensor.

Removal and Installation

EBS014WQ

CRANKSHAFT POSITION SENSOR

Refer to EM-137, "OIL PAN AND OIL STRAINER" .

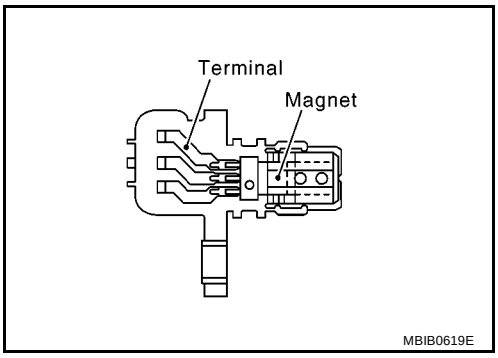
DTC P0336 CKP SENSOR

PFP:23731

Description

EBS014WR

The crankshaft position sensor monitors engine speed by means of signals from the sensing plate (with 56 protrusions) installed to the fly wheel. The datum signal output is detected 6° signal and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.



CONSULT-II Reference Value in Data Monitor Mode

EBS014WS

Specification data are reference values.

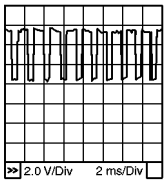
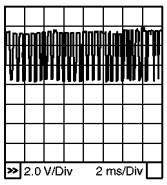
MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

ECM Terminals and Reference Value

EBS014WT

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
44	L*1 L/R*2	Crankshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L/W*1 L/G*2	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R*1 L/G*2	Crankshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For YD22DDT engine models
*2: For YD22DDTi engine models

On Board Diagnosis Logic

EBS014WU

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor ● Signal plate

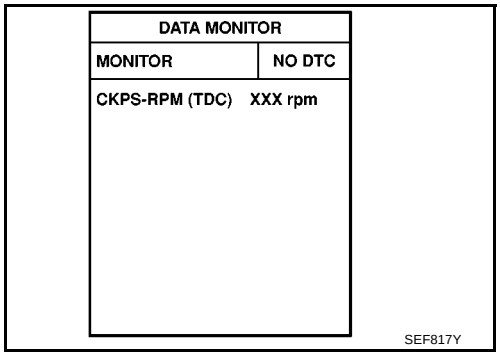
DTC Confirmation Procedure

EBS014WV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

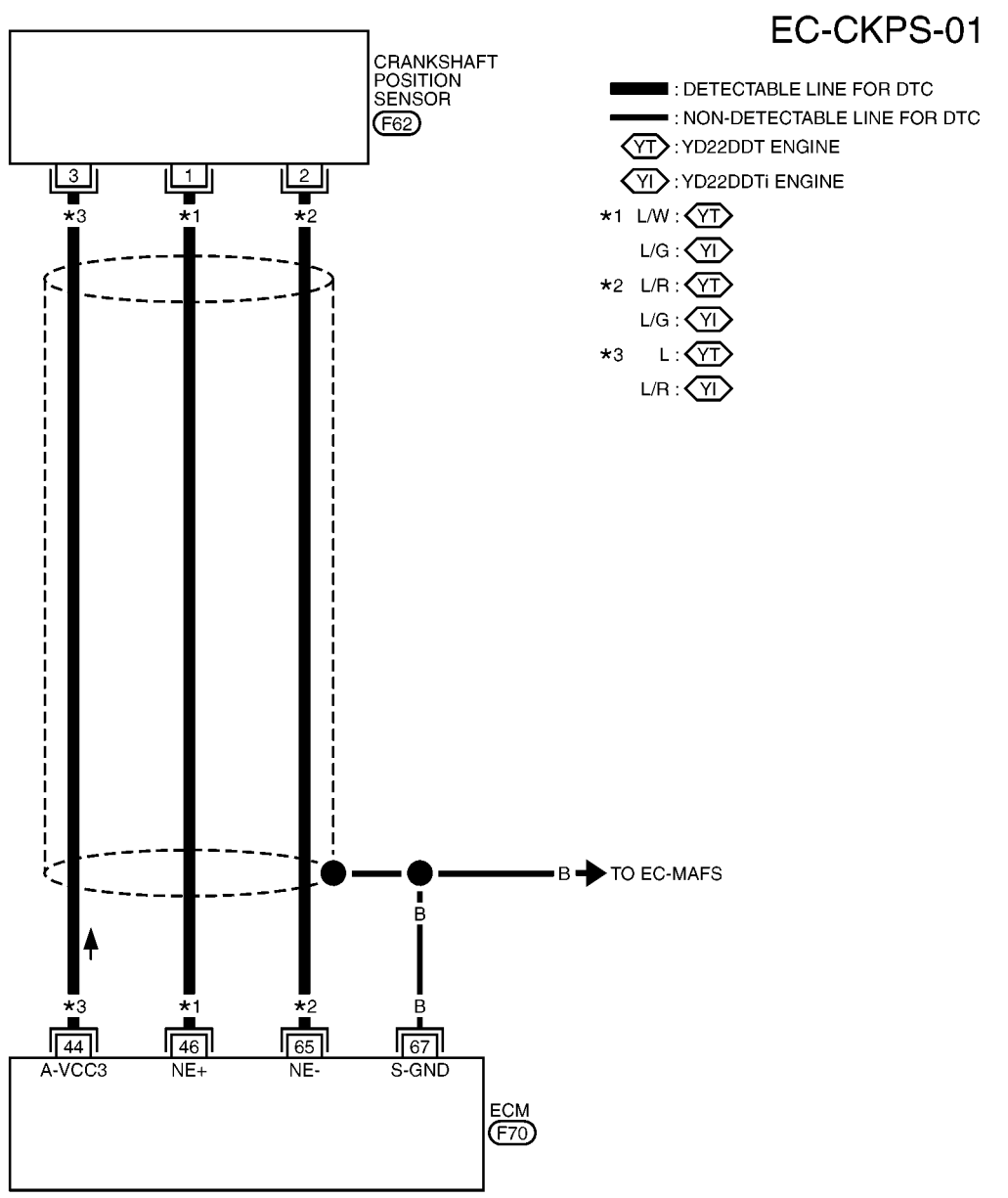
WITH CONSULT-II

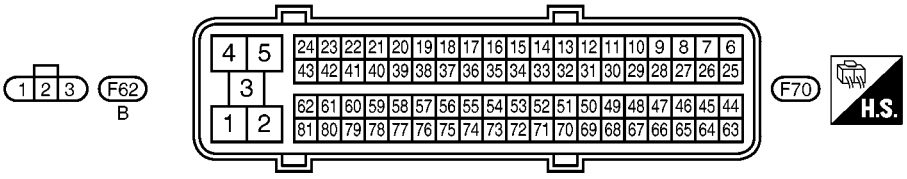
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1404, "Diagnostic Procedure" .



Wiring Diagram

EBS014WW





YEC504A

Diagnostic Procedure

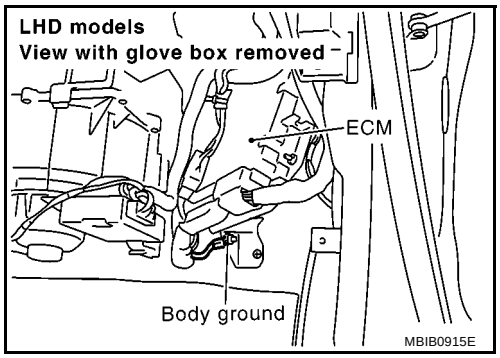
EBS014WX

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

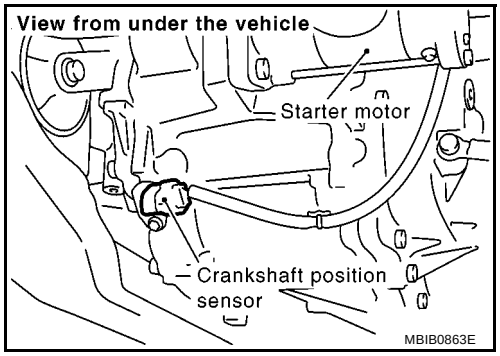
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position sensor harness connector.
2. Turn ignition switch ON.



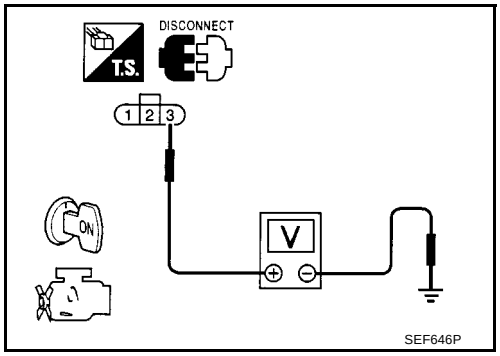
3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1405, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor.

6. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 7.
NG >> Replace the signal plate.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

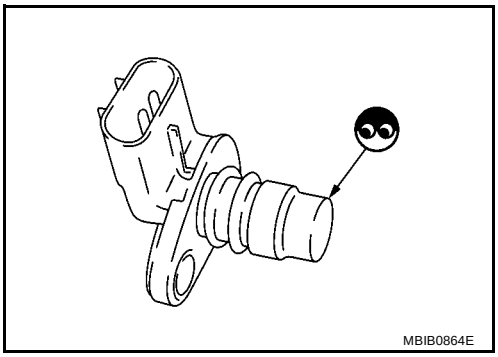
>> **INSPECTION END**

Component Inspection

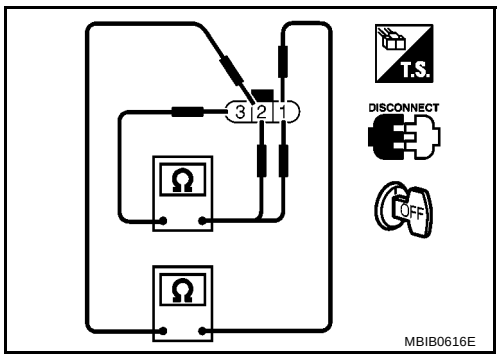
EBS014WY

CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	Except 0 or ∞
2 (+) - 1 (-)	Except 0

6. If NG, replace crankshaft position sensor.

Removal and Installation

EBS014WZ

CRANKSHAFT POSITION SENSOR

Refer to EM-137, "OIL PAN AND OIL STRAINER" .

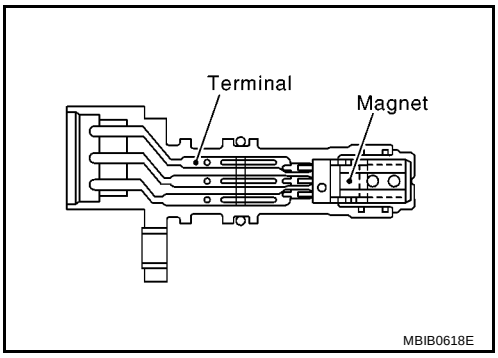
DTC P0340 CMP SENSOR

PFP:23731

Description

EBS014X0

The camshaft position sensor identifies a particular cylinder by means of signals from the sensing plate (with five protrusions) installed to the camshaft. The datum signal output is detected 90° signal and sent to the ECM.

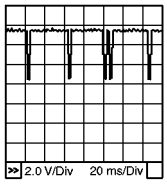
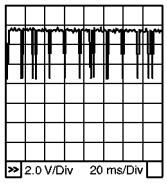


ECM Terminals and Reference Value

EBS014X1

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014X2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor

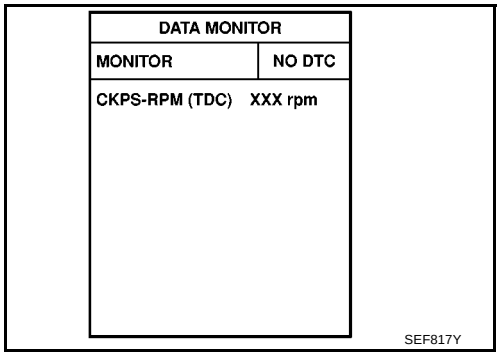
DTC Confirmation Procedure

EBS014X3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

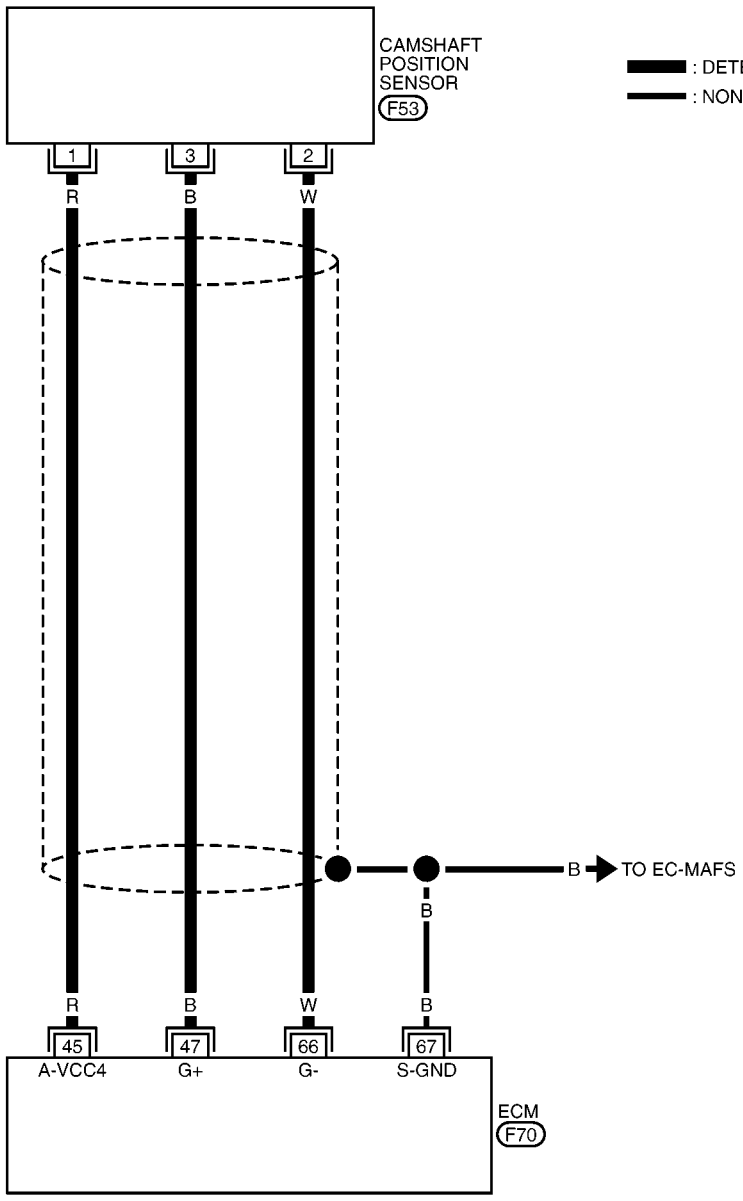
WITH CONSULT-II

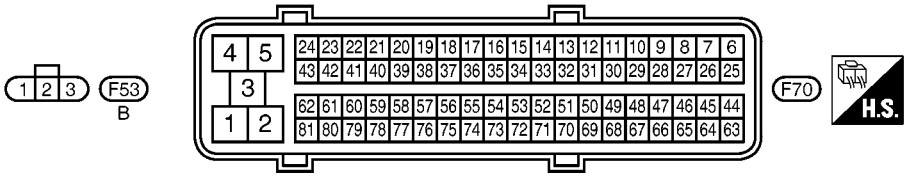
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1410, "Diagnostic Procedure" .



Wiring Diagram

EBS014X4





YEC505A

Diagnostic Procedure

EBS014X5

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

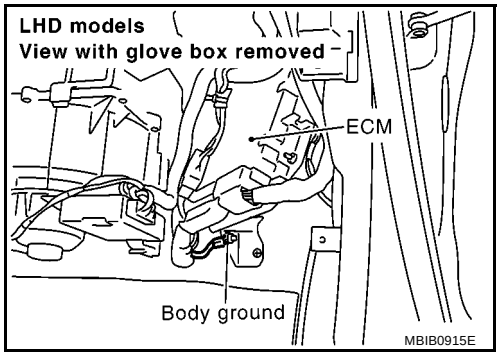
Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-13, “STARTING SYSTEM”.)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

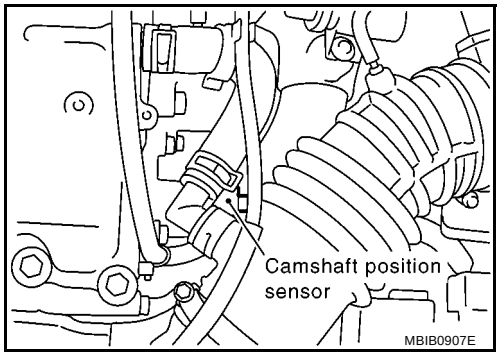
OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connection.



3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

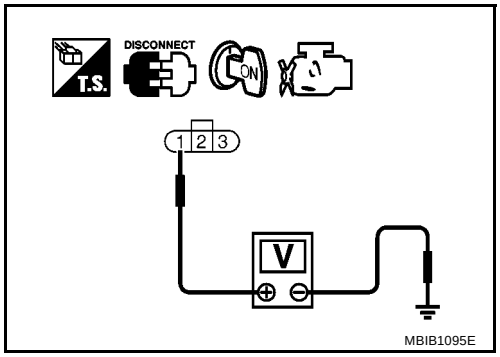


3. Check voltage between CMP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 66 and CMP sensor terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal 47 and CMP sensor terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1411, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

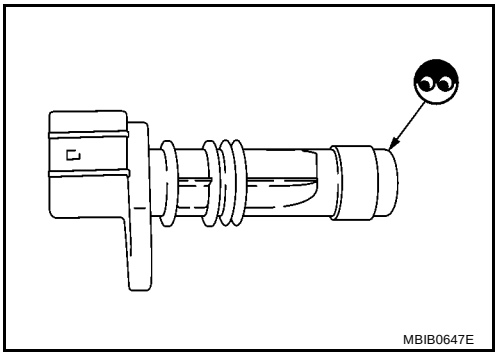
>> **INSPECTION END**

Component Inspection

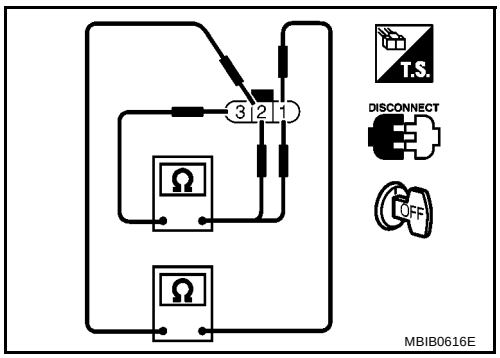
EBS014X6

CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) -2 (-)	
2 (+) - 1 (-)	Except 0 or ∞

6. If NG, replace camshaft position sensor.

Removal and Installation

EBS014X7

CAMSHAFT POSITION SENSOR

Refer to EM-143, "VACUUM PUMP" .

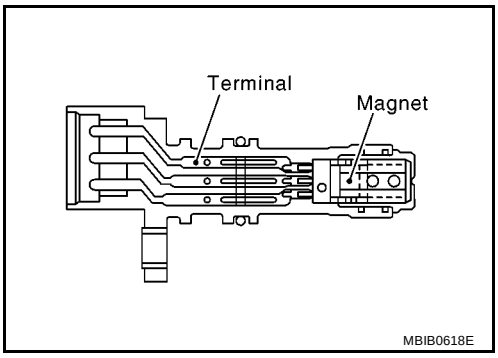
DTC P0341 CMP SENSOR

PFP:23731

Description

EBS014X8

The camshaft position sensor identifies a particular cylinder by means of signals from the sensing plate (with five protrusions) installed to the camshaft. The datum signal output is detected 90° signal and sent to the ECM.

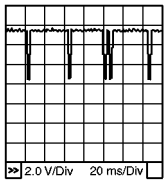
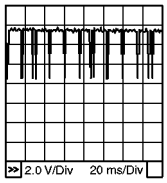


ECM Terminals and Reference Value

EBS014X9

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	R	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	B	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 6V ★  MBIB0878E
66	W	Camshaft position sensor ground	**[Ignition switch ON]**	Approximately 0.3V
67	B	Sensor ground (Sensors shield circuit)	**[Ignition switch ON]**	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014XA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	● Harness connectors (The sensor circuit is opener shorted.) ● Camshaft position sensor ● Signal plate

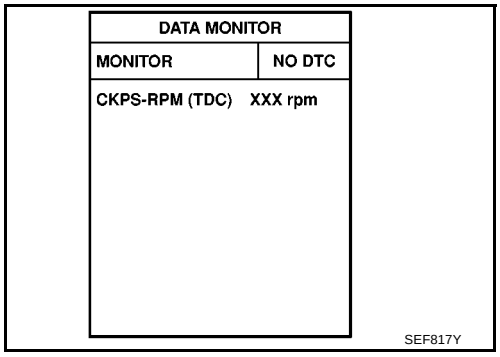
DTC Confirmation Procedure

EBS014XB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

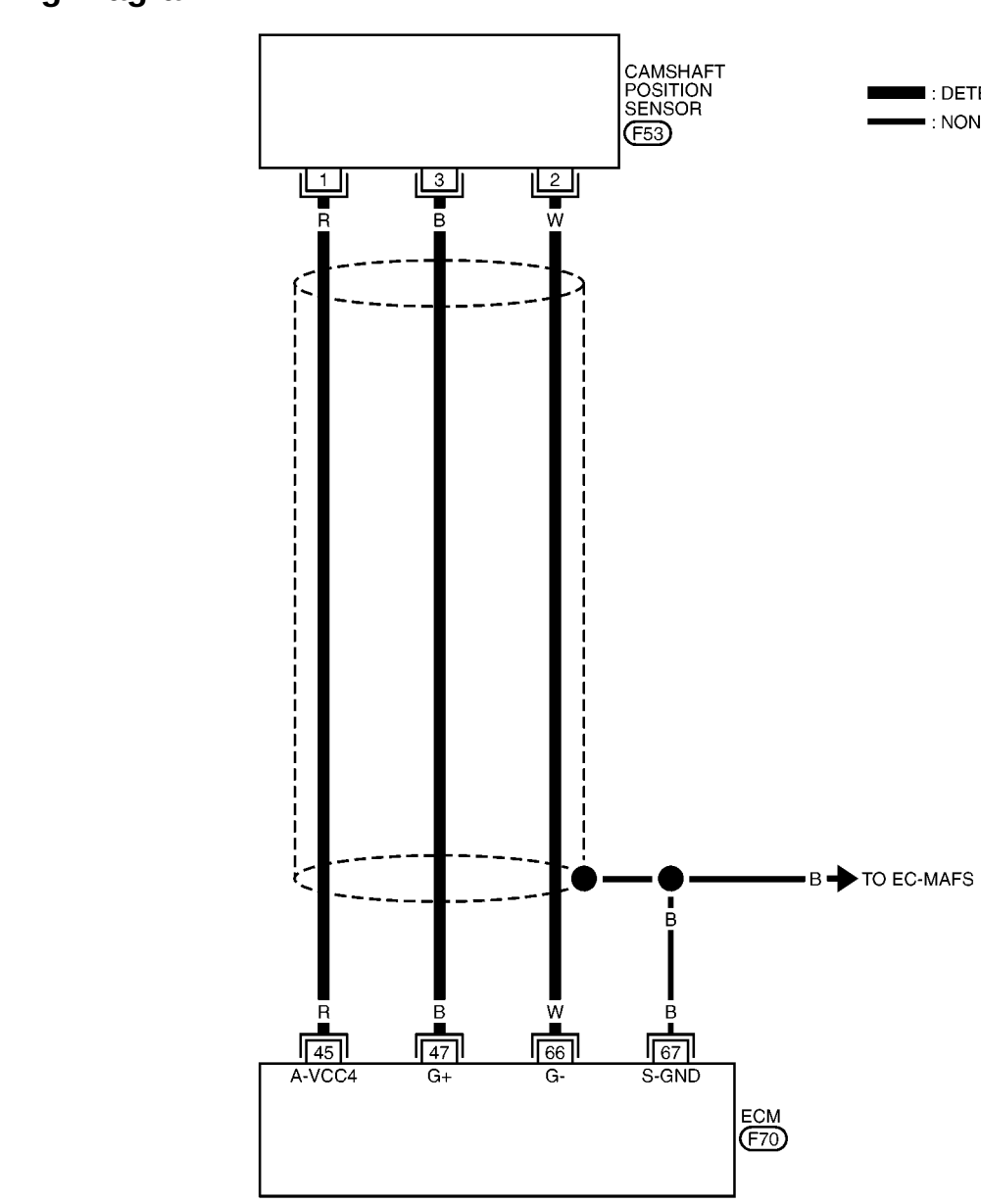
WITH CONSULT-II

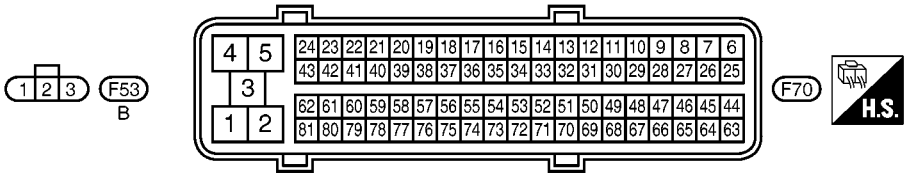
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1416, "Diagnostic Procedure" .



Wiring Diagram

EBS014XC





YEC505A

Diagnostic Procedure

EBS014XD

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

Yes or No

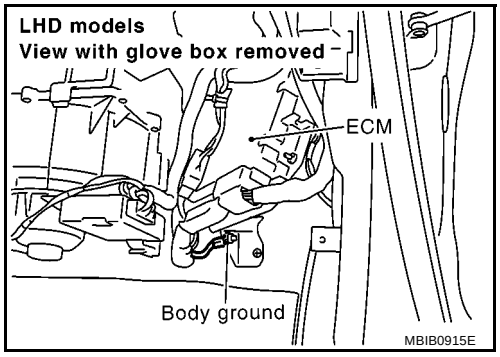
Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-16, “STARTING SYSTEM”.)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

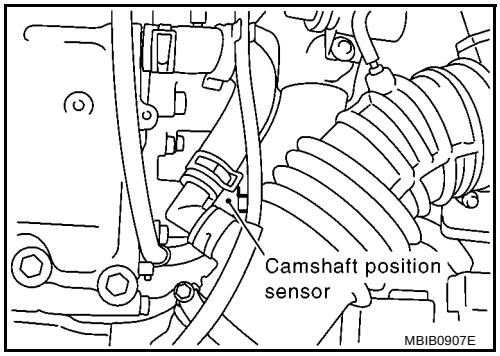
OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connection.



3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

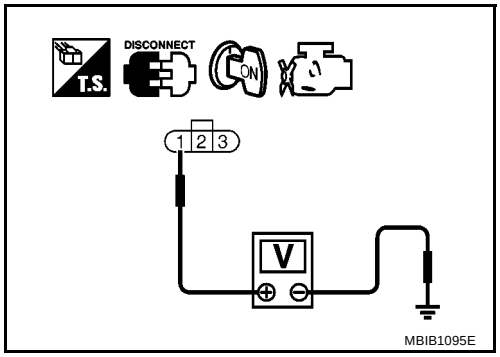


3. Check voltage between CMP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 66 and CMP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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 harness continuity between ECM terminal 47 and CMP sensor terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1418, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

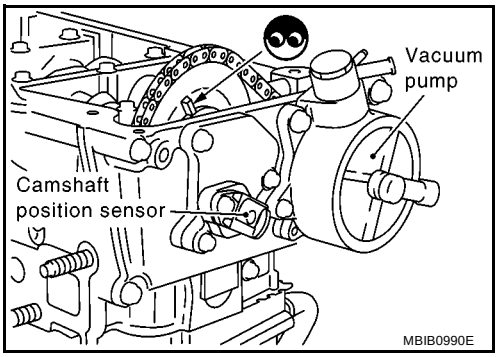
7. CHECK CAMSHAFT (EXHAUST)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

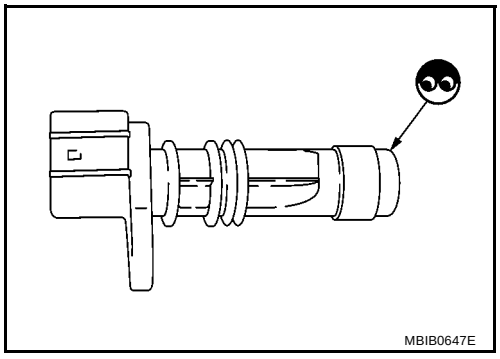
>> **INSPECTION END**

Component Inspection

EBS014XE

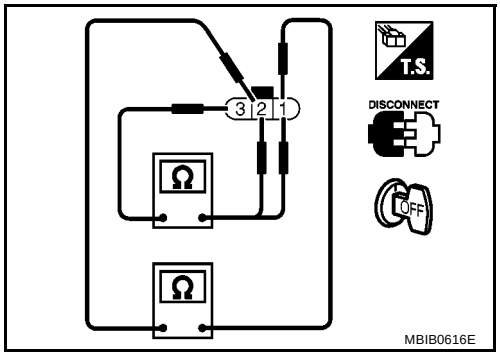
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0
3 (+) - 2 (-)	
2 (+) - 1 (-)	Except 0 or ∞



6. If NG, replace camshaft position sensor.

Removal and Installation

EBS014XF

CAMSHAFT POSITION SENSOR

Refer to EM-143, "VACUUM PUMP" .

DTC P0563 BATTERY VOLTAGE

PFP:24410

On Board Diagnosis Logic

EBS014XG

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563	Battery voltage high	An excessively high voltage from the battery is sent to ECM.	● Battery ● Battery terminal ● Alternator

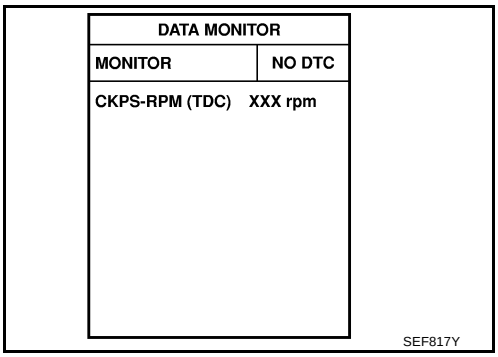
DTC Confirmation Procedure

EBS014XH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 35 seconds.
4. If DTC is detected, go to EC-1419, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014XI

1. INSPECTION START

Are jumper cables connected for the jump starting?

Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK BATTERY AND ALTERNATOR

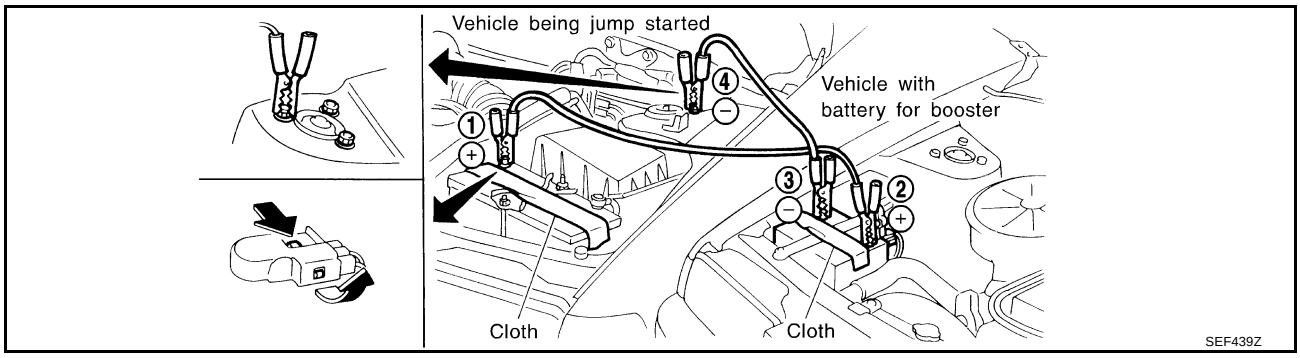
Check that the proper type of battery and alternator is installed.
Refer to SC-3, “BATTERY”, and SC-24, “CHARGING SYSTEM”.

OK or NG

OK >> GO TO 5.
NG >> Replace with a proper one.

3. CHECK JUMPER CABLES INSTALLATION

Check that the jumper cables are connected in the correct sequence.



OK or NG

OK >> GO TO 4.
NG >> Reconnect jumper cables properly.

4. CHECK BATTERY FOR BOOSTER

Check that the battery for the booster is a 12V battery.

OK or NG

OK >> GO TO 5.
NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

Perform EC-1419, "DTC Confirmation Procedure" , again.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-1273, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.

- Wiring harness and harness connectors for burn
- Fuses for short

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace malfunctioning part.

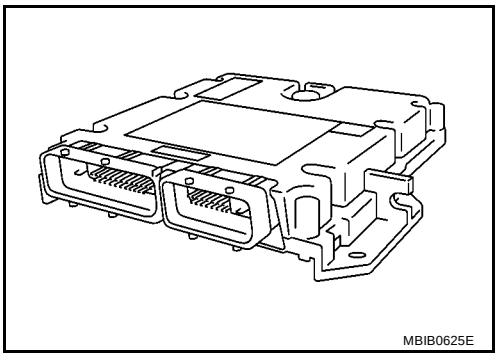
DTC P0605 ECM

PFP:23710

Description

EBS014XJ

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

EBS014XK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

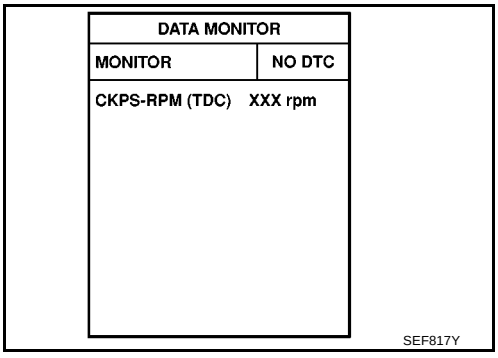
DTC Confirmation Procedure

EBS014XL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1421, "Diagnostic Procedure" .



SEF817Y

Diagnostic Procedure

EBS014XM

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1421, "DTC Confirmation Procedure" , again.
5. Is DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-1273, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

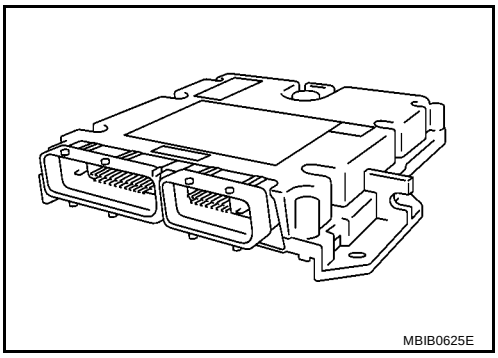
DTC P0606 ECM

PFP:23710

Description

EBS014XN

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

EBS014XO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0606	Engine control module (Processor)	ECM calculation function is malfunctioning.	● ECM

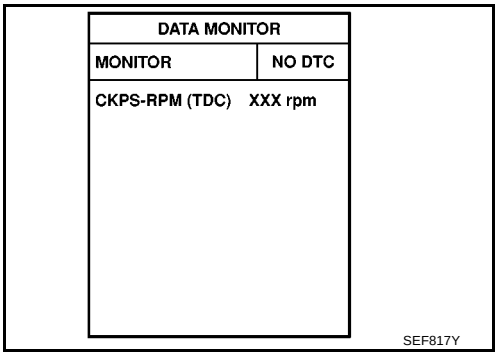
DTC Confirmation Procedure

EBS014XP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1423, "Diagnostic Procedure" .



SEF817Y

Diagnostic Procedure

EBS014XQ

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1423, "DTC Confirmation Procedure" , again.
5. Is DTC P0606 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-1273, "NATS (Nissan Anti-theft System)" .
3. Perform “Fuel Pump Learning Value Clearing”. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

DTC P0628, P0629 FUEL PUMP

PFP:16700

Description

EBS014XR

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS014XS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

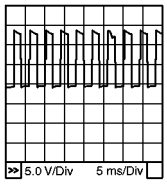
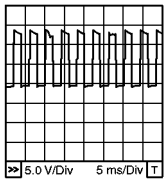
ECM Terminals and Reference Value

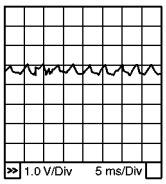
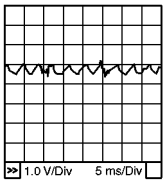
EBS014XT

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014XU

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0628	Fuel pump control circuit low input	ECM detects a control circuit for the fuel pump is open or short to ground.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump
P0629	Fuel pump control circuit high output	ECM detects a control circuit for the fuel pump is short to power.	

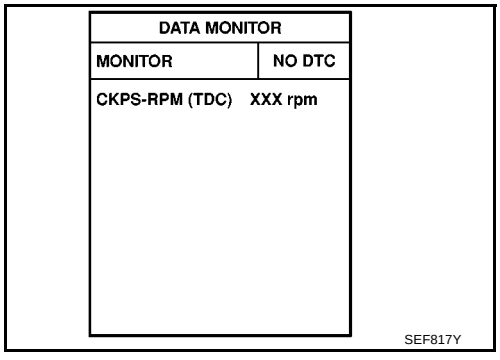
DTC Confirmation Procedure

EBS014XV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 5 seconds.
4. If DTC is detected, go to EC-1428, "Diagnostic Procedure" .

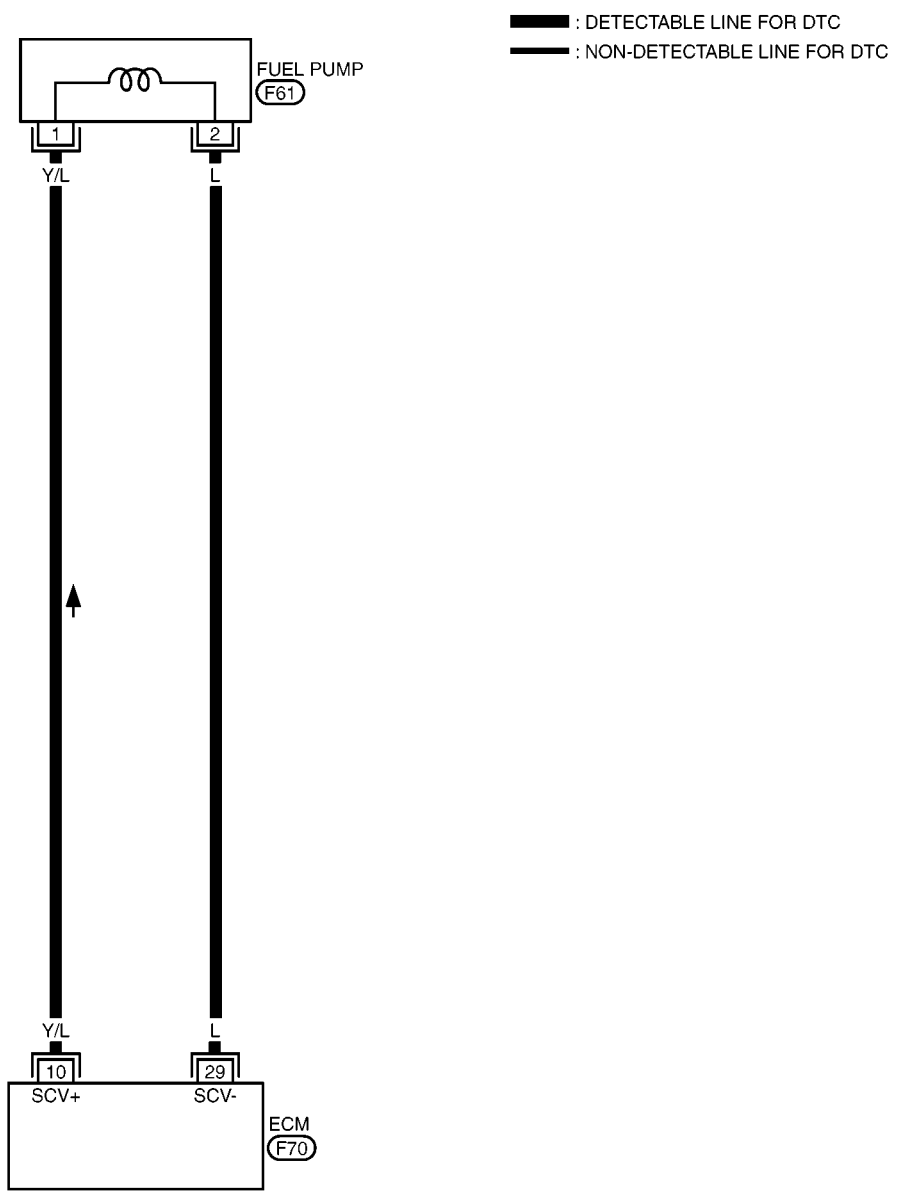


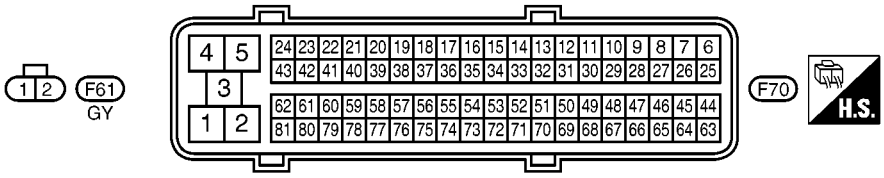
SEF817Y

Wiring Diagram

EBS014XW

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

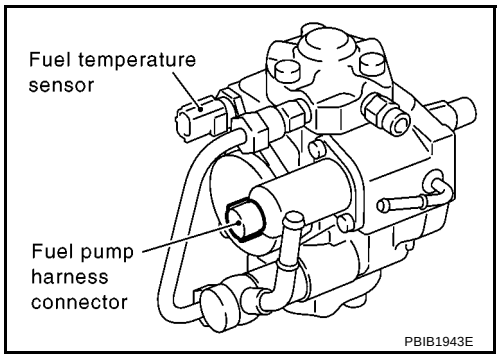
EBS014XX

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP

Refer to EC-1429, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

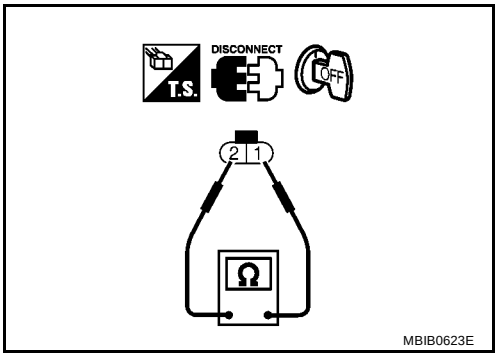
EBS014XY

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS014XZ

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

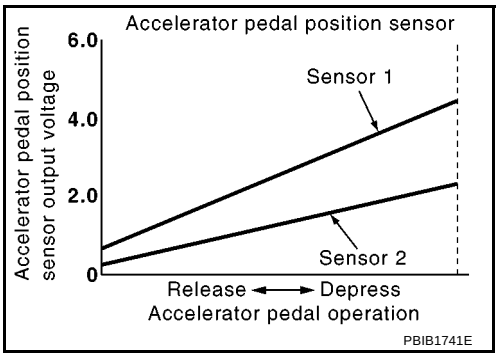
DTC P0642, P0643 SENSOR POWER SUPPLY

PFP:18002

Description

EBS014Y0

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS014Y1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.2 - 0.7V
		Accelerator pedal: fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: fully released	0.1 - 0.4V
		Accelerator pedal: fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS014Y2

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014Y3

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0642	Accelerator pedal position sensor 1 power supply circuit low	ECM detects a voltage of power source for the APP sensor 1 is excessively low.	● Harness or connectors (The APP sensor 1 power supply circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0643	Accelerator pedal position sensor 1 power supply circuit high	ECM detects a voltage of power source for the APP sensor 1 is excessively high.	

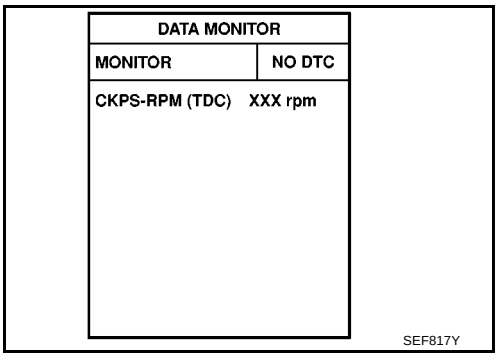
DTC Confirmation Procedure

EBS014Y4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

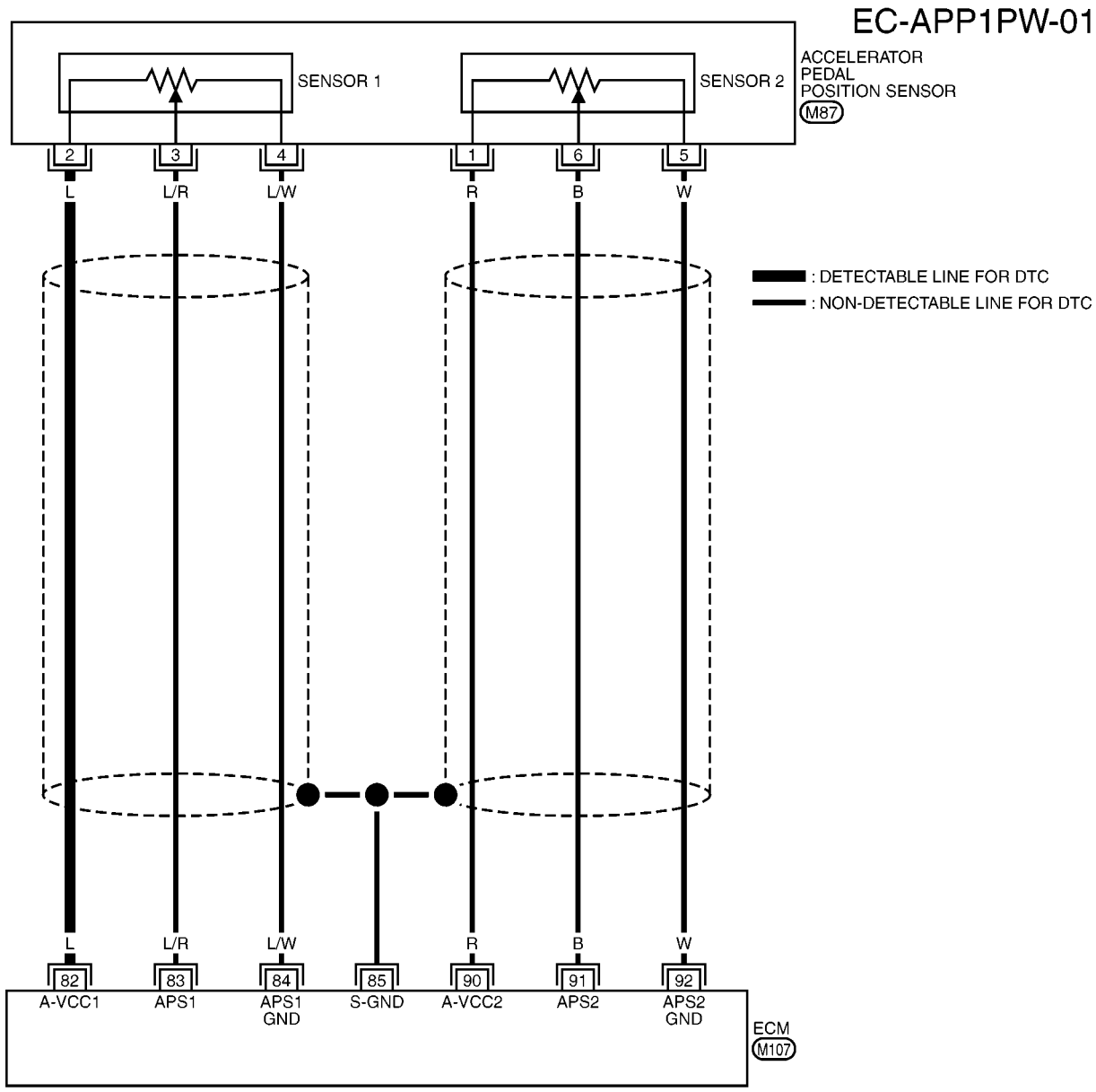
WITH CONSULT-II

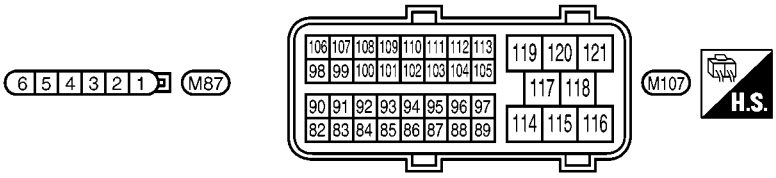
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1433, "Diagnostic Procedure" .



Wiring Diagram

EBS014Y5





YEC522A

Diagnostic Procedure

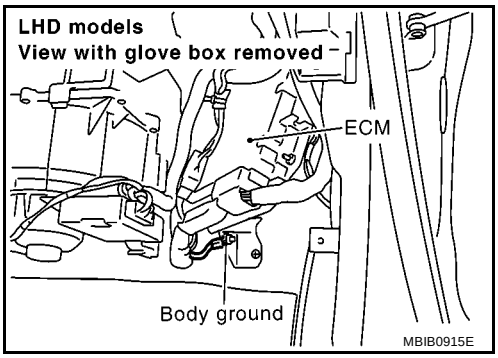
EBS014Y6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

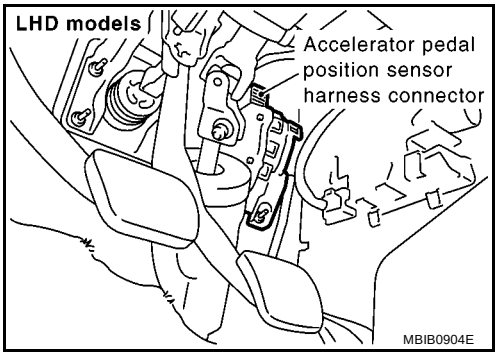
OK or NG

OK >> GO TO 2.
NG >> 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.

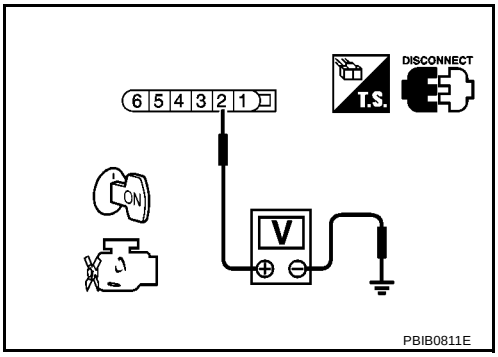


3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR

Refer to EC-1434, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace accelerator pedal assembly.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

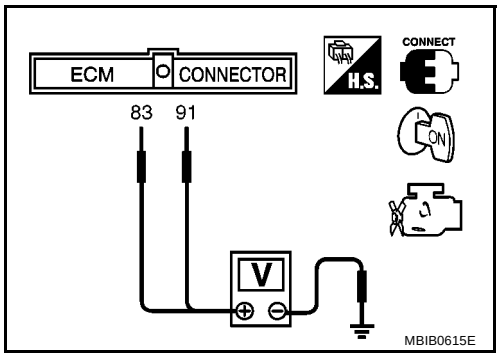
Component Inspection

EBS014Y7

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS014Y8

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

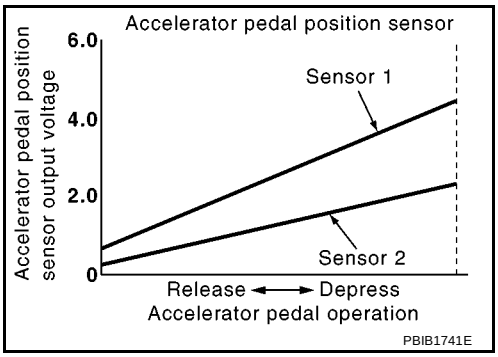
DTC P0652, P0653 SENSOR POWER SUPPLY

PFP:18002

Description

EBS014Y9

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS014YA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS014YB

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014YC

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0652	Accelerator pedal position sensor 2 power supply circuit low	ECM detects a voltage of power source for the APP sensor 2 is excessively low.	● Harness or connectors (The APP sensor 2 power supply circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0653	Accelerator pedal position sensor 2 power supply circuit high	ECM detects a voltage of power source for the APP sensor 2 is excessively high.	

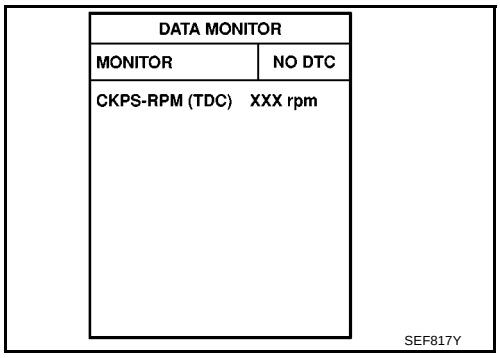
DTC Confirmation Procedure

EBS014YD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

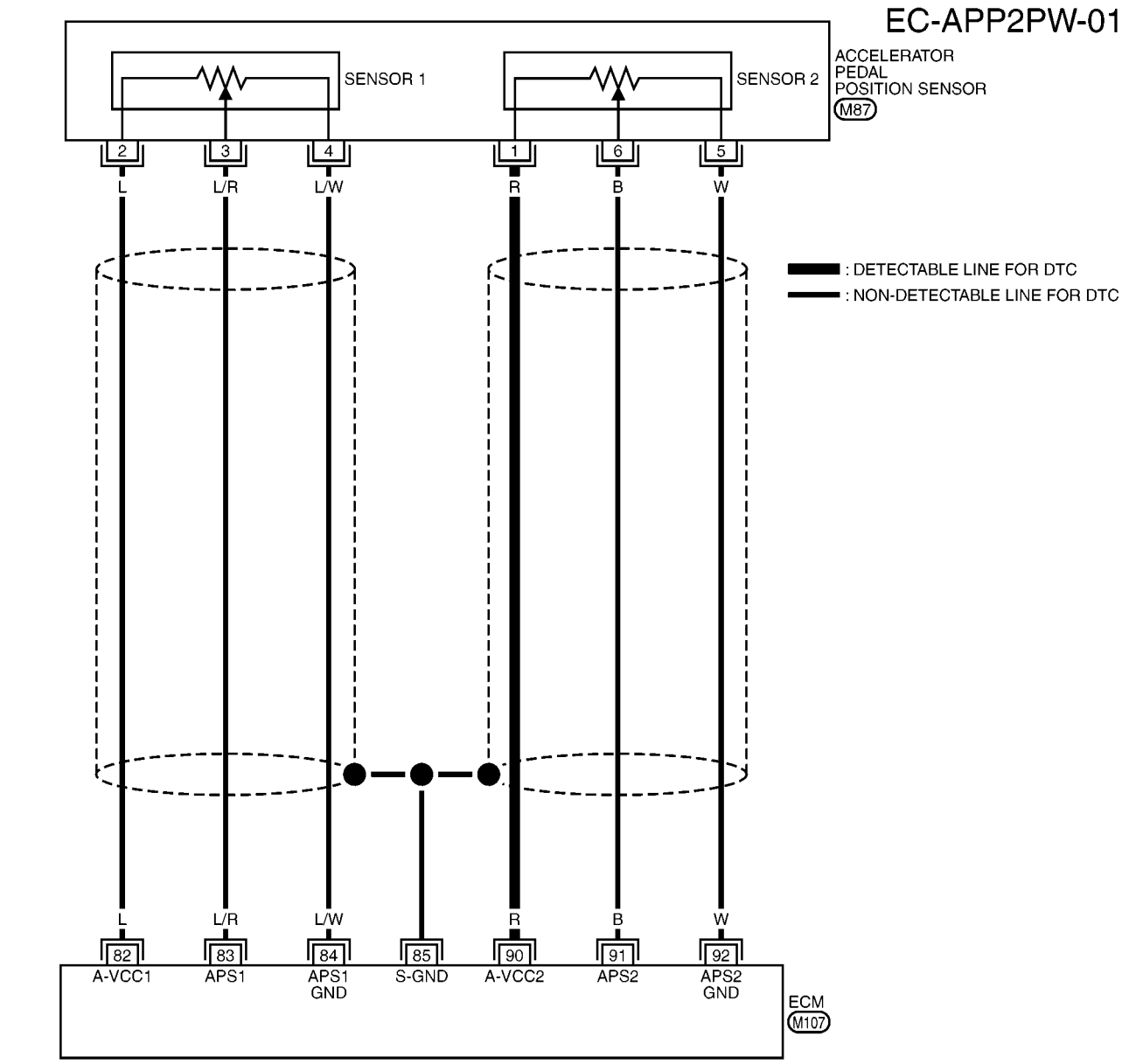
WITH CONSULT-II

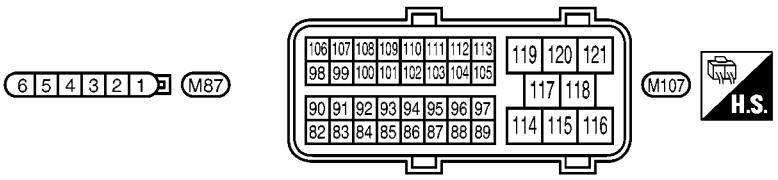
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1438, "Diagnostic Procedure" .



Wiring Diagram

EBS014YE





YEC523A

Diagnostic Procedure

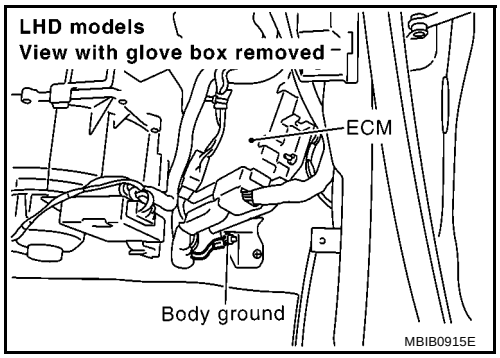
EBS014YF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

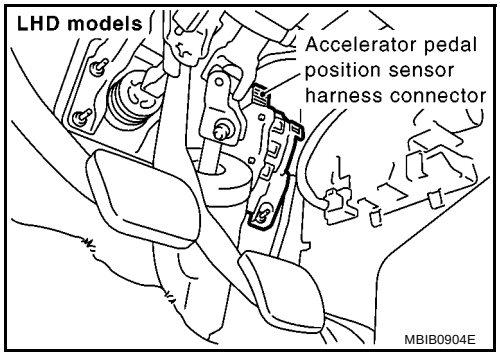
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

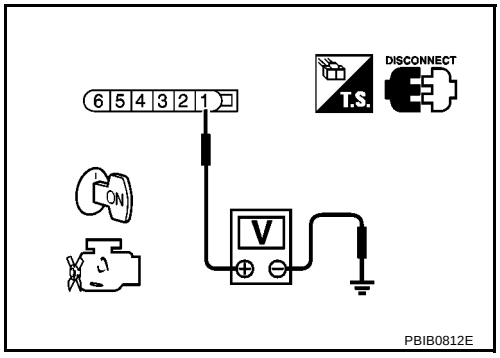


3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR

Refer to EC-1439, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace accelerator pedal assembly.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

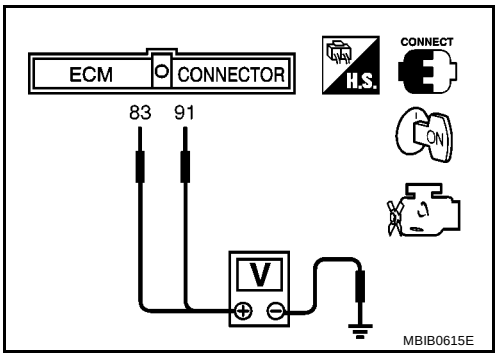
Component Inspection

EBS014YG

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and engine body under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS014YH

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

DTC P0686 ECM RELAY

PFP:25230

ECM Terminals and Reference valve

EBS014YI

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

EBS014YJ

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0686	ECM relay circuit	ECM detects ECM relay is stuck closed even if ignition switch OFF.	● Harness or connectors (The ECM relay circuit is shorted.) ● ECM relay

DTC Confirmation Procedure

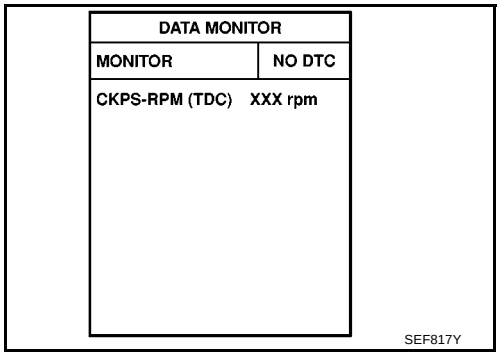
EBS014YK

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

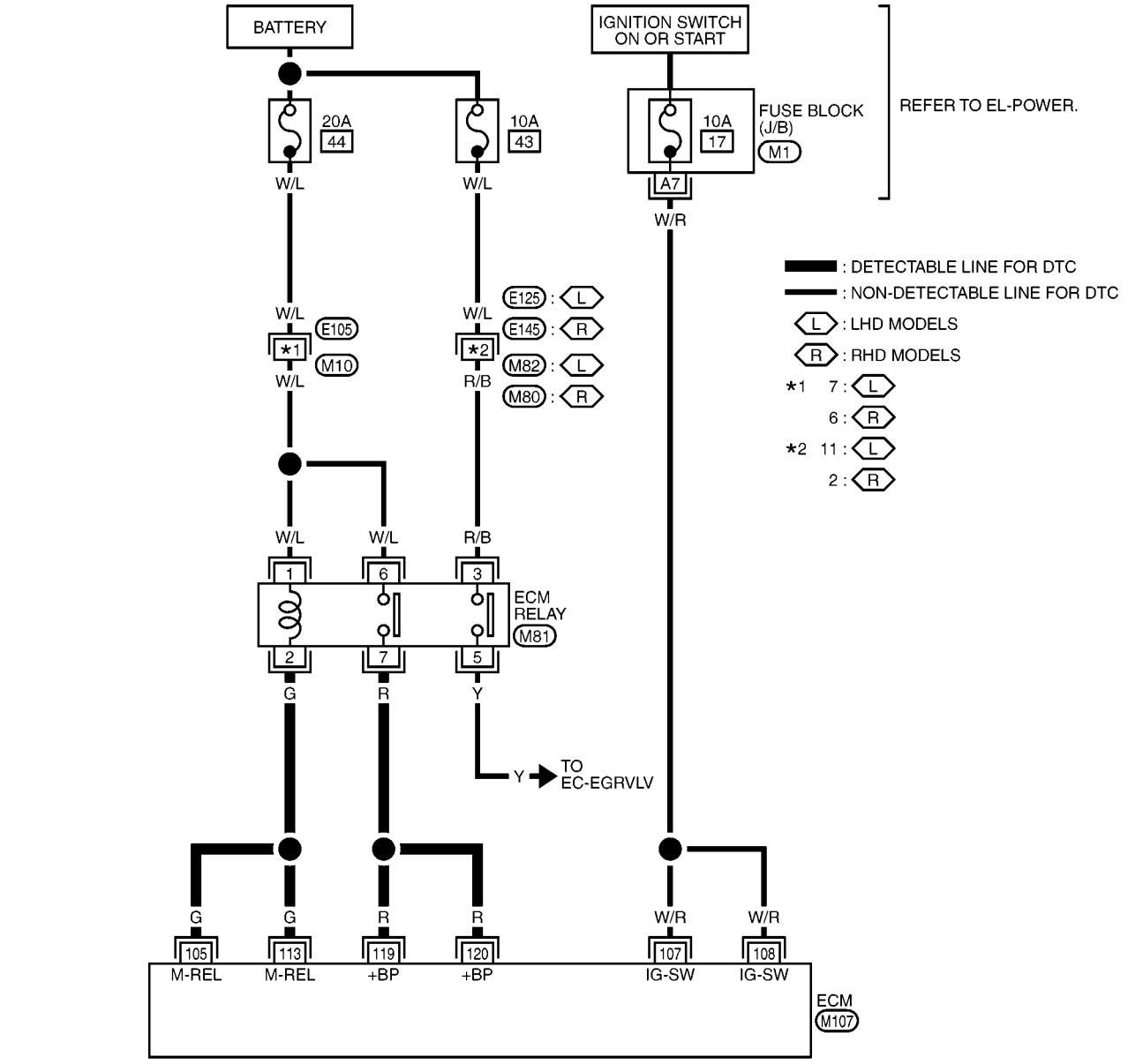
1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-1442, "Diagnostic Procedure" .

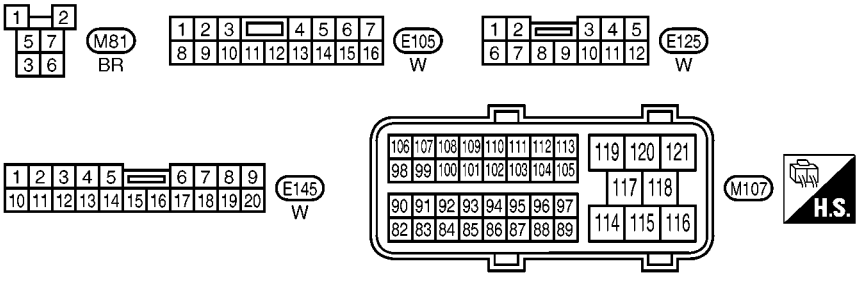


Wiring Diagram

EBS014YL

EC-ECMRLY-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-
JUNCTION BOX (J/B)

MBWA0655E

Diagnostic Procedure

EBS014YM

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 2.
NG >> Repair short to ground in harness or connectors.

2. CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

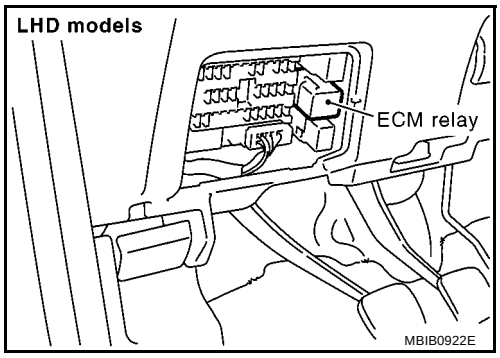
1. Disconnect ECM relay.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK ECM RELAY

Refer to EC-1442, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace ECM relay.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

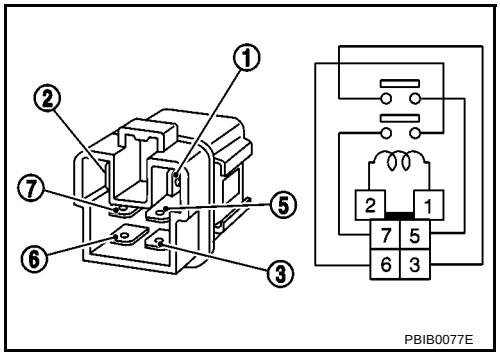
EBS014YN

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

EBS014YO

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

EBS014YP

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

DTC Confirmation Procedure

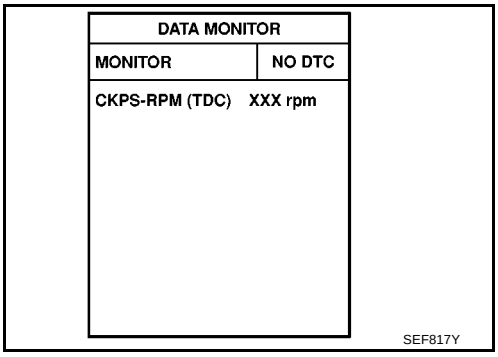
EBS014YQ

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1443, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014YR

Go to BR-97, “TROUBLE DIAGNOSIS” (models with ESP system) or BR-61, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” (model without ESP system).

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

EBS014YS

NOTE:
If DTC P1212 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .
This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.
Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

EBS014YT

The MI will not light up 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 ESP/TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

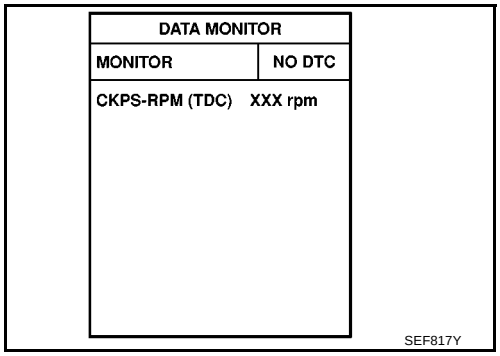
DTC Confirmation Procedure

EBS014YU

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1444, "Diagnostic Procedure" .



Diagnostic Procedure

EBS014YV

1. CHECK ESP/TCS/ABS CONTROL UNIT FUNCTION

Go to BR-97, “TROUBLE DIAGNOSIS” (models with ESP system) or BR-61, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” (model without ESP system).

>> **INSPECTION END**

DTC P1260 - P1267 FUEL INJECTOR ADJUSTMENT RESISTOR

PFP:16600

Description

EBS014YW

The fuel injector adjustment resistor is built into the fuel injector. The resistance is constant and individual. ECM uses the individual resistance to determine the fuel injection pulse.

ECM Terminals and Reference Value

EBS014YX

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	L/G	Fuel injector adjustment resistor No. 1	**[Ignition switch ON]**	0.5 - 5.1V (There are individual differences between fuel injector adjustment resistors.)
60	L/R	Fuel injector adjustment resistor No. 3		
61	R/Y	Fuel injector adjustment resistor No. 4		
62	LG/W	Fuel injector adjustment resistor No. 2		
78	R	Fuel injector adjustment resistor ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS014YY

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1260	No. 1 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 1 cylinder fuel injector adjustment resistor is sent to ECM.	● Harness or connectors (The fuel injector adjustment resistor circuit is open or shorted.) ● Fuel injector adjustment resistor
P1261	No. 1 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 1 cylinder fuel injector adjustment resistor is sent to ECM.	
P1262	No. 2 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 2 cylinder fuel injector adjustment resistor is sent to ECM.	
P1263	No. 2 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 2 cylinder fuel injector adjustment resistor is sent to ECM.	
P1264	No. 3 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 3 cylinder fuel injector adjustment resistor is sent to ECM.	
P1265	No. 3 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 3 cylinder fuel injector adjustment resistor is sent to ECM.	
P1266	No. 4 cylinder fuel injector adjustment resistor low input	An excessively low voltage from the No. 4 cylinder fuel injector adjustment resistor is sent to ECM.	
P1267	No. 4 cylinder fuel injector adjustment resistor high input	An excessively high voltage from the No. 4 cylinder fuel injector adjustment resistor is sent to ECM.	

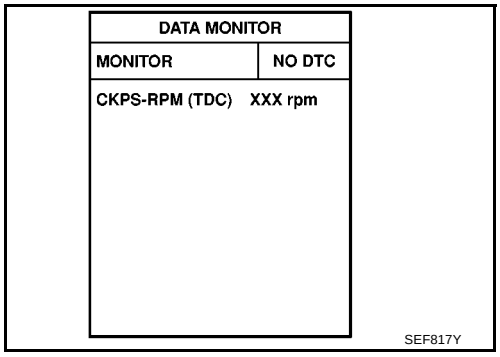
DTC Confirmation Procedure

EBS014YZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

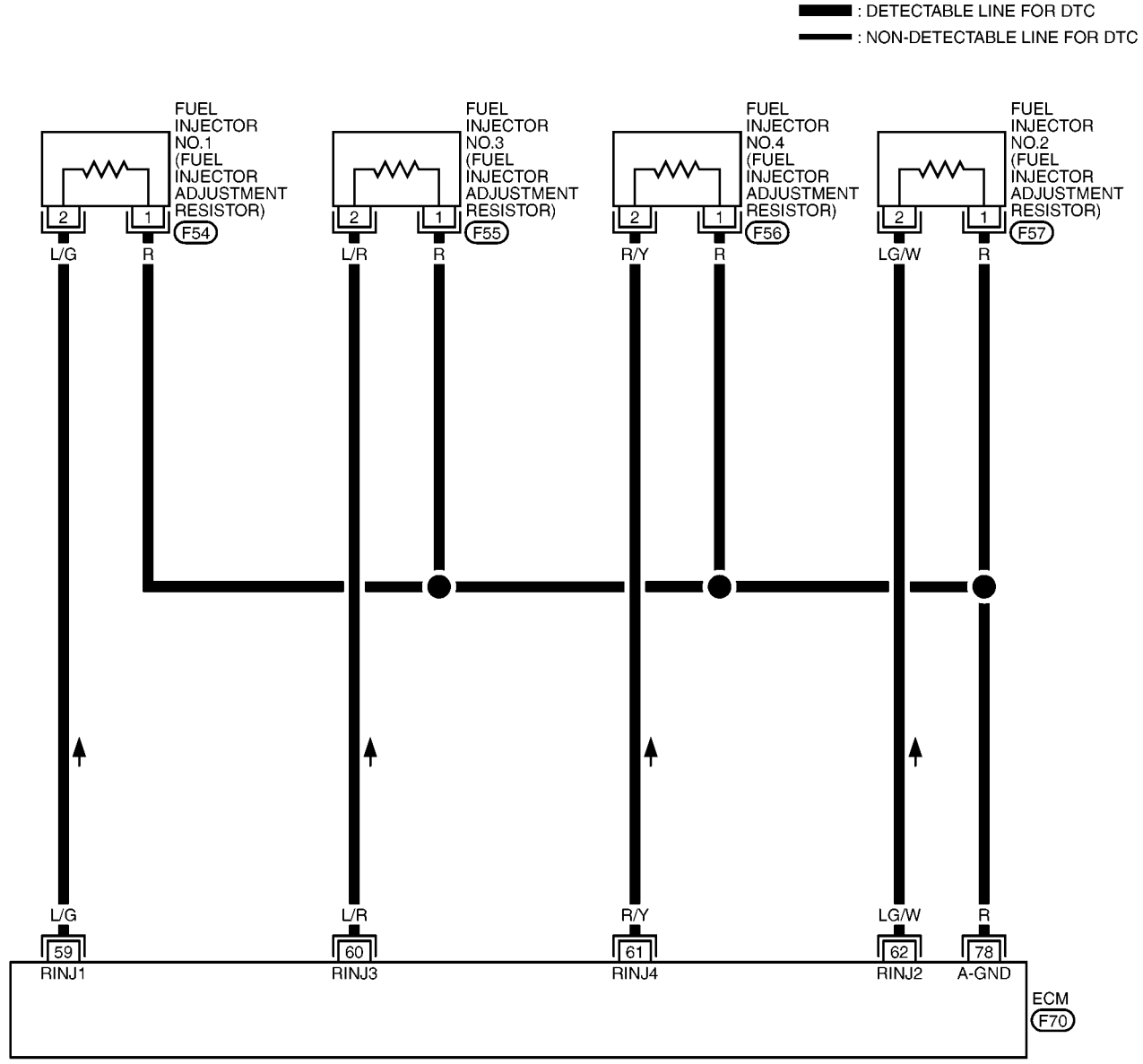
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1448, "Diagnostic Procedure" .

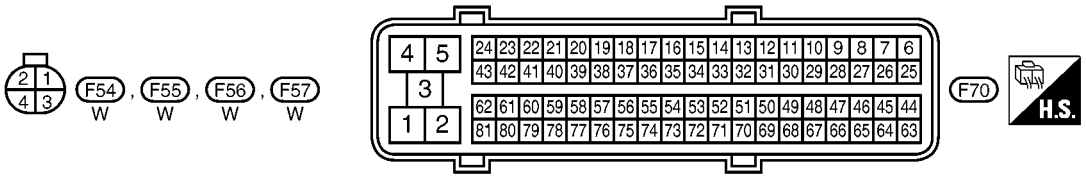


Wiring Diagram

EBS014Z0

EC-FIAR-01





MBWA0631E

Diagnostic Procedure

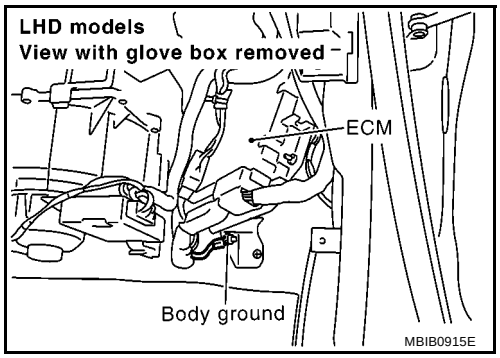
EBS014Z1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

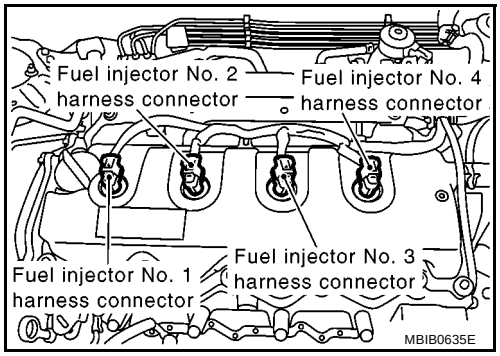
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR POWER SUPPLY CIRCUIT

1. Disconnect fuel injector harness connector of malfunctioning cylinder.
2. Turn ignition switch ON.

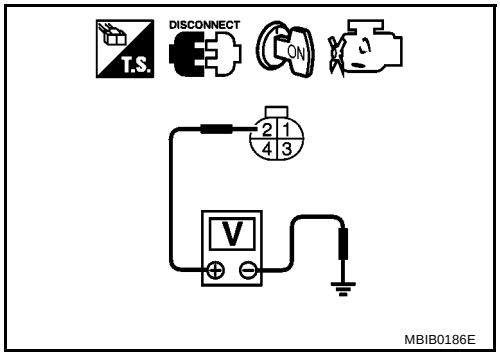


3. Check voltage between fuel injector terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 1 and ECM terminal 78.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR ADJUSTMENT RESISTOR

Refer to EC-1449, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel injector.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

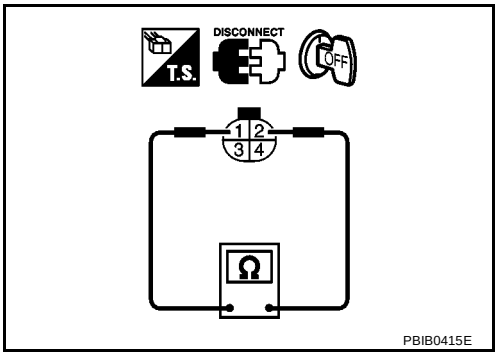
EBS014Z2

FUEL INJECTOR ADJUSTMENT RESISTOR

1. Disconnect fuel injector harness connector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

If NG, replace fuel injector.



Removal and Installation

EBS014Z3

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

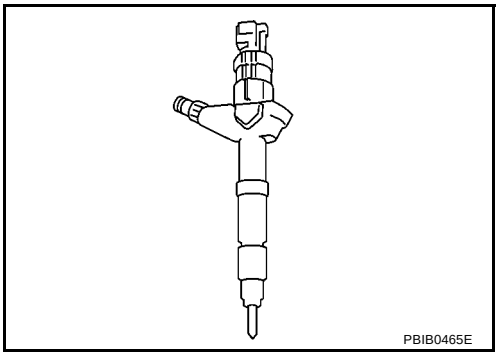
DTC P1268 - P1271 FUEL INJECTOR

PFP:16600

Component Description

EBS014Z4

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS014Z5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

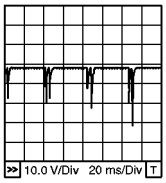
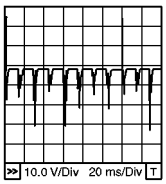
ECM Terminals and Reference Value

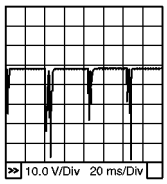
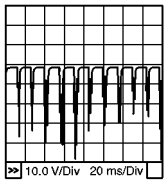
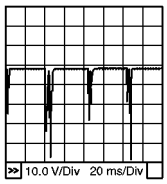
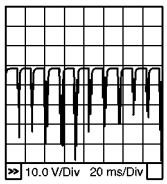
EBS014Z6

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014Z7

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1268	No. 1 cylinder fuel injector	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	● Fuel injector
P1269	No. 2 cylinder fuel injector	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270	No. 3 cylinder fuel injector	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271	No. 4 cylinder fuel injector	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC Confirmation Procedure

EBS014Z8

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

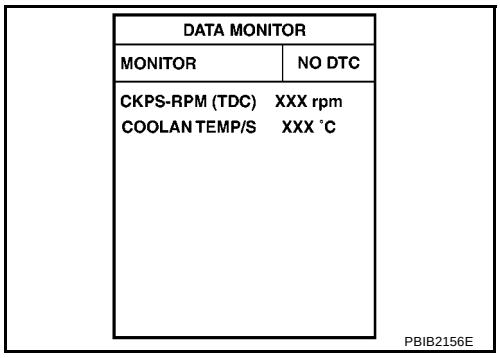
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Restart engine and let it idle for about 15 minutes.
3. If DTC is detected, go to EC-1454, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
4. Drive vehicle and maintain the following conditions for at least 60 seconds.

CKPS·RPM	700 - 2000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

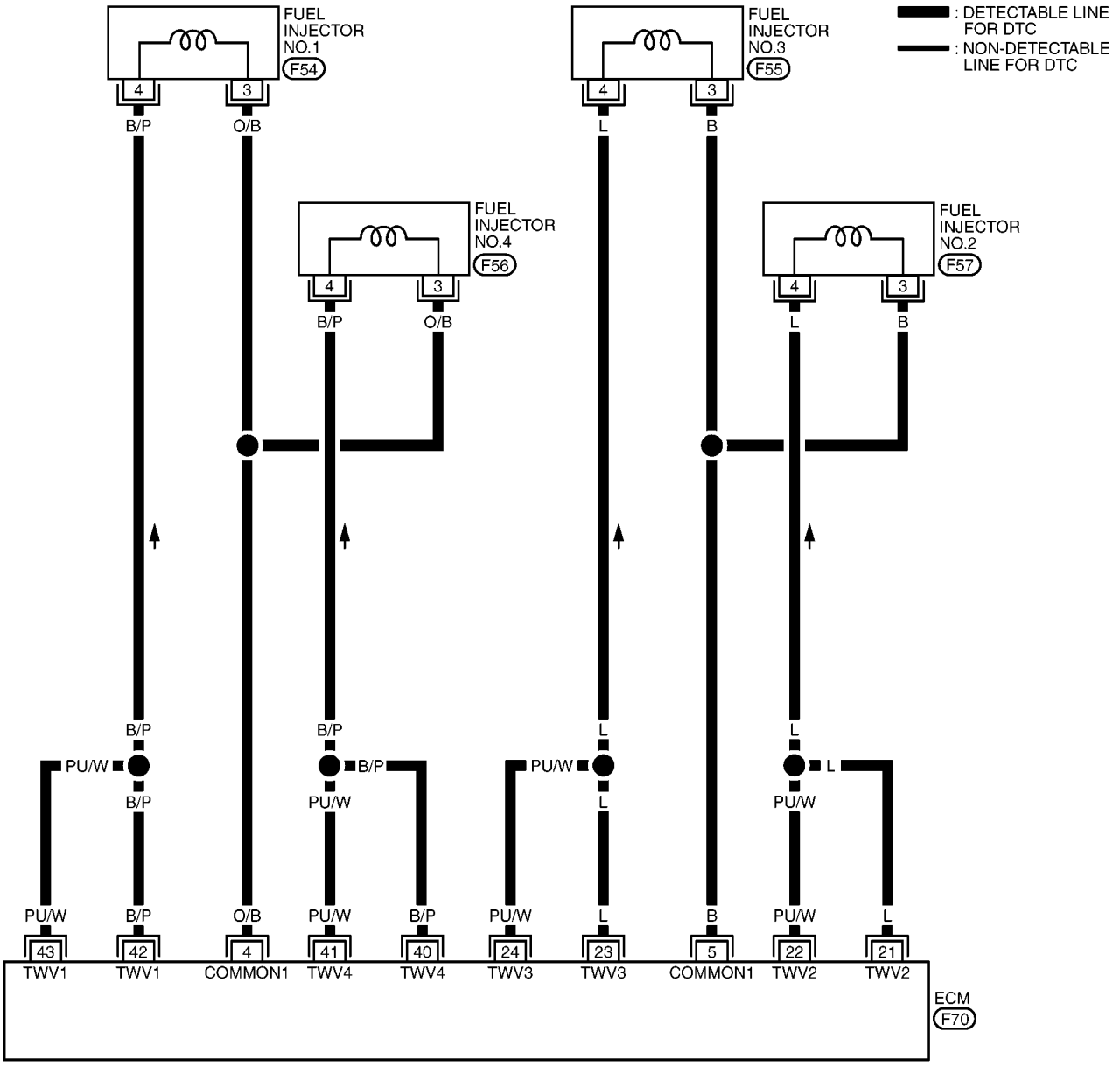
5. If DTC is detected, go to EC-1454, "Diagnostic Procedure" .



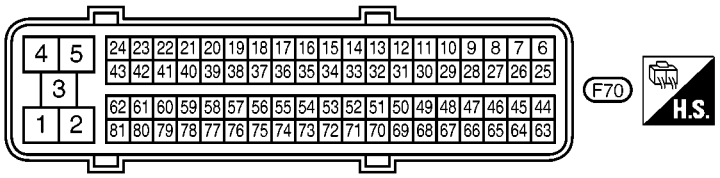
Wiring Diagram

EBS014Z9

EC-INJECT-01







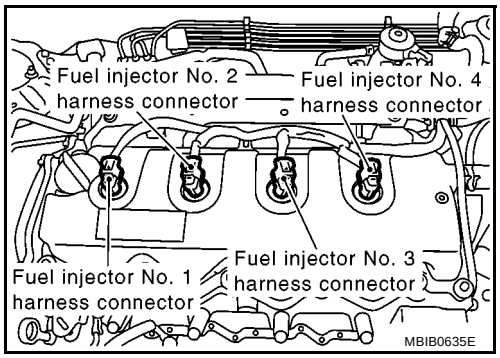
MBWA0633E

Diagnostic Procedure

EBS014ZA

1. CHECK FUEL INJECOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	4	3	No.1
P1269	5	3	No.2
P1270	5	3	No.3
P1271	4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	42, 43	4	No.1
P1269	21, 22	4	No.2
P1270	23, 24	4	No.3
P1271	40, 41	4	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1455, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors of malfunctioning cylinder and another cylinder.
2. Install fuel injectors to different cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Select “SELF DIAG RESULTS” mode with CONSULT-II.
6. Touch “ERASE”.
7. Perform EC-1452, "DTC Confirmation Procedure" .
8. Is another DTC displayed?

Yes or No

Yes >> Replace fuel injector of malfunctioning cylinder.
No >> GO TO 5.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

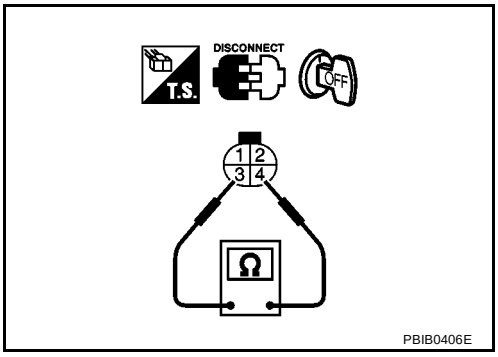
EBS014ZB

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS014ZC

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

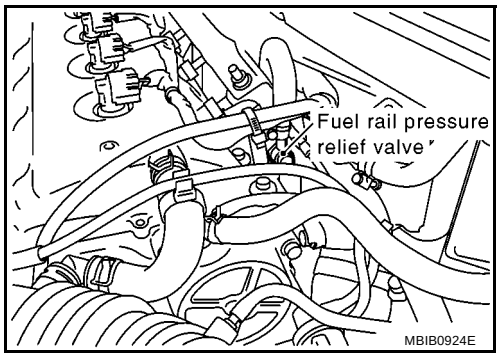
DTC P1272 FUEL PUMP

PFP:16700

Description

EBS014ZD

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve opens to carry excess fuel to the return hose.



CONSULT-II Reference Value in Data Monitor Mode

EBS014ZE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

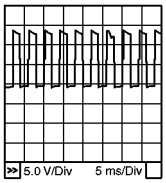
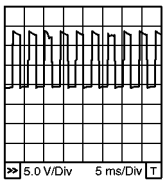
ECM Terminals and Reference Value

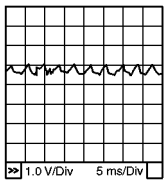
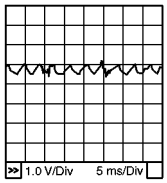
EBS014ZF

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014ZG

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1272	Fuel rail pressure relief valve open	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	● Harness or connectors (Fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor ● Air mixed with fuel ● Lack of fuel

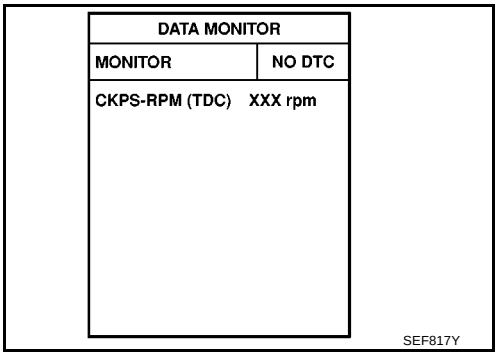
DTC Confirmation Procedure

EBS014ZH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
4. If DTC is detected, go to EC-1459, "Diagnostic Procedure" .

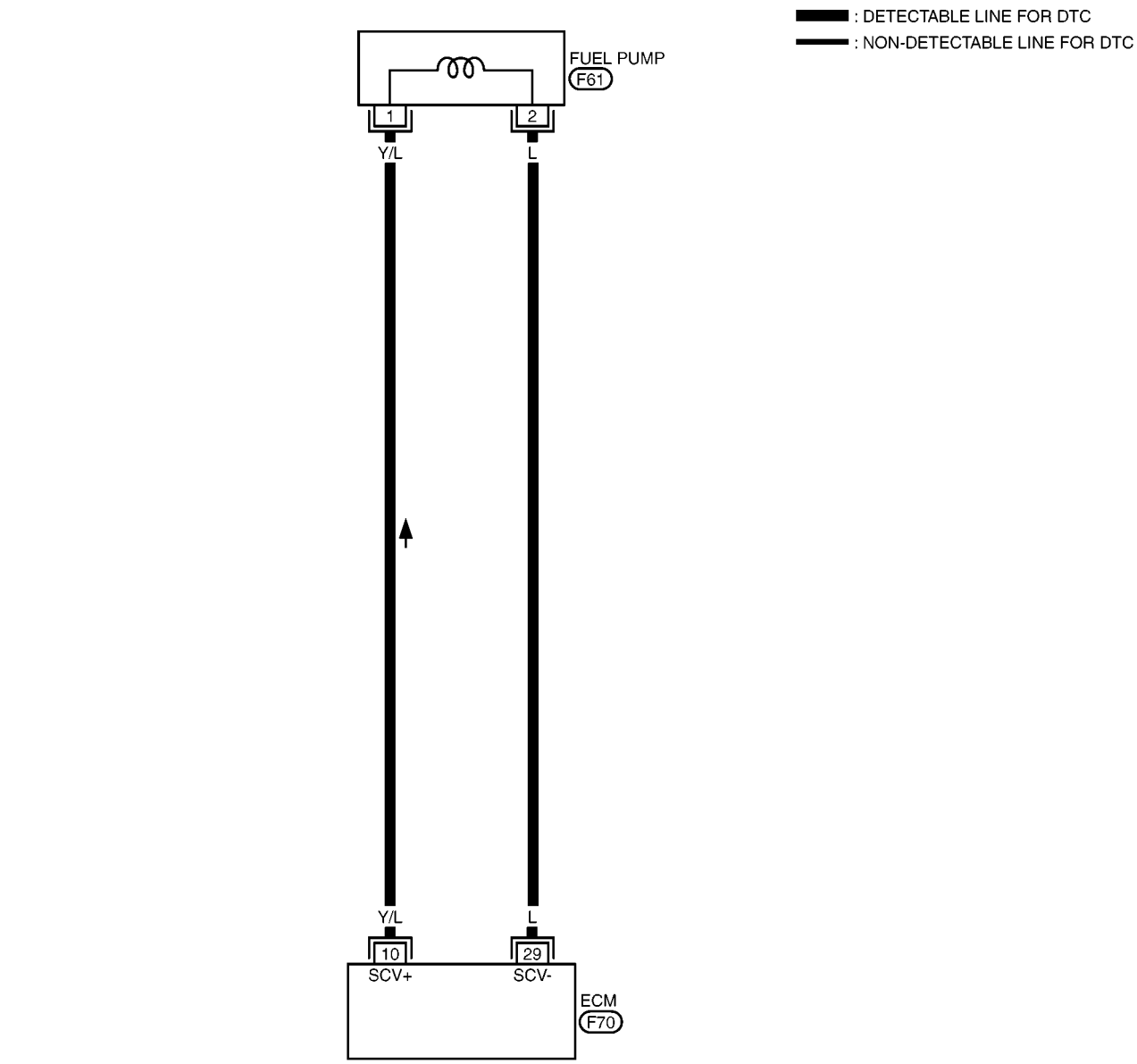


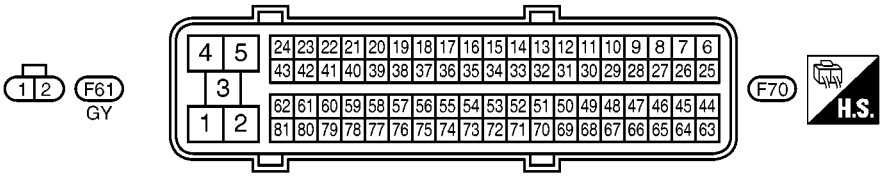
SEF817Y

Wiring Diagram

EBS014ZI

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

EBS014ZJ

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

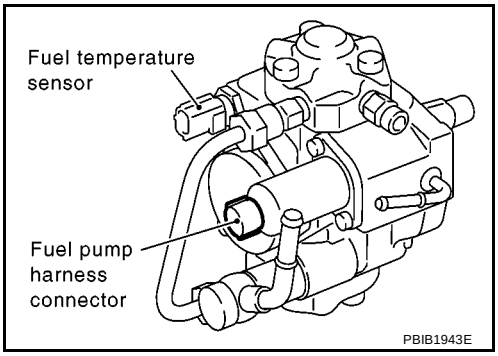
1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1457, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.



3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP

Refer to EC-1460, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

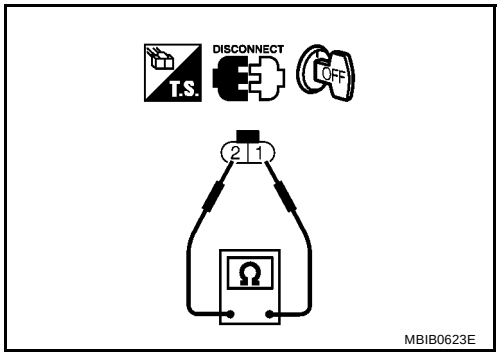
EBS014ZK

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

   Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS014ZL

FUEL RAIL

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1273 FUEL PUMP

PFP:16700

Description

EBS014ZM

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS014ZN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

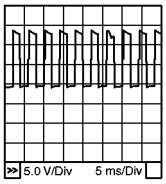
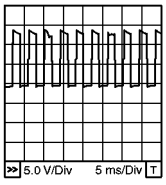
ECM Terminals and Reference Value

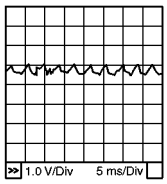
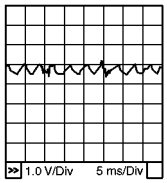
EBS014ZO

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014ZP

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1273	Fuel pump insufficient flow	ECM detects the abnormal pulse of fuel pressure.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor

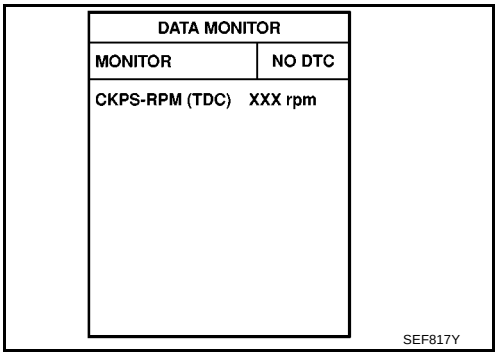
DTC Confirmation Procedure

EBS014ZQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 10 seconds.
4. If DTC is detected, go to EC-1465, "Diagnostic Procedure" .

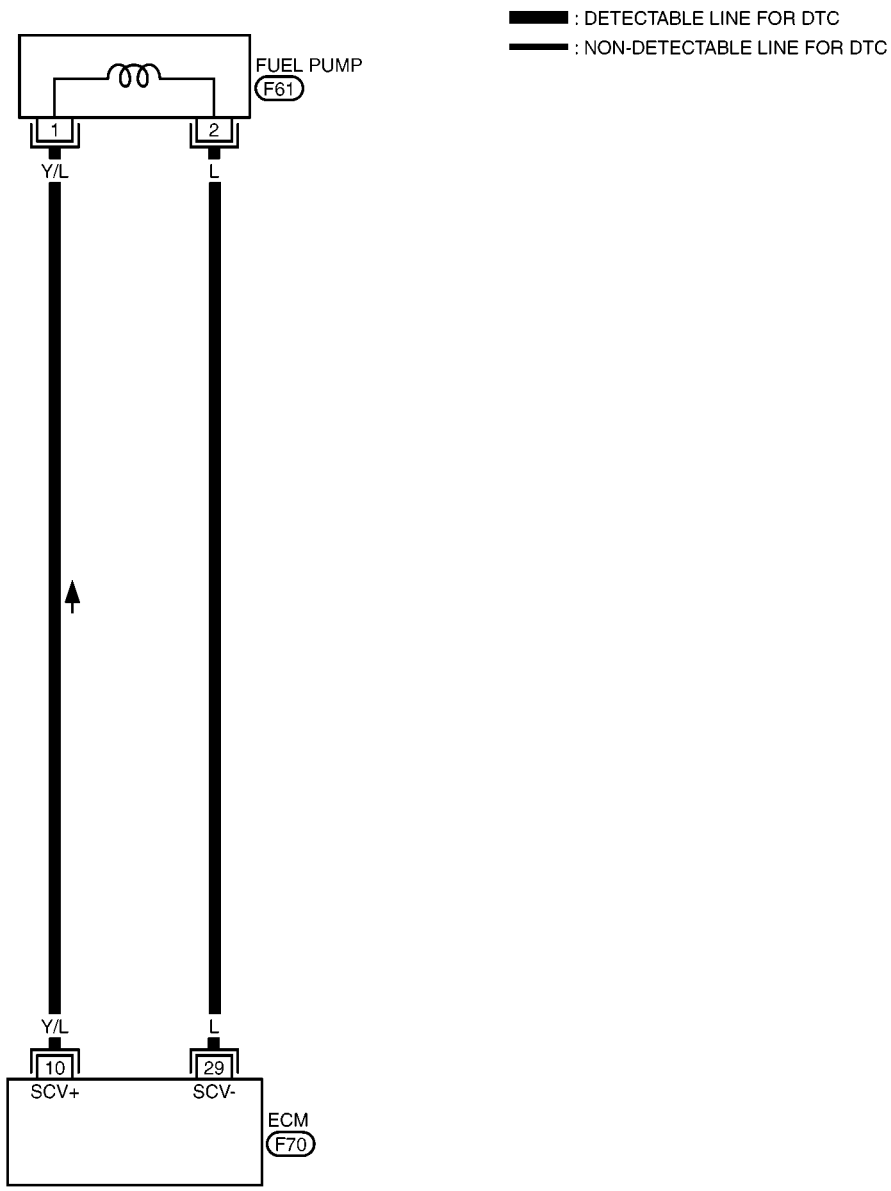


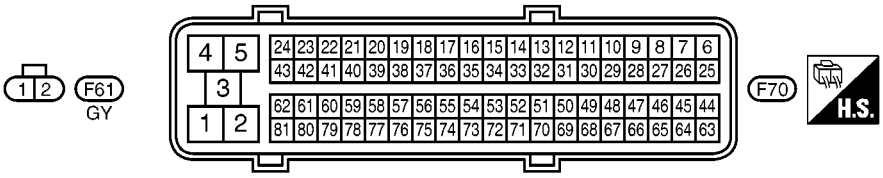
SEF817Y

Wiring Diagram

EBS014ZR

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

EBS014ZS

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1463, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Yes or No

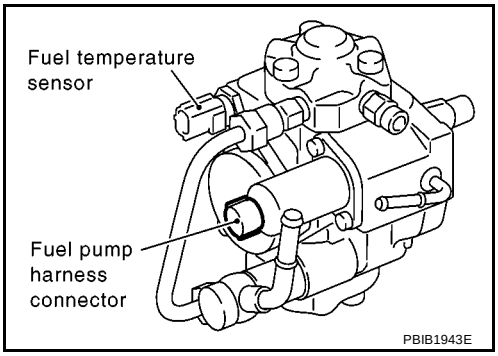
Yes >> GO TO 2.
No >> **INSPECTION END**

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel rail.

5. CHECK FUEL PUMP

Refer to EC-1466, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

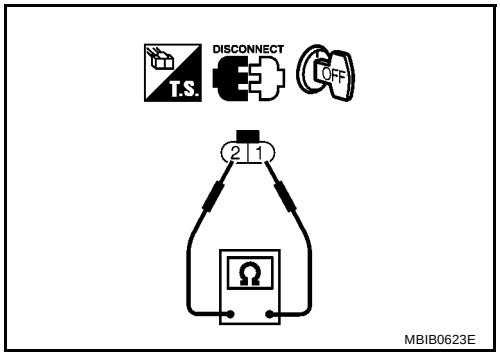
EBS014ZT

FUEL PUMP

1. Check continuity between fuel supply pump terminals 1 and 2.

Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS014ZU

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1274 FUEL PUMP

PFP:16700

Description

EBS014ZV

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS014ZW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

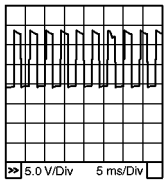
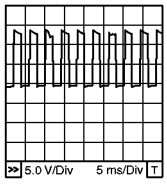
ECM Terminals and Reference Value

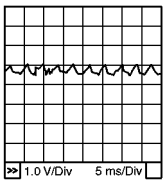
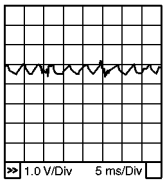
EBS014ZX

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS014ZY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1274	Fuel pump protection	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

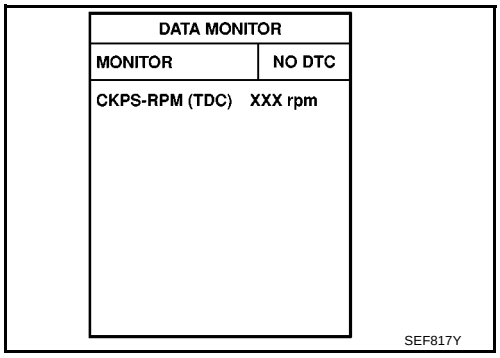
DTC Confirmation Procedure

EBS014ZZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Tuning ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let idle for at least 5 seconds.
4. If DTC is detected, go to EC-1470, "Diagnostic Procedure" .

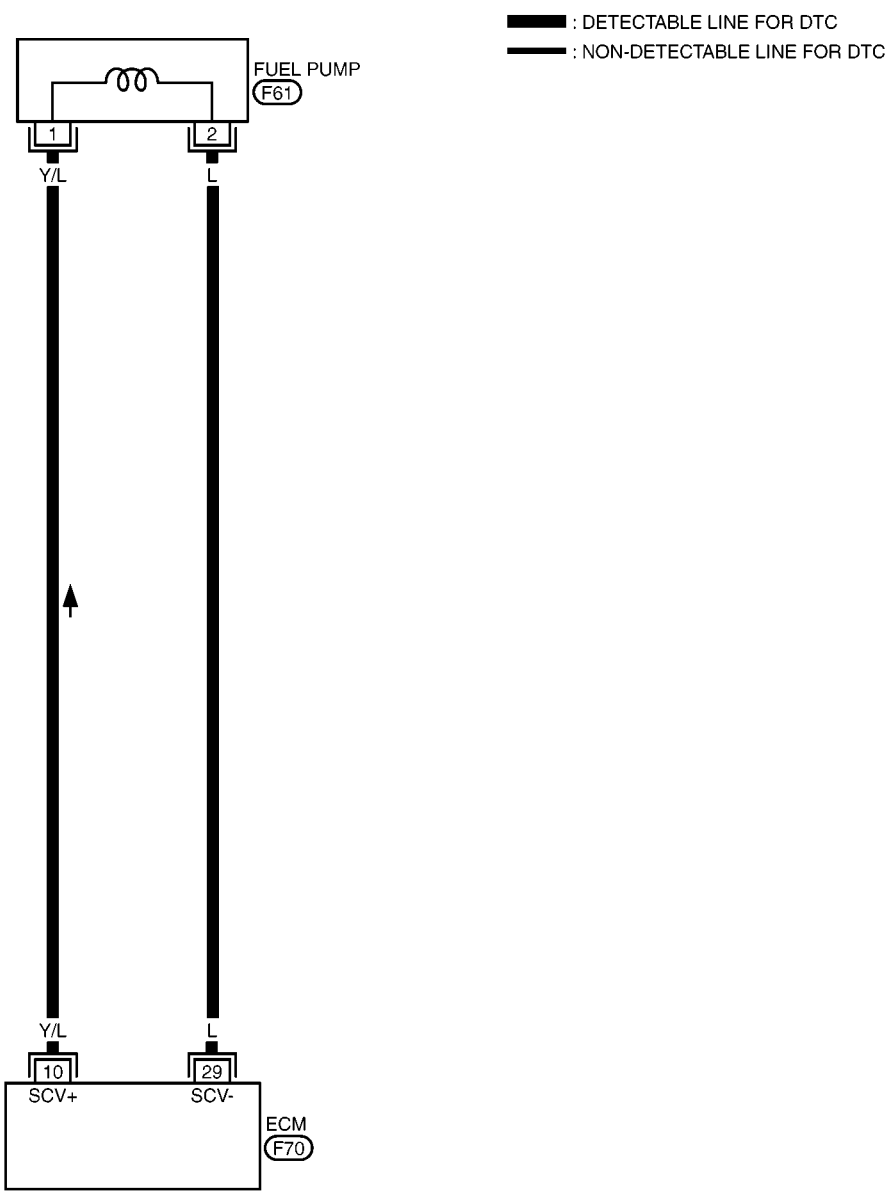


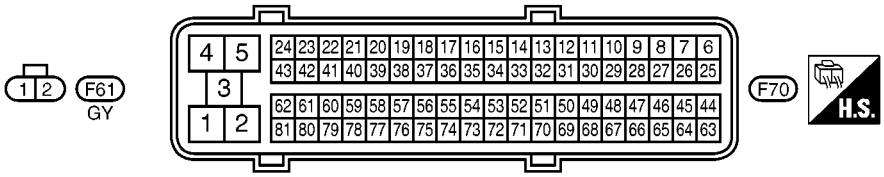
SEF817Y

Wiring Diagram

EBS01500

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

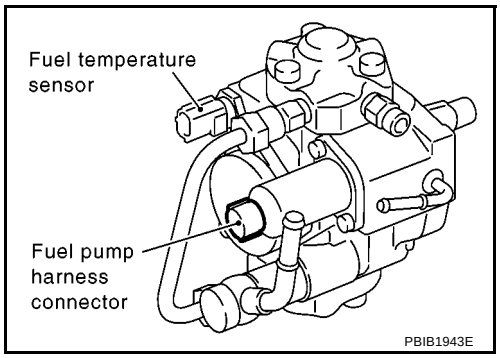
EBS01501

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1471, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

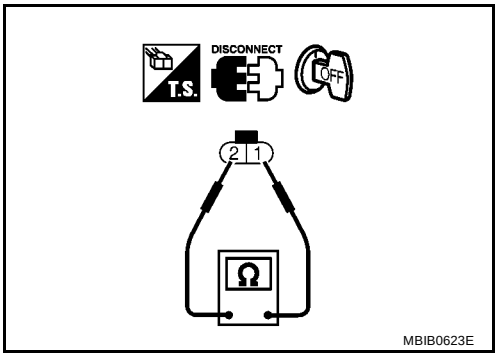
EBS01502

FUEL PUMP

1. Check continuity between fuel pump terminals 1 and 2.

   Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS01503

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

DTC P1275 FUEL PUMP

PFP:16700

Description

EBS01504

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

EBS01505

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

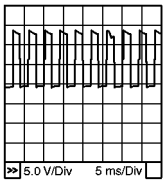
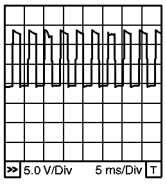
ECM Terminals and Reference Value

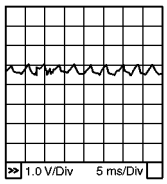
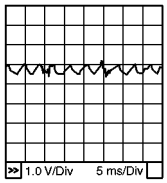
EBS01506

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump power supply	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS01507

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1275	Fuel pump exchange	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

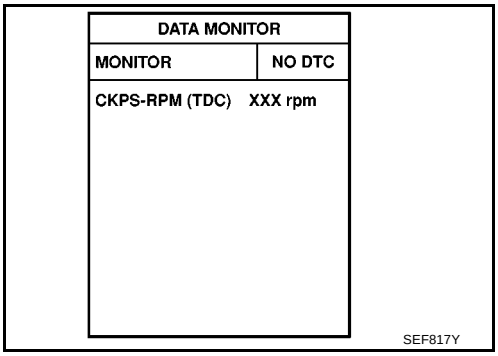
DTC Confirmation Procedure

EBS01508

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 60 seconds.
4. If DTC is detected, go to EC-1475, "Diagnostic Procedure" .

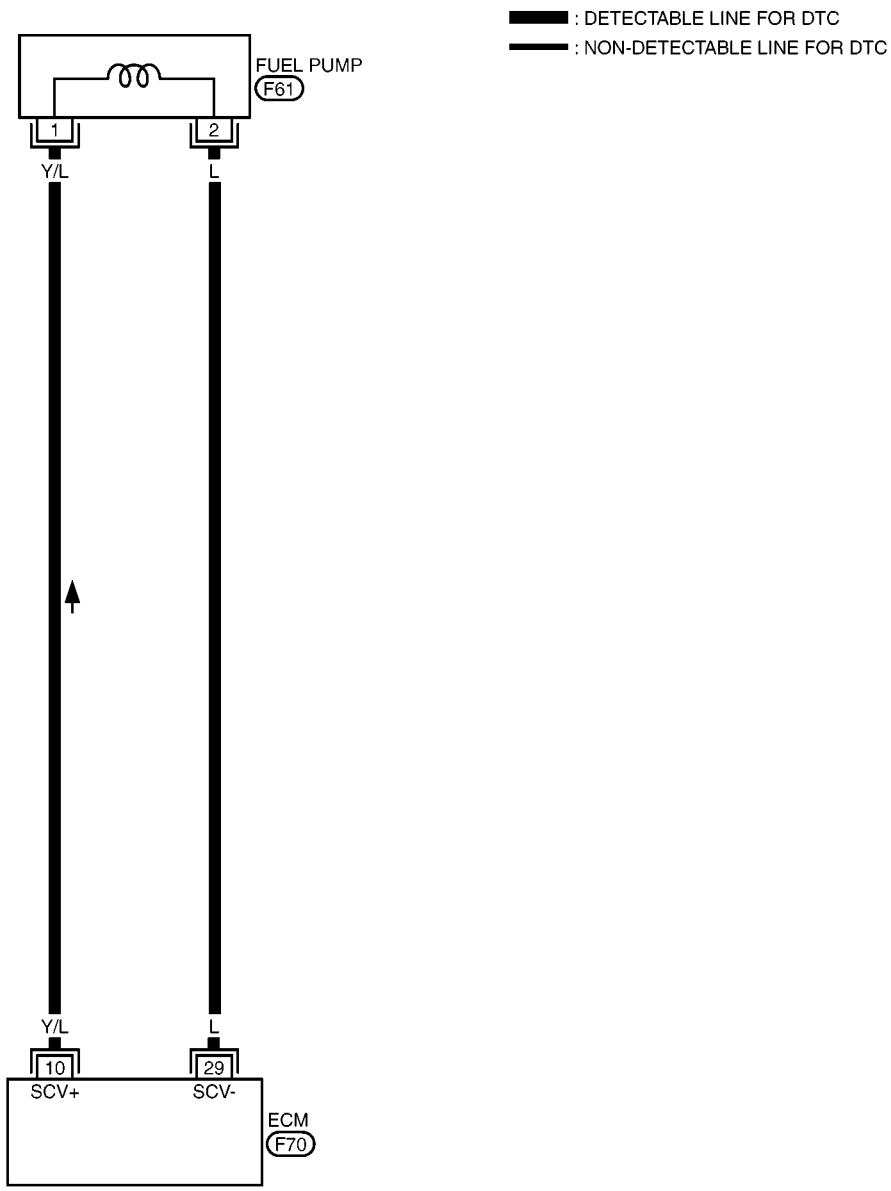


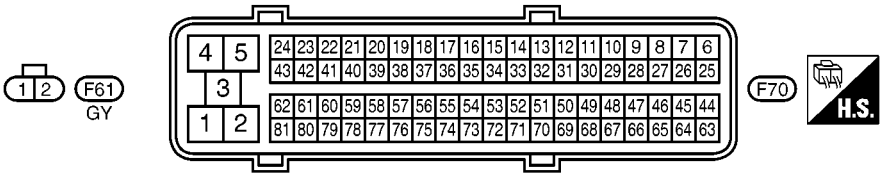
SEF817Y

Wiring Diagram

EBS01509

EC-F/PUMP-01





YEC509A

Diagnostic Procedure

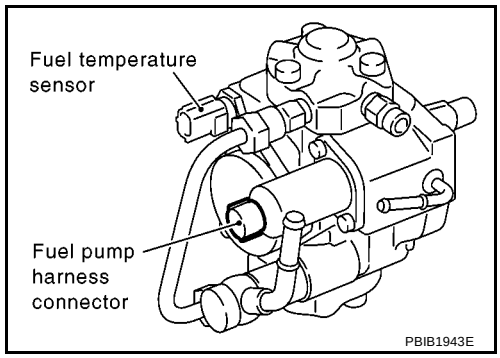
EBS0150A

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump harness connectors.
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1356, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1476, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

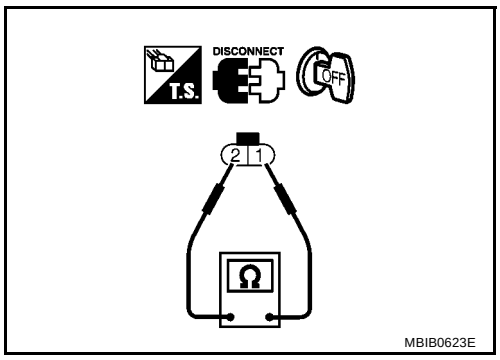
EBS0150B

FUEL PUMP

1. Check continuity between fuel pump terminals 1 and 2.

   Continuity should exist.

2. If NG, replace fuel pump.



Removal and Installation

EBS0150C

FUEL PUMP

Refer to EM-150, "FUEL PUMP" .

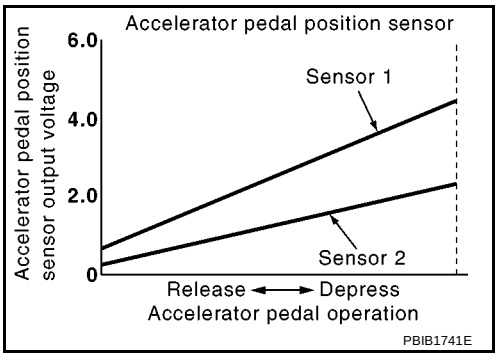
DTC P2135 APP SENSOR

PFP:18002

Description

EBS0150D

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.



CONSULT-II Reference Value in Data Monitor Mode

EBS0150E

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.2 - 0.7V
		Accelerator pedal: Fully depressed	3.9 - 4.9V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.1 - 0.4V
		Accelerator pedal: Fully depressed	1.9 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

ECM Terminals and Reference Value

EBS0150F

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	L	Accelerator pedal position sensor 1 power supply	**[Ignition switch ON]**	Approximately 5.3V
83	L/R	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.2V
84	L/W	Accelerator pedal position sensor 1 ground	**[Ignition switch ON]**	Approximately 0.3V
85	—	Sensor ground (Accelerator pedal position sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
90	R	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	B	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.4 - 0.7V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.2 - 2.7V
92	W	Accelerator pedal position sensor 2 ground	**[Ignition switch ON]**	Approximately 0.3V

On Board Diagnosis Logic

EBS0150G

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	● Harness or connectors (The APP sensor circuit is open or shorted.) ● Accelerator pedal position sensor

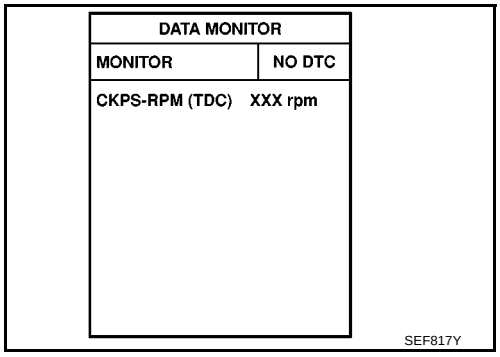
DTC Confirmation Procedure

EBS0150H

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

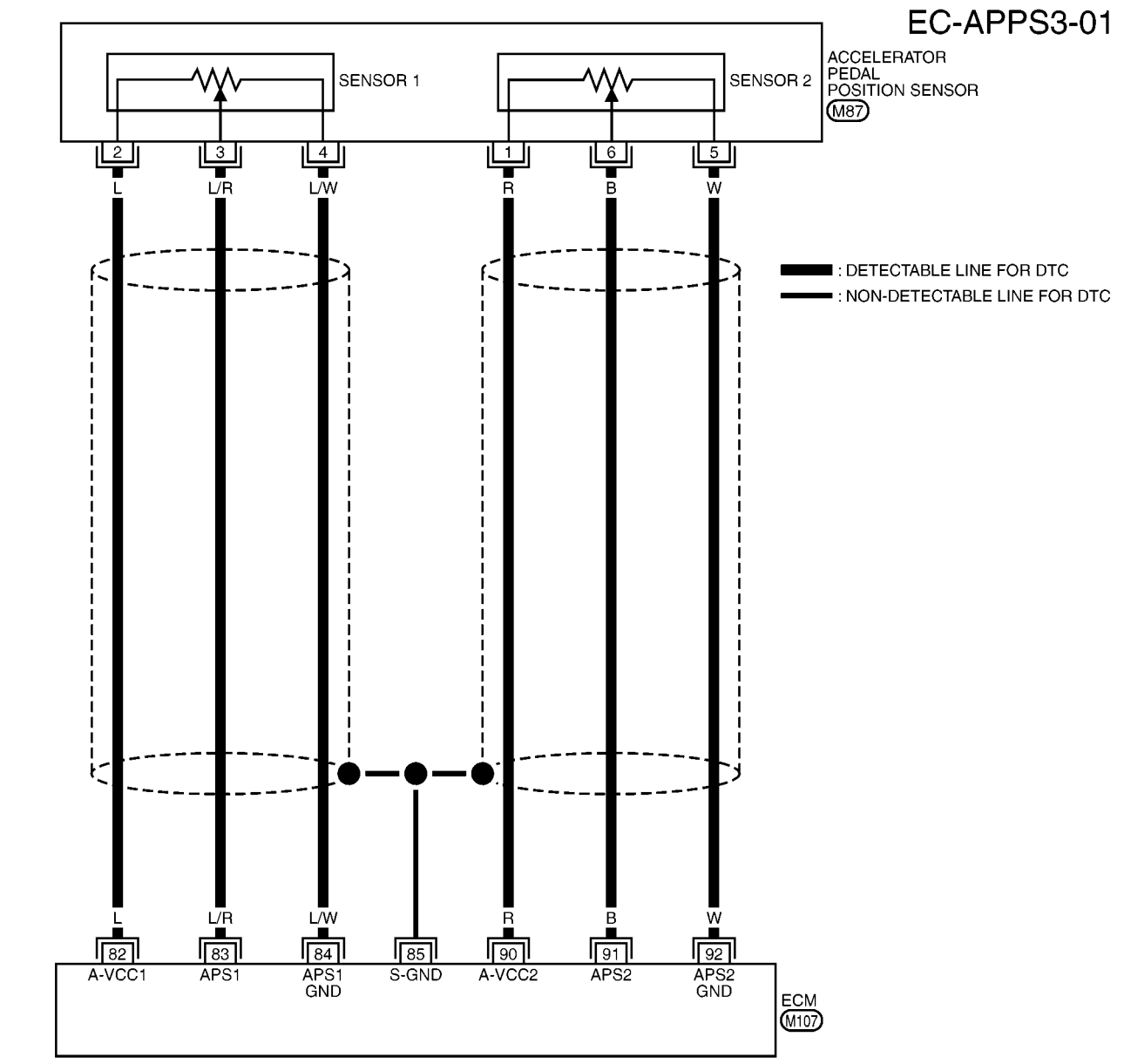
WITH CONSULT-II

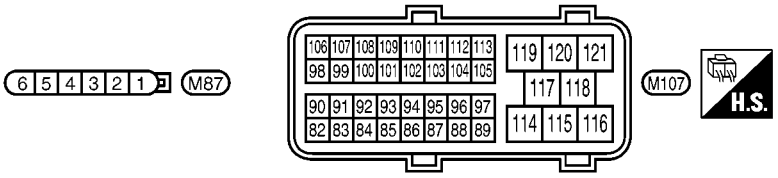
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
5. If DTC is detected, go to EC-1480, "Diagnostic Procedure" .



Wiring Diagram

EBS0150I





YEC521A

Diagnostic Procedure

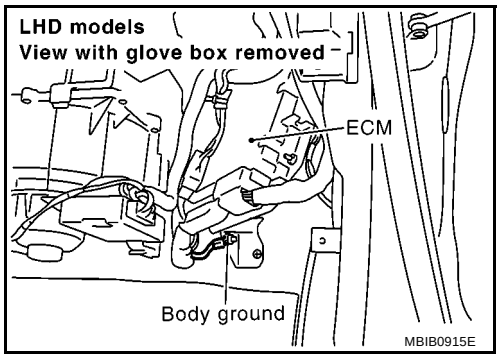
EBS0150J

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

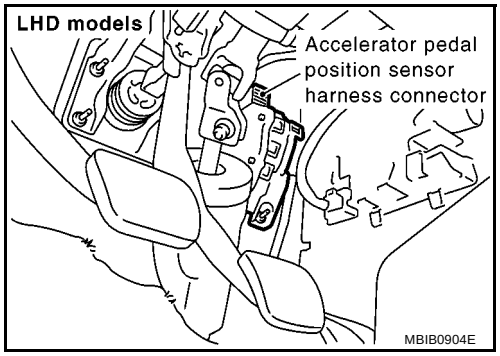
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

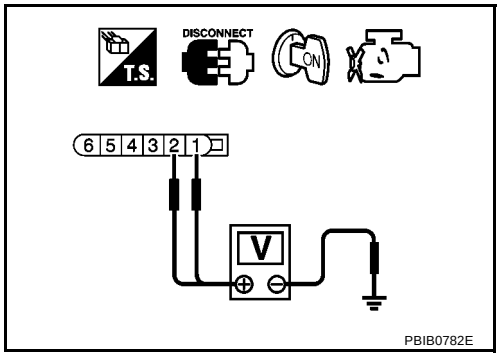


3. Check voltage between APP sensor terminals 1, 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 84, APP sensor terminal 5 and ECM terminal 92.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> 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 harness continuity between ECM terminal 83 and APP sensor terminal 3, ECM terminal 91 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1481, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

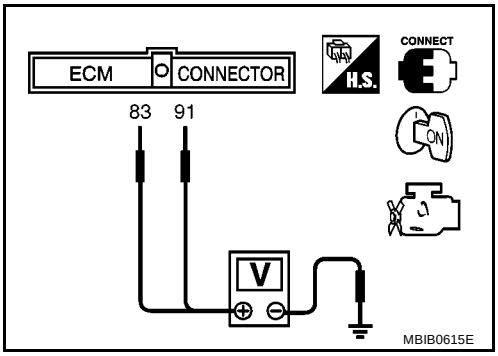
Component Inspection

EBS0150K

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and body ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	4.2 - 5.2V
91 (Accelerator pedal position sensor 2)	Fully released	0.4 - 0.7V
	Fully depressed	2.2 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

EBS0150L

ACCELERATOR PEDAL

Refer to FE-16, “ACCELERATOR CONTROL SYSTEM”.

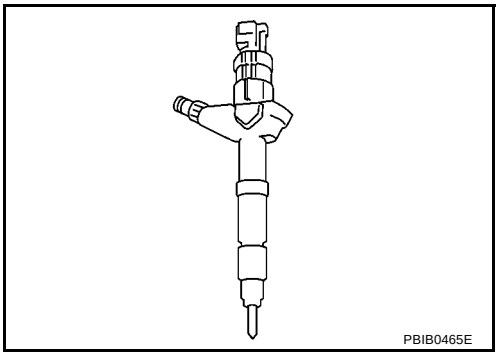
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

PFP:16600

Component Description

EBS0150M

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS0150N

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

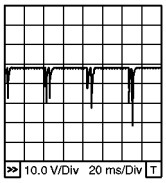
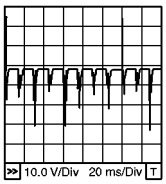
ECM Terminals and Reference Value

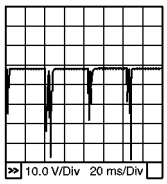
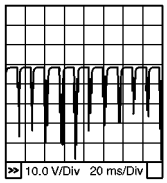
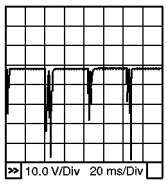
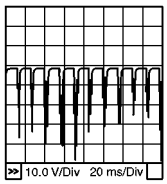
EBS0150O

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS0150P

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2146	No. 1 and 4 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.)
P2149	No. 2 and 3 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC Confirmation Procedure

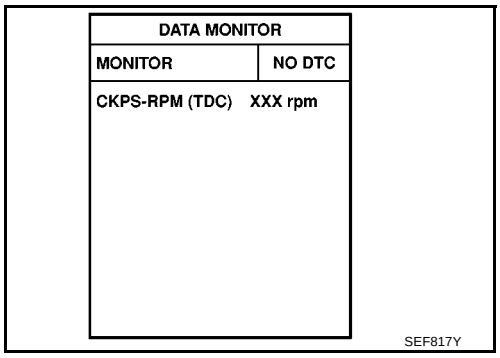
EBS0150Q

NOTE:
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 the ambient temperature is more than -20°C (-4°F).

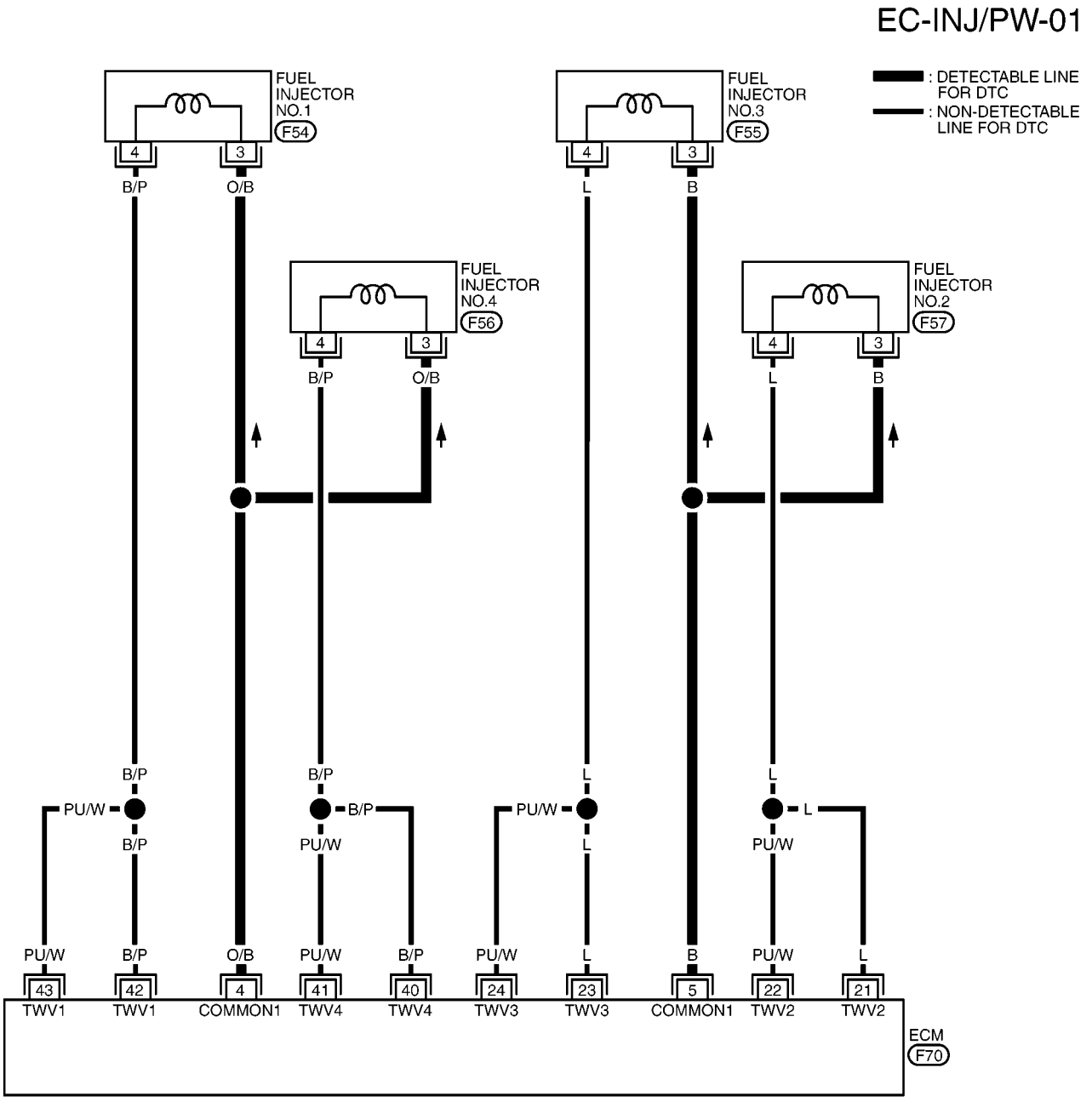
WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1486, "Diagnostic Procedure" .

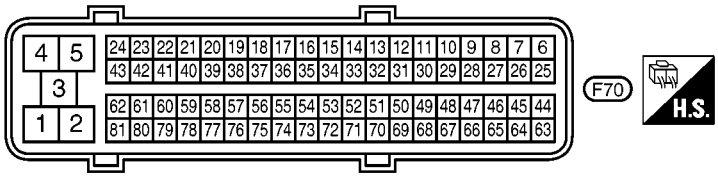


Wiring Diagram

EBS0150R







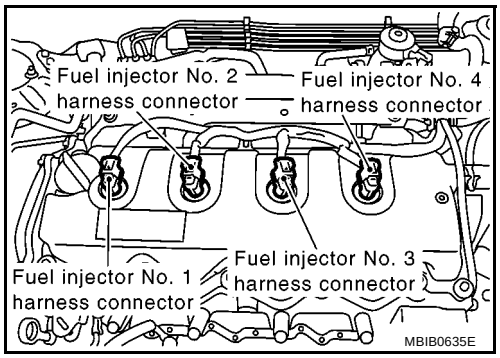
MBWA0632E

Diagnostic Procedure

EBS0150S

1. CHECK FUEL INJECOR POWER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Terminal		Cylinder
ECM	Fuel injector	
4	3	No.1
5	3	No.2
5	3	No.3
4	3	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

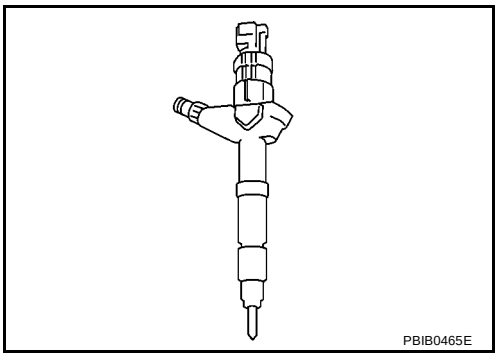
DTC P2147, P2148 FUEL INJECTOR CIRCUIT

PFP:16600

Component Description

EBS0150T

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 needle valve back and allows fuel to flow through the fuel injector into the intake cylinder. 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.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

EBS0150U

Specification data are reference values.

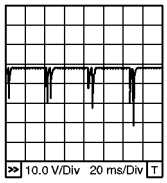
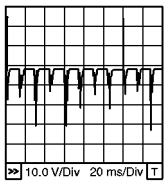
MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No-load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

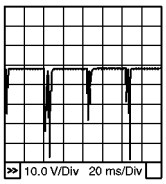
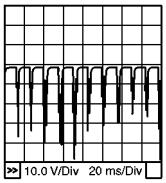
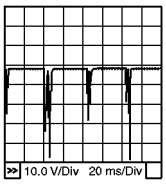
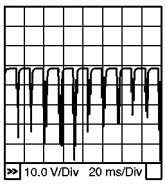
ECM Terminals and Reference Value

EBS0150V

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	O/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	5 - 10V ★  MBIB0883E
5	B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	5 - 10V ★  MBIB0884E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	L PU/W L PU/W	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E
40 41 42 43	B/P PU/W B/P PU/W	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

EBS0150W

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2147	Fuel injector circuit low input	ECM detects the fuel injector circuit is shorted to ground.	● Harness or connectors (The fuel injector circuit is shorted.)
P2148	Fuel injector circuit high input	ECM detects the fuel injector circuit is shorted to power.	

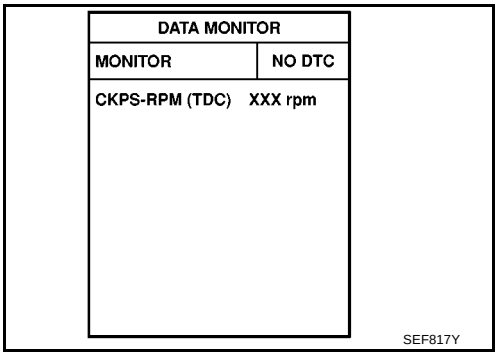
DTC Confirmation Procedure

EBS0150X

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

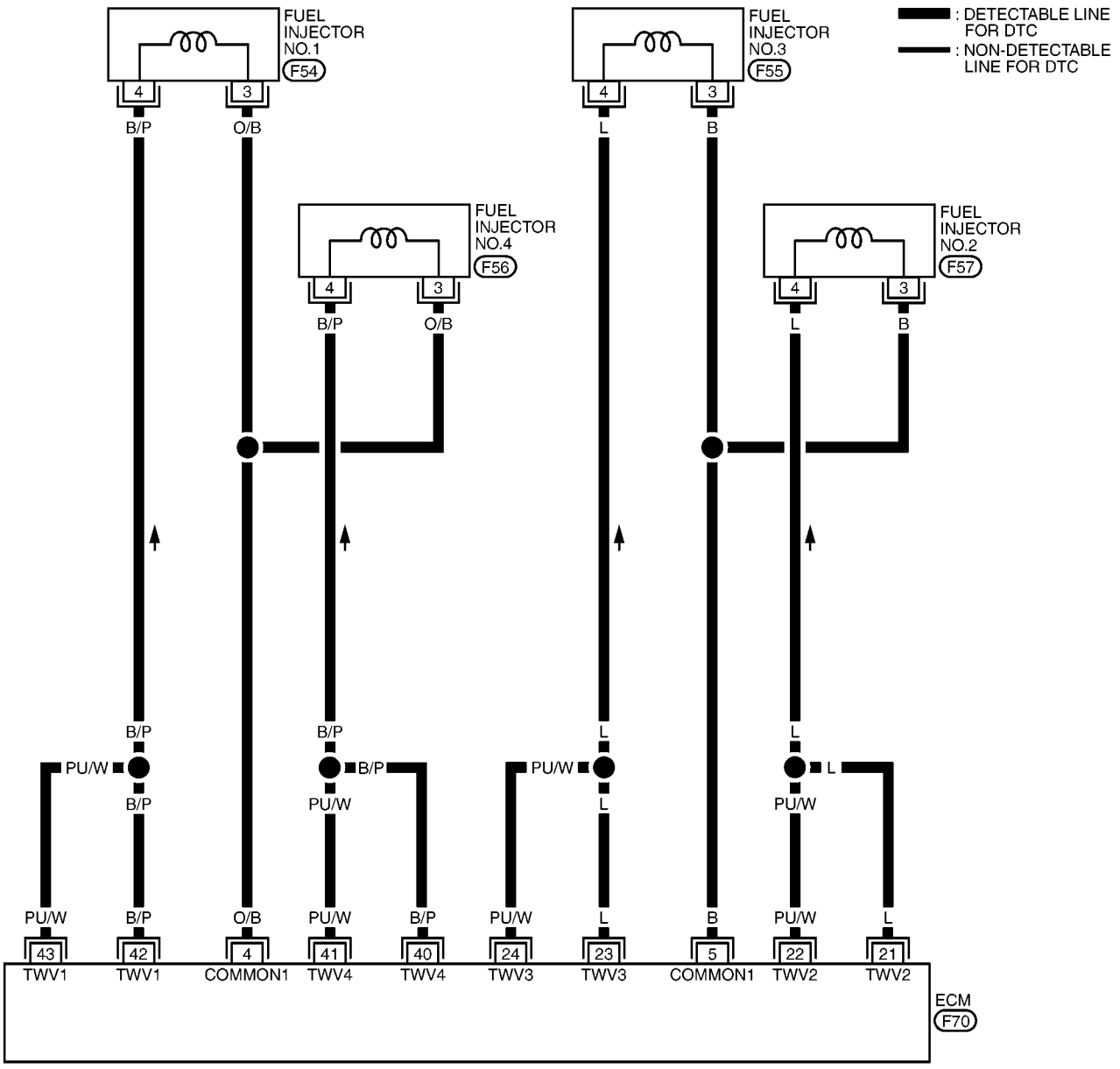
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1491, "Diagnostic Procedure" .



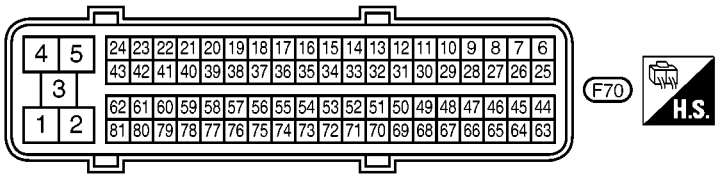
Wiring Diagram

EBS0150Y

EC-INJECT-01







MBWA0633E

Diagnostic Procedure

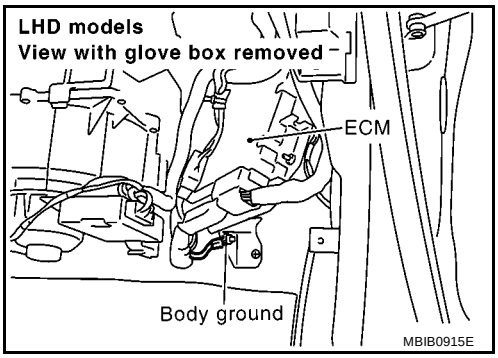
EBS0150Z

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten body ground screw. Refer to EC-1317, "Ground Inspection" .

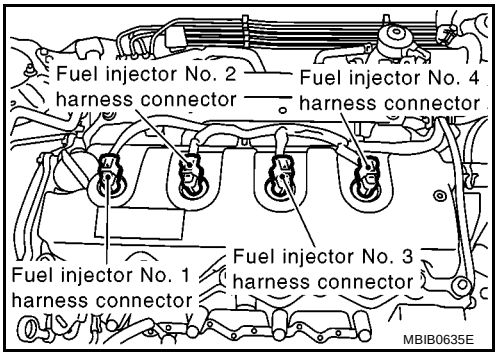
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connection.



2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Cylinder	Terminal		Continuity
	Fuel injector	ECM	
No.1	3	42, 43	Should not exist
		4	Should exist
	4	42,43	Should exist
		4	Should not exist
No.2	3	21, 22	Should not exist
		5	Should exist
	4	21, 22	Should exist
		5	Should not exist
No.3	3	23, 24	Should not exist
		5	Should exist
	4	23, 24	Should exist
		5	Should not exist
No.4	3	40, 41	Should not exist
		4	Should exist
	4	40, 41	Should exist
		4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FUEL INJECTOR

Refer to EC-1492, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel injector.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

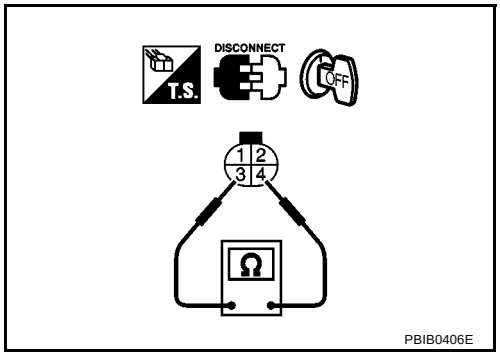
EBS01510

FUEL INJECTOR

1. Disconnect fuel injector.
2. Check continuity between terminals as shown in the figure.

Continuity should exist.

3. If NG, replace fuel injector.



Removal and Installation

EBS01511

FUEL INJECTOR

Refer to EM-147, "INJECTION TUBE AND FUEL INJECTOR" .

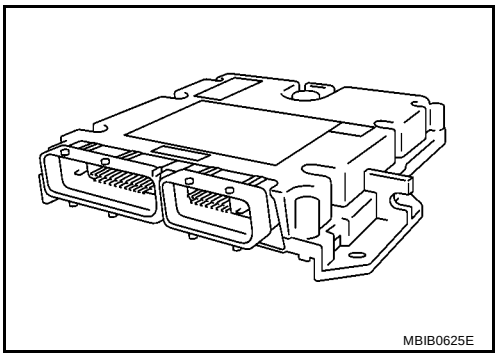
DTC P2228, P2229 BARO SENSOR

PFP:23731

Description

EBS01512

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.


MBIB0625E

On Board Diagnosis Logic

EBS01513

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	● ECM
P2229	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

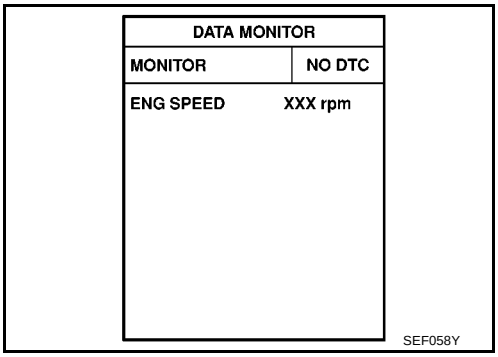
DTC Confirmation Procedure

EBS01514

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1493, "Diagnostic Procedure" .



SEF058Y

Diagnostic Procedure

EBS01515

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1493, "DTC Confirmation Procedure" , again.
5. Is DTC P2228 or P2229 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-1273, "NATS (Nissan Anti-theft System)" .
3. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1270, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

GLOW CONTROL SYSTEM

PFP:25230

Description

EBS01516

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Glow control	Glow lamp Glow relay Glow plugs
Engine coolant temperature sensor	Engine coolant temperature		

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When coolant temperature is lower than approximately 80°C (176°F):

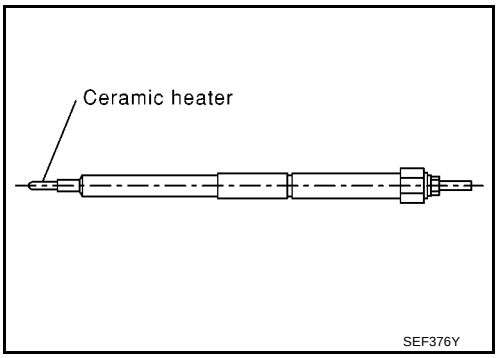
- Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
- Starting
  After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

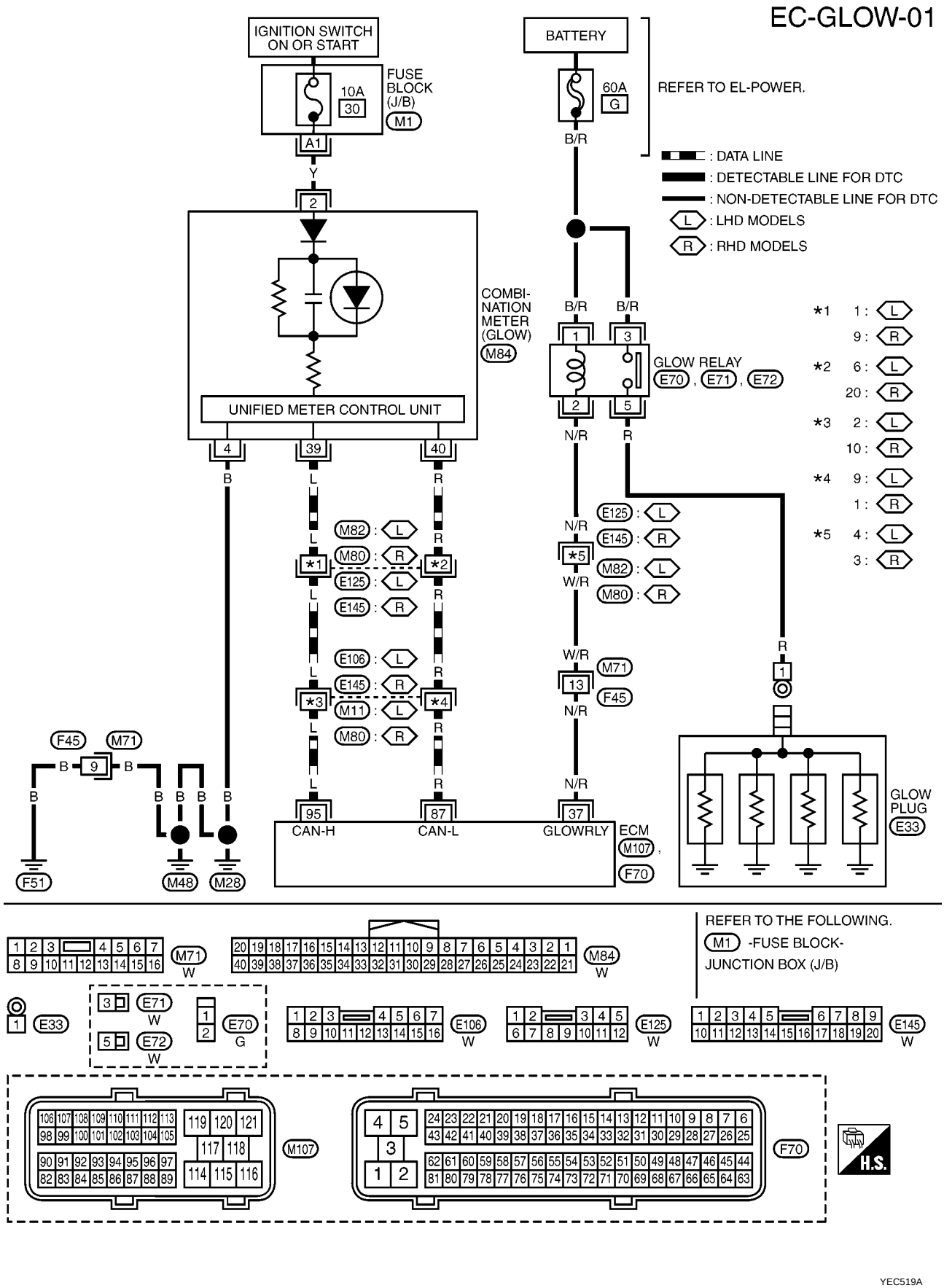
Glow Plug

The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.



Wiring Diagram

EBS01517



YEC519A

Diagnostic Procedure

EBS01518

1. INSPECTION START

Check fuel level, fuel supplying system, starter motor, etc.

OK or NG

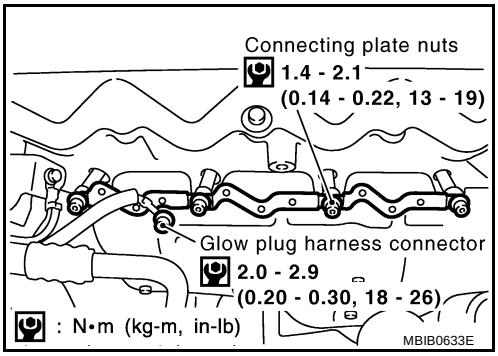
OK >> GO TO 2.
NG >> Correct.

2. CHECK INSTALLATION

Check that glow plug nut and all glow plug connecting plate nuts are installed properly.

OK or NG

OK >> GO TO 3.
NG >> Install properly.



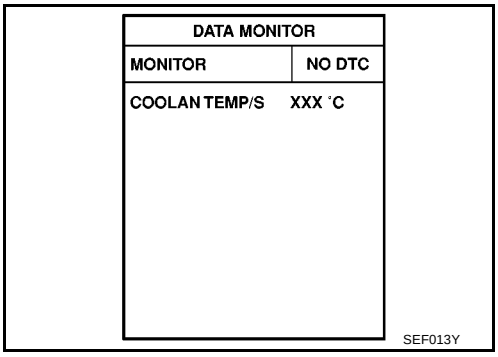
3. CHECK GLOW INDICATOR LAMP OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

OK or NG

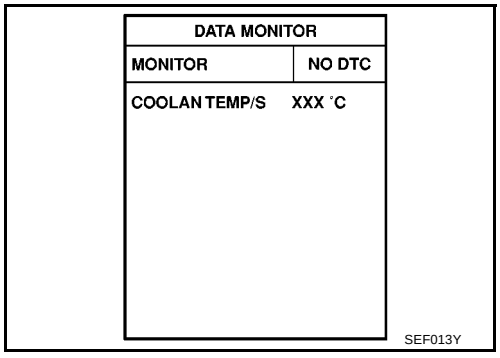
OK >> GO TO 4.
NG >> GO TO 5.



4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

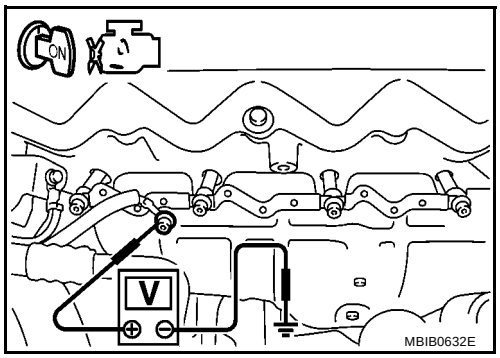
With CONSULT-II

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



6. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

5. CHECK DTC

Check that DTC U1000 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, refer to EC-1318, "DTC U1000 CAN COMMUNICATION LINE" .
No >> GO TO 6.

6. CHECK COMBINATON METER OPERATION

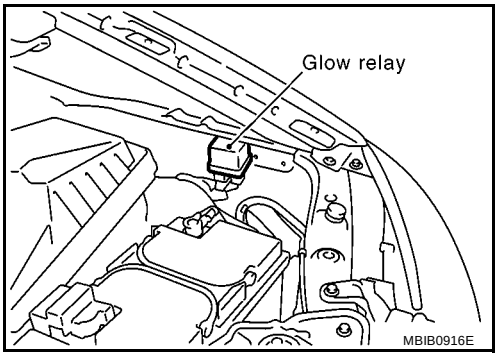
Does combination meter operate normally?

Yes or No

Yes >> GO TO 14.
No >> Check warning lamps circuit. Refer to EL-115, “WARNING LAMPS”.

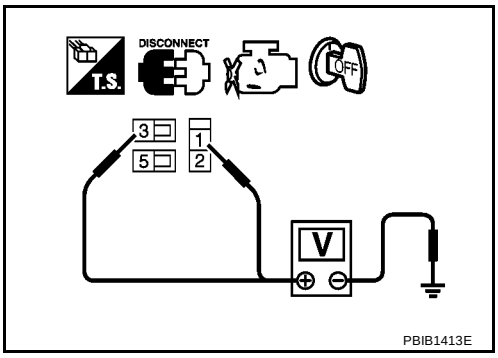
7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.



3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open or short between glow relay and battery

>> Repair harness or connectors.

9. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- Harness for open or short between glow relay and ECM

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

11. CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check harness continuity between glow relay terminal 5 and glow plug harness connector. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK GLOW RELAY

Refer to EC-1501, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace glow relay.

13. CHECK GLOW PLUG

Refer to EC-1501, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace glow plug.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

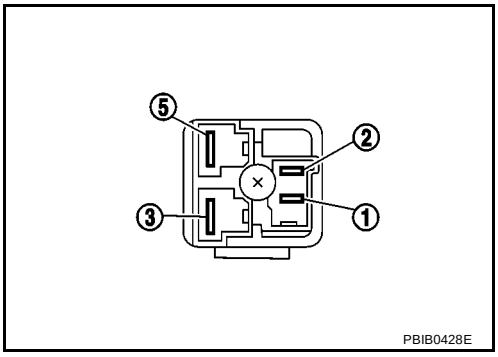
EBS01519

GLOW RELAY

Check continuity between glow relay terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

Operation takes less than 1 second.



PBIB0428E

GLOW PLUG

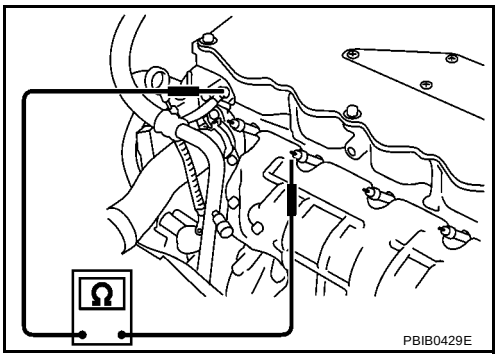
1. Remove glow plug connecting plate.
2. Check glow plug resistance.

Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

NOTE:

- **Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.**
- **If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.**
- **If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.**
- **Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.**

: 20.1 N-m (2.1 kg-m, 15 ft-lb)



PBIB0429E

Removal and Installation

EBS0151A

GLOW PLUG

Refer to EM-142, "GLOW PLUG" .

EGR VOLUME CONTROL SYSTEM

PFP:14710

Description

EBS0151B

SYSTEM DESCRIPTION

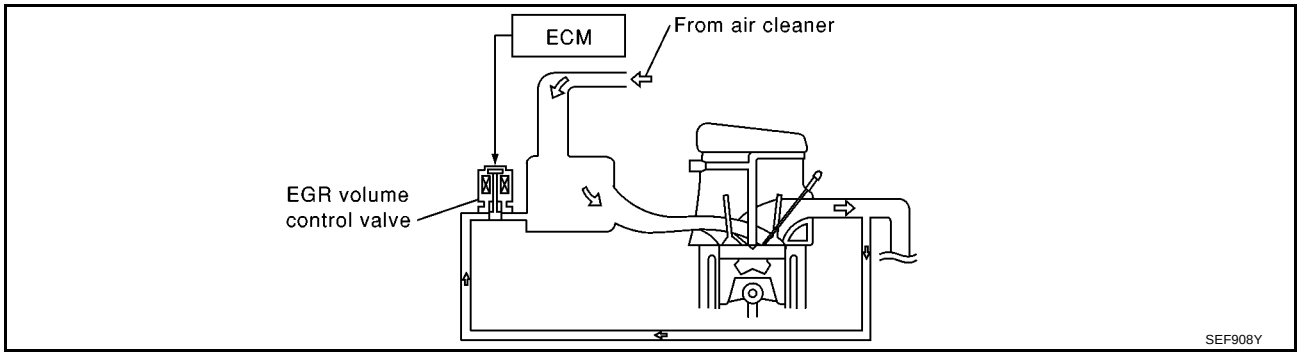
Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor*	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch*	Air conditioner operation		

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

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

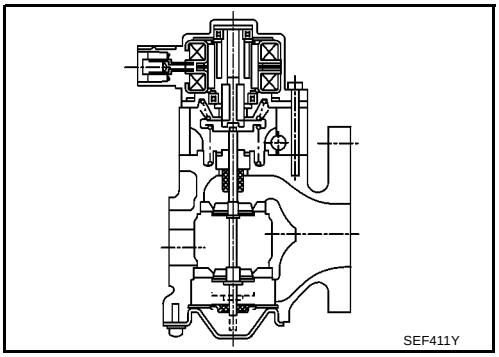
- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

EBS0151C

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No-load	After one minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

ECM Terminals and Reference Value

EBS0151D

Specification data are reference values and are measured between each terminal and ground.

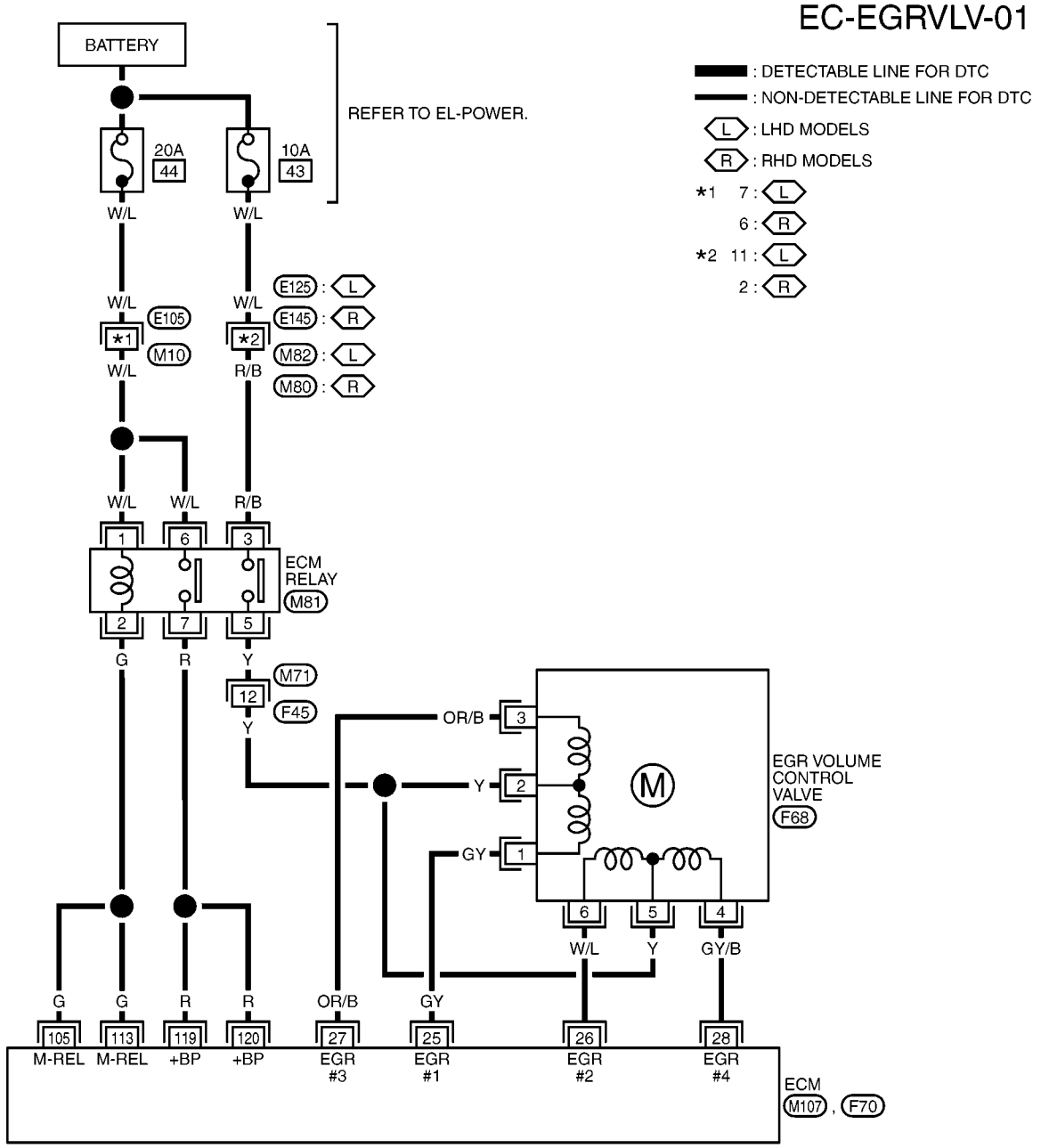
CAUTION:

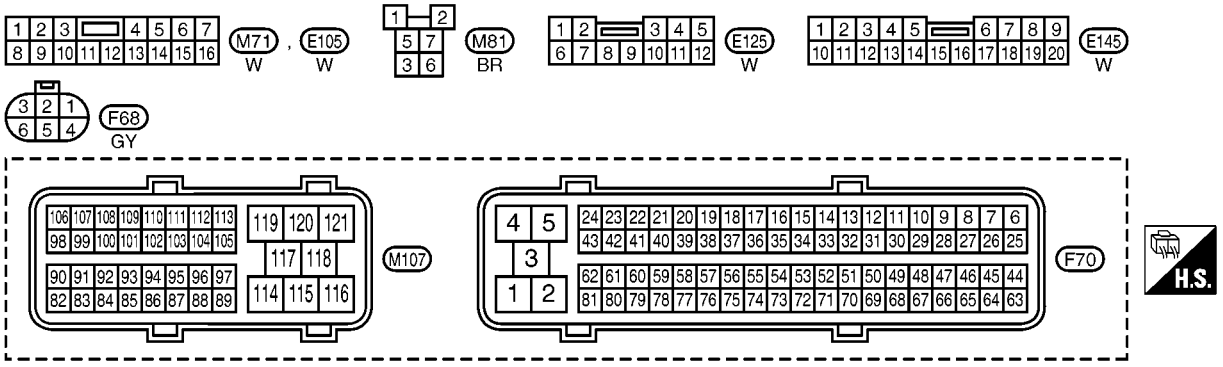
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS0151E





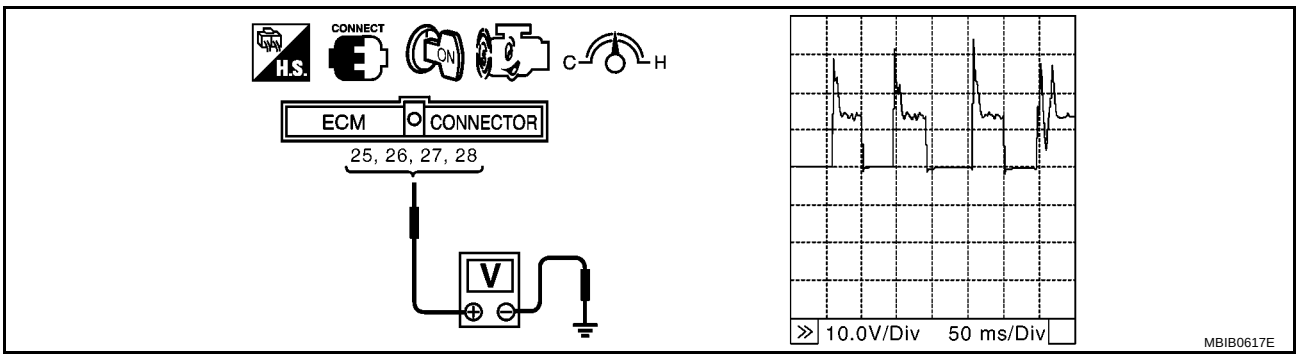
MBWA0622E

Diagnostic Procedure

EBS0151F

1. CHECK EGR VOLUME CONTROL SYSTEM OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Set the oscilloscope probe between ECM terminals 25, 26, 27, 28 and ground.
3. Start engine and let it idle.
4. Check the oscilloscope screen when revving engine up to 3,200 rpm and return to idle.



The pulse signal as shown in the figure should appear.

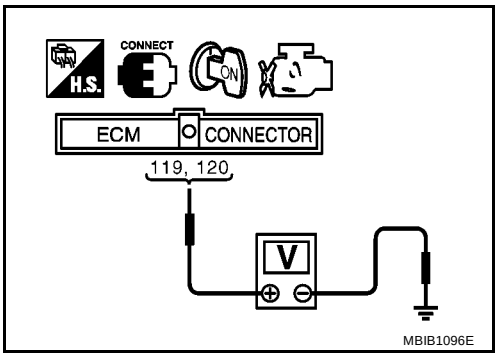
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

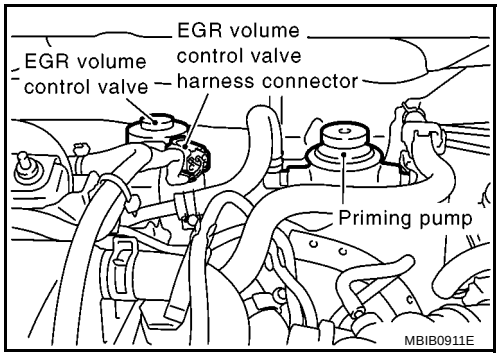


OK or NG

OK >> GO TO 3.
NG >> Go to EC-1310, "MAIN POWER SUPPLY AND GROUND CIRCUIT" .

3. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.

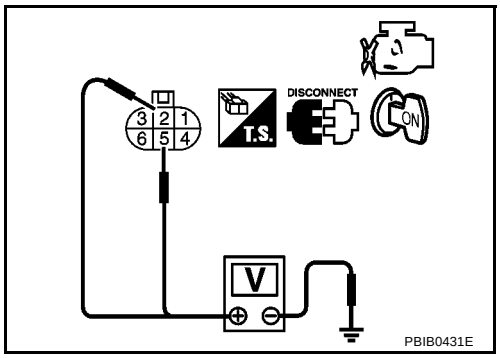


4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

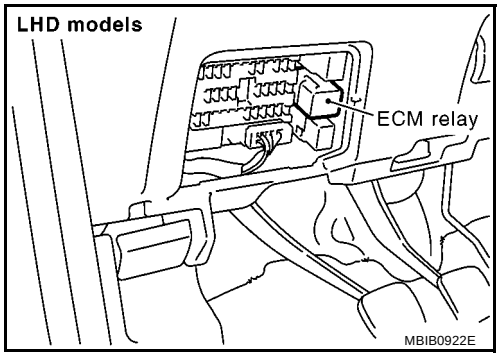
OK or NG

OK >> GO TO 9.
NG >> GO TO 4.



4. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.

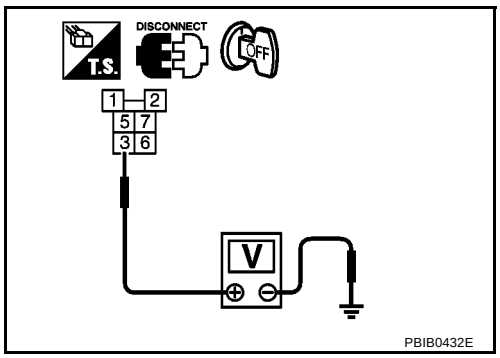


3. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E125, M82 (LHD models)
- Harness connectors E145, M80 (RHD models)
- 10A fuse
- Harness for open or short between ECM relay and battery

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

6. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM relay terminal 5 and EGR volume control valve terminals 2, 5. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay and EGR volume control valve

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

8. CHECK ECM RELAY

Refer to EC-1316, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace ECM relay.

9. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1508, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EGR volume control valve.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

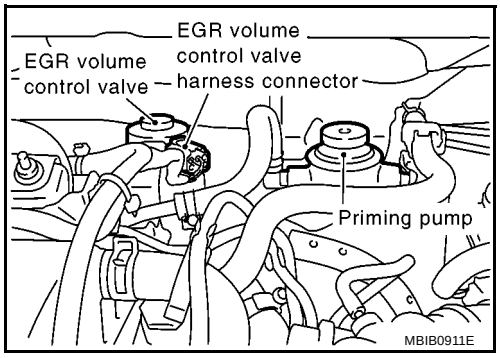
Component Inspection

EBS0151G

EGR VOLUME CONTROL VALVE

With CONSULT-II

1. Disconnect EGR volume control valve harness connector.

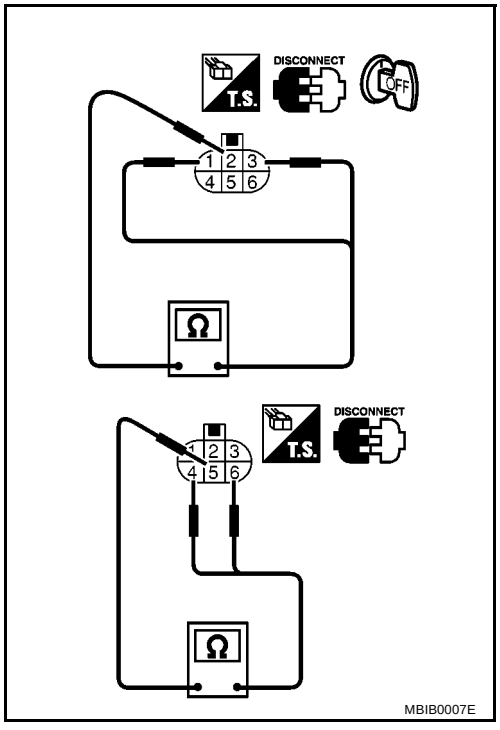


2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

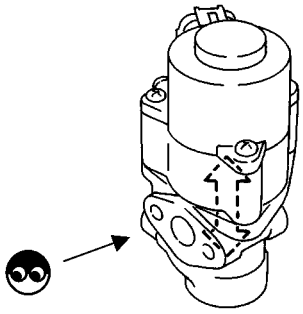
If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
   (The EGR volume control valve harness connector should remain connected.)
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.



6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



SEF819Y

If NG, replace the EGR volume control valve.

Removal and Installation

EBS0151H

EGR VOLUME CONTROL VALVE

Refer to EM-123, "INTAKE MANIFOLD" .

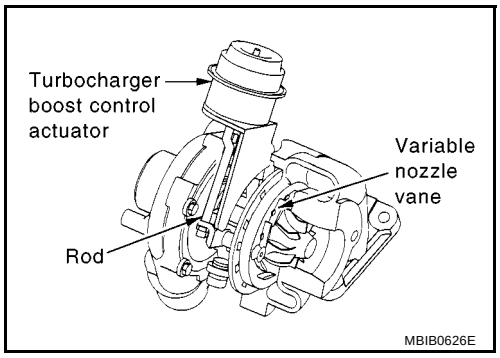
TC BOOST CONTROL SOLENOID VALVE

PFP:14956

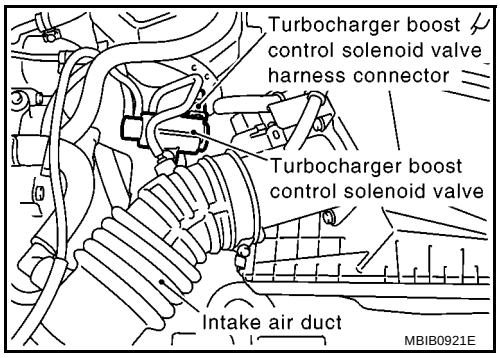
Description

EBS0151I

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



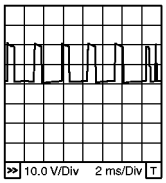
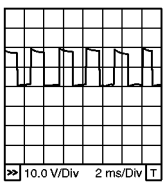
ECM Terminals and Reference Value

EBS0151J

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

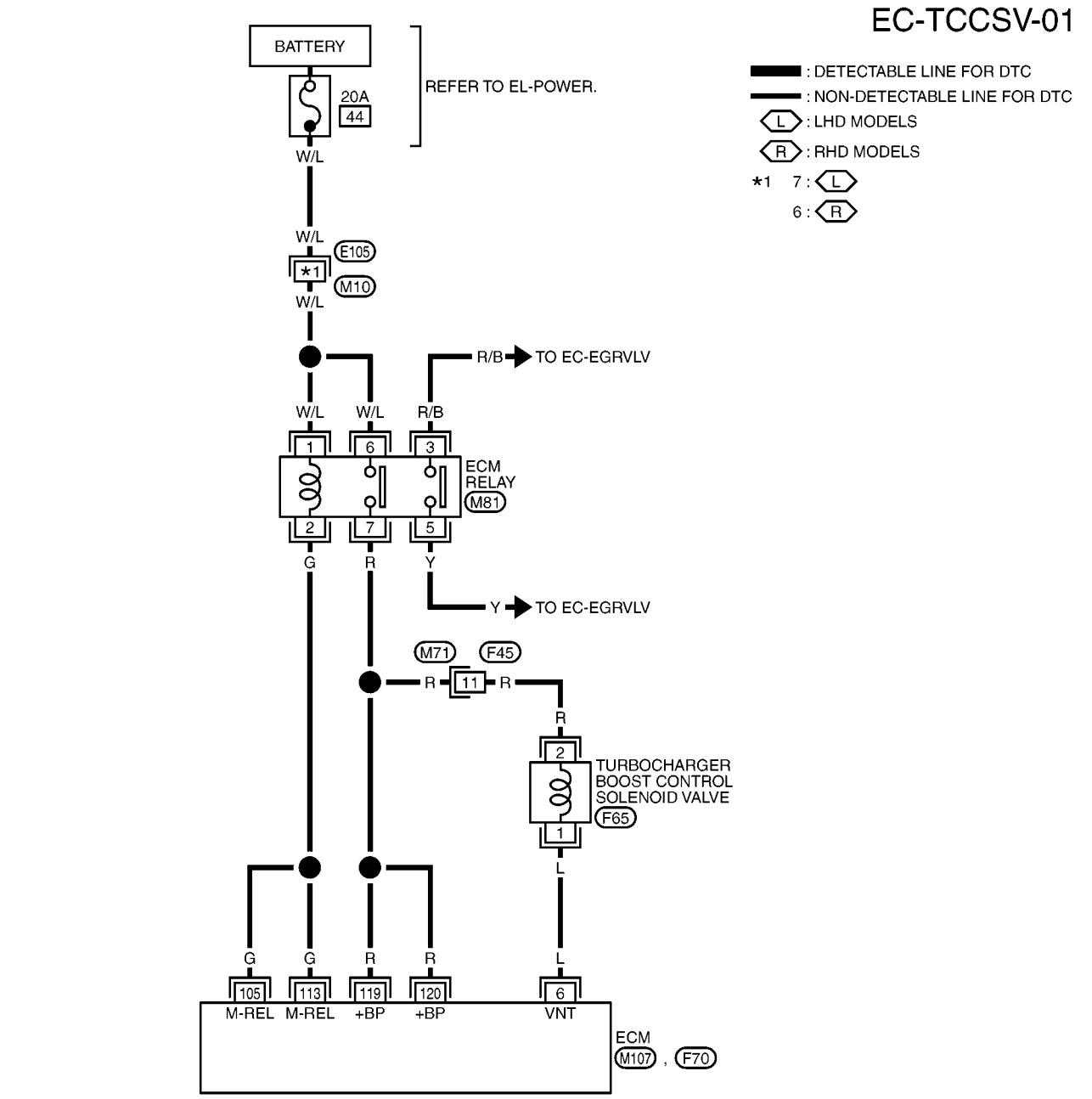
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

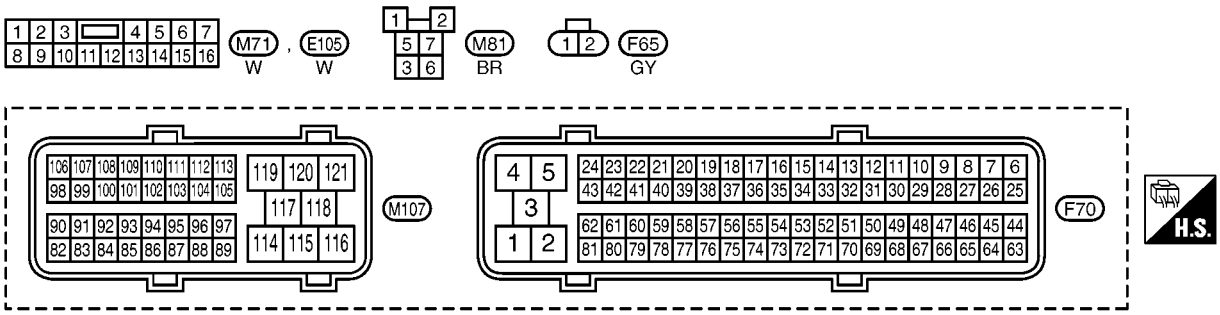
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage and Pulse signal)
6	L	Turbocharger boost control solenoid valve*	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E

*: YD22DDTi engine models

Wiring Diagram

EBS0151K





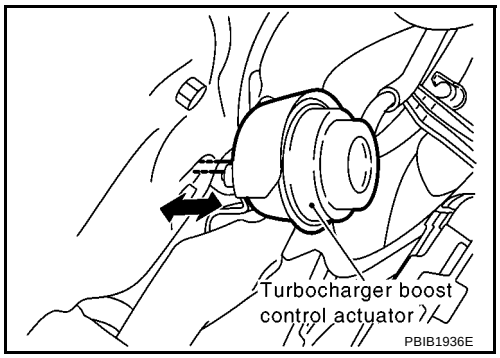
MBWA0624E

Diagnostic Procedure

EBS0151L

1. CHECK OVERALL FUNCTION

1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.

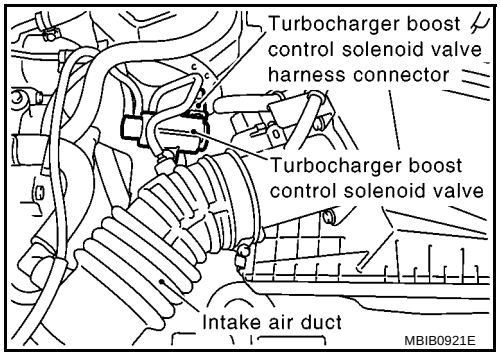


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

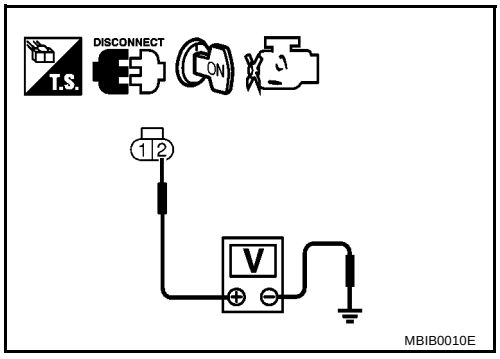
2. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between turbocharger boost control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F45, M71
- Harness for open or short between ECM relay 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.

4. 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 harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> 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-1513, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

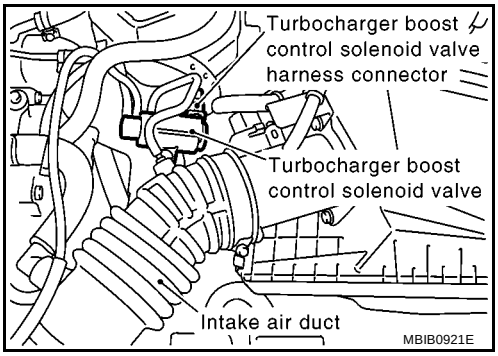
>> **INSPECTION END**

Component Inspection

EBS0151M

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.

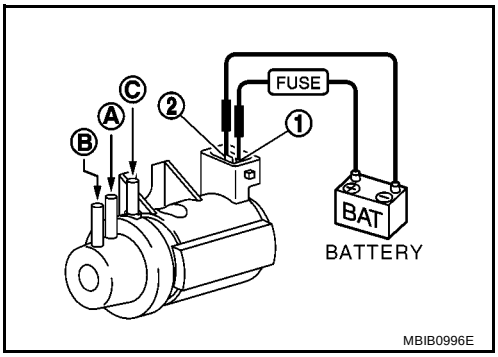


2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.
3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals **1** and **2**	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



Removal and Installation

EBS0151N

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EM-128, "EXHAUST MANIFOLD AND TURBOCHARGER" .

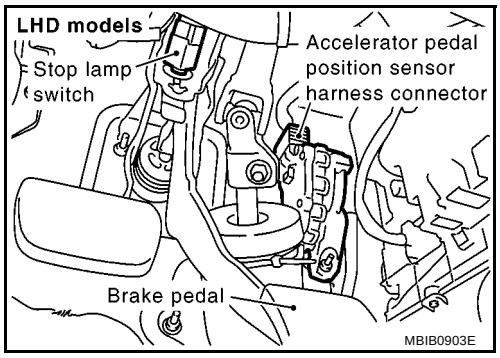
BRAKE SWITCH

PFP:25230

Description

EBS0151O

The stop lamp switch is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.



CONSULT-II Reference Value in Data Monitor Mode

EBS0151P

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

ECM Terminals and Reference Value

EBS0151Q

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

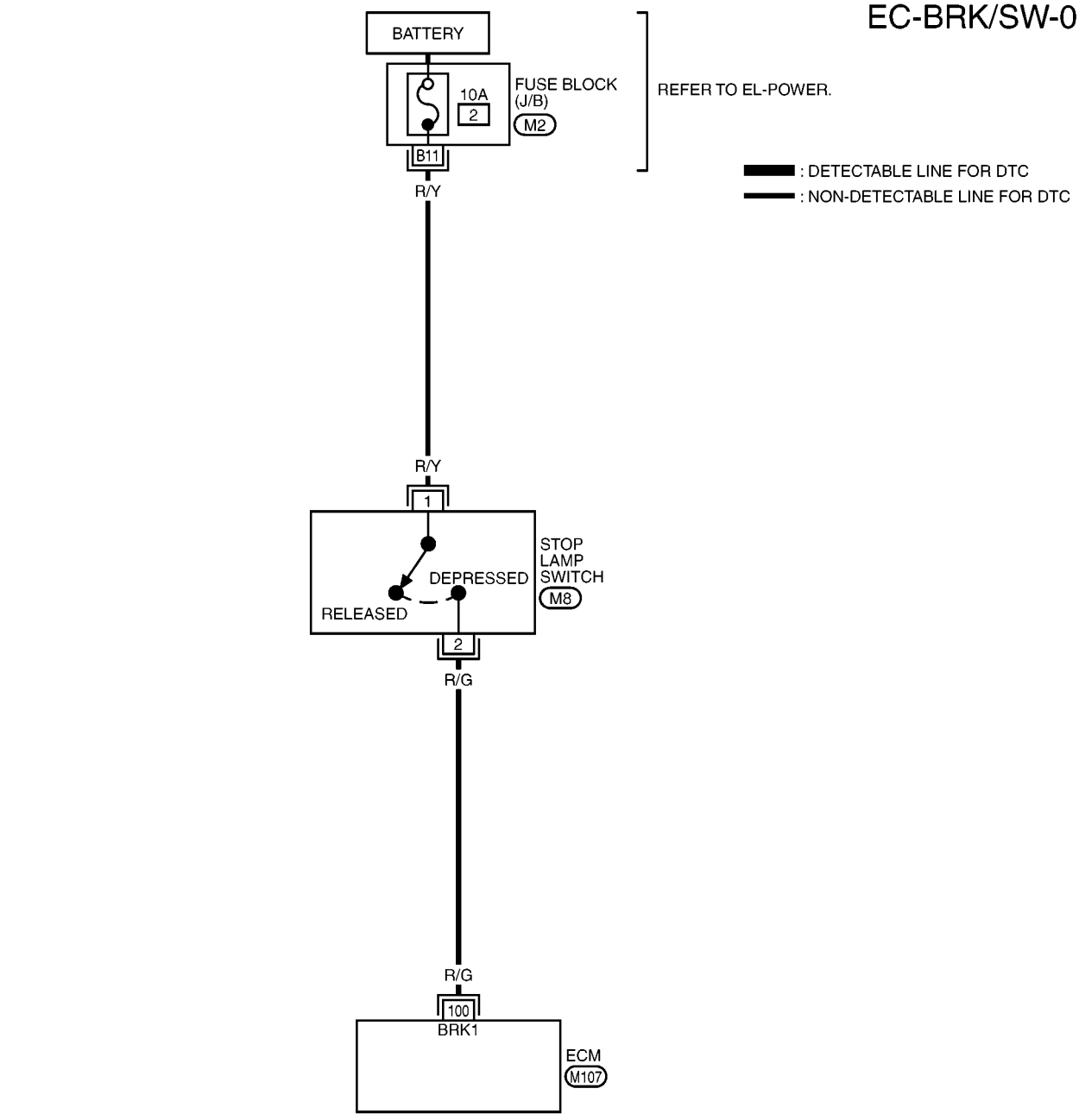
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

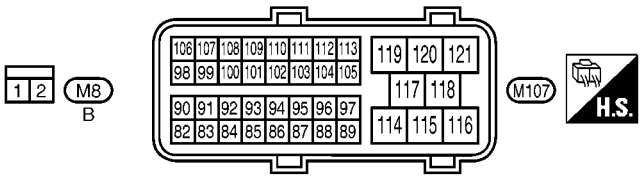
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	R/G	Stop lamp switch	**[Ignition switch ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS0151R

EC-BRK/SW-01





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-
JUNCTION BOX (J/B)

YEC514A

Diagnostic Procedure

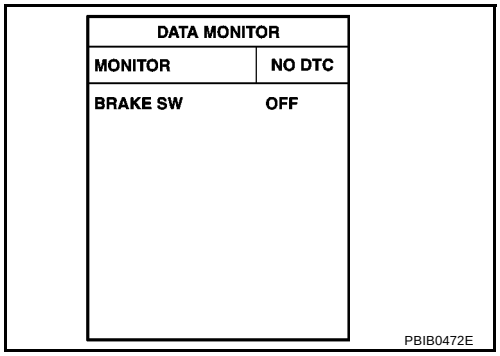
EBS0151S

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” signal under the following conditions.

Conditions	BRAKE SW
Brake pedal released	OFF
Brake pedal slightly depressed	ON

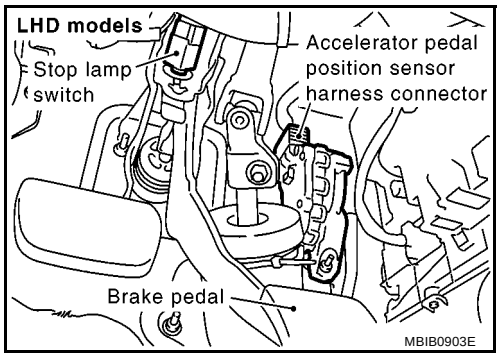


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

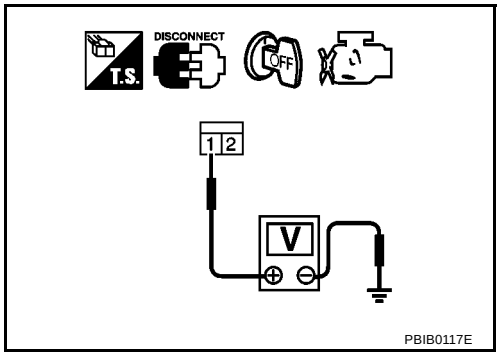
2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M2
- Harness for open and 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 harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> 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-1517, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

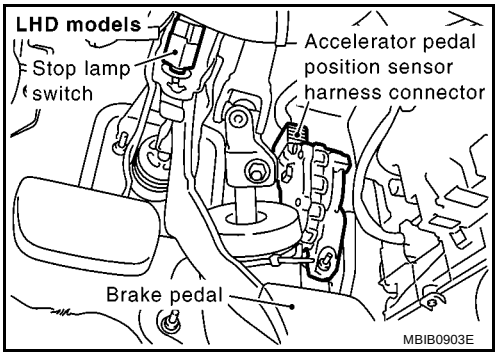
>> **INSPECTION END**

Component Inspection

EBS0151T

STOP LAMP SWITCH

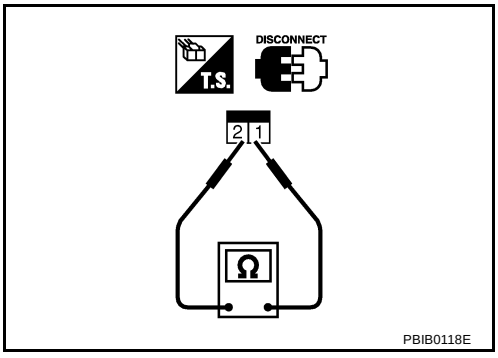
1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to BR-14, “BRAKE PEDAL AND BRACKET”, and perform step 2 again.



PNP SWITCH

PFP:32006

Description

EBS0151U

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

EBS0151V

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF

ECM Terminals and Reference Value

EBS0151W

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

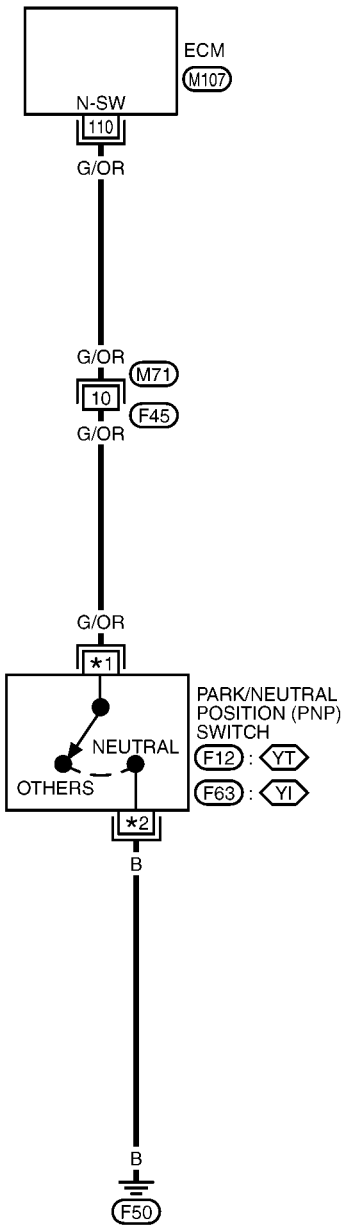
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Gear position is Neutral	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

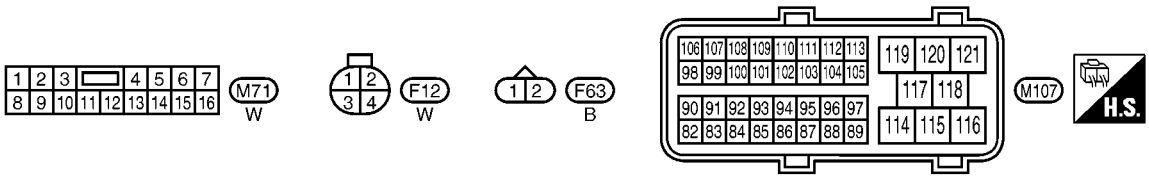
Wiring Diagram

EBS0151X

EC-PNP/SW-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
YT : YD22DDT ENGINE
YI : YD22DDTi ENGINE
*1 2 : YT
1 : YI
*2 4 : YT
2 : YI



YEC515A

Diagnostic Procedure

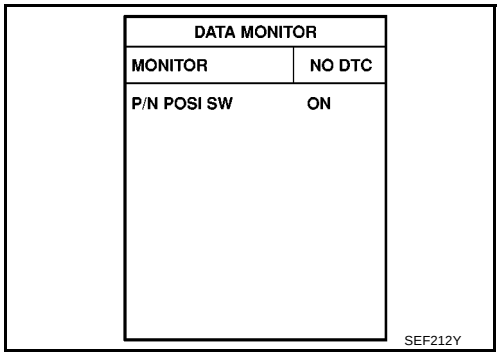
EBS0151Y

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

Shift lever position	P/N POSI SW
Neutral position	ON
Except the above position	OFF



OK or NG

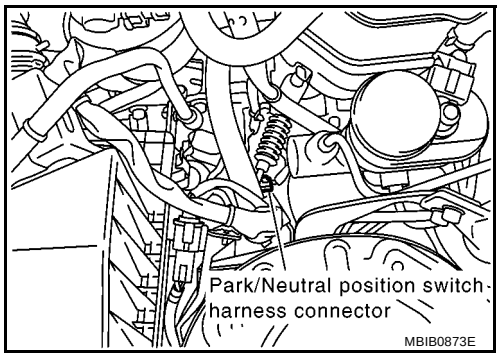
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 4 (YD22DDT engine models), 2 (YD22DDTi engine models) and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 2 (YD22DDT engine models), 1 (YD22DDTi engine models).
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open or short between PNP switch and ECM

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

5. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to MT-12, "POSITION SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

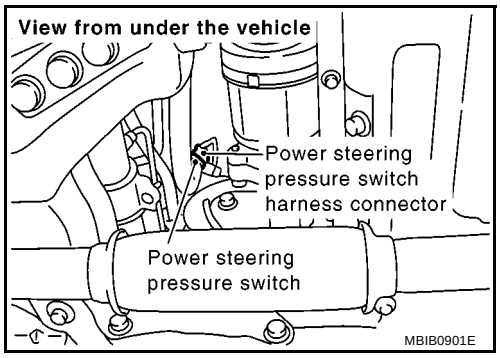
PSP SWITCH

PFP:49761

Component Description

EBS0151Z

The power steering pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the fuel injector pulse width to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

EBS01520

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

ECM Terminals and Reference Value

EBS01521

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

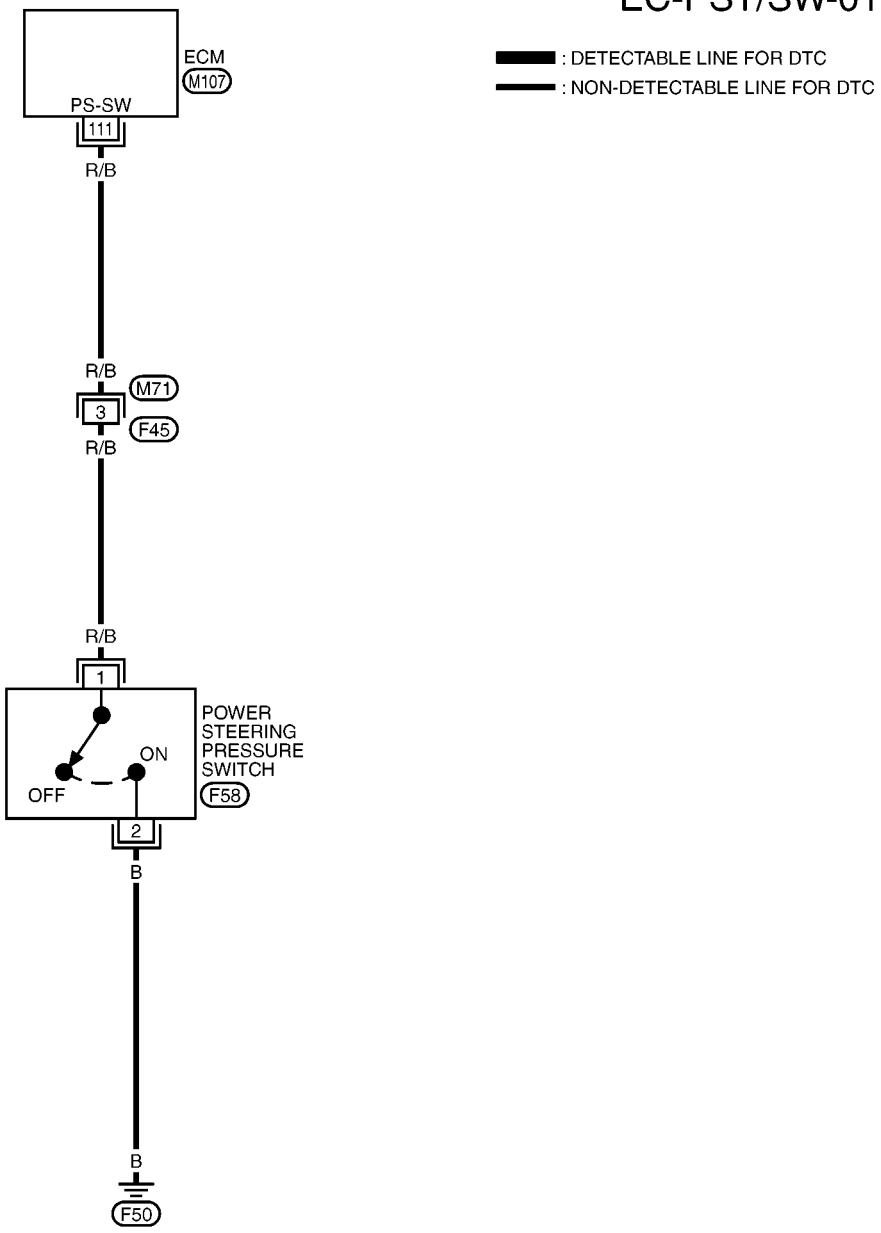
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

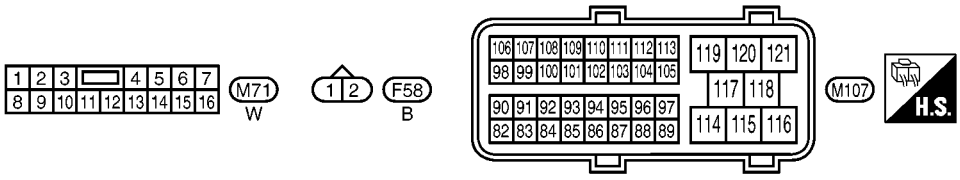
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	R/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

EBS01522

EC-PST/SW-01





YEC517A

Diagnostic Procedure

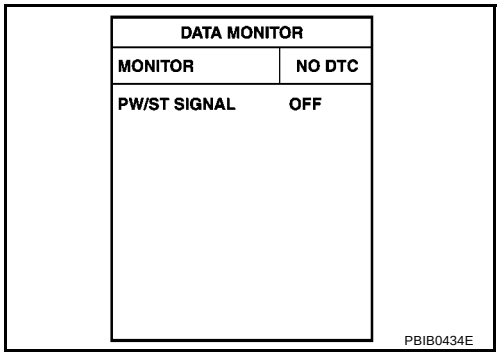
EBS01523

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Conditions	PW/ST SIGNAL
Steering wheel is in neutral position	OFF
Steering wheel is turned	ON



OK or NG

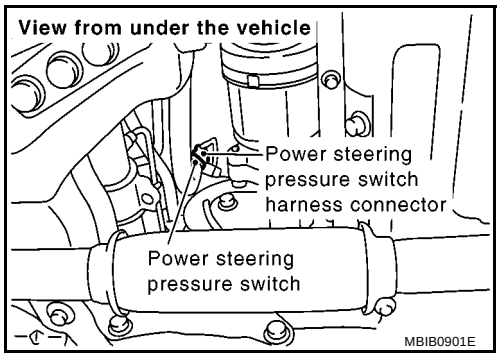
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK POWER STEERING PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power steering pressure switch harness connector.
3. Check harness continuity between power steering pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK POWER STEERING PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 111 and power steering pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M71, F45
- Harness for open and short between power steering pressure switch and ECM

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

5. CHECK POWER STEERING PRESSURE SWITCH

Refer to EC-1525, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace power steering pressure switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

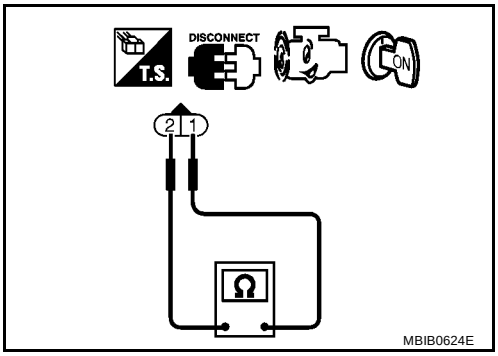
Component Inspection

EBS01524

POWER STEERING PRESSURE SWITCH

1. Disconnect power steering pressure switch harness connector and then start engine.
2. Check continuity between power steering pressure switch terminal 1 and 2 under the following conditions.

Conditions	Continuity
Steering wheel is being fully turned.	Yes
Steering wheel is not being turned.	No



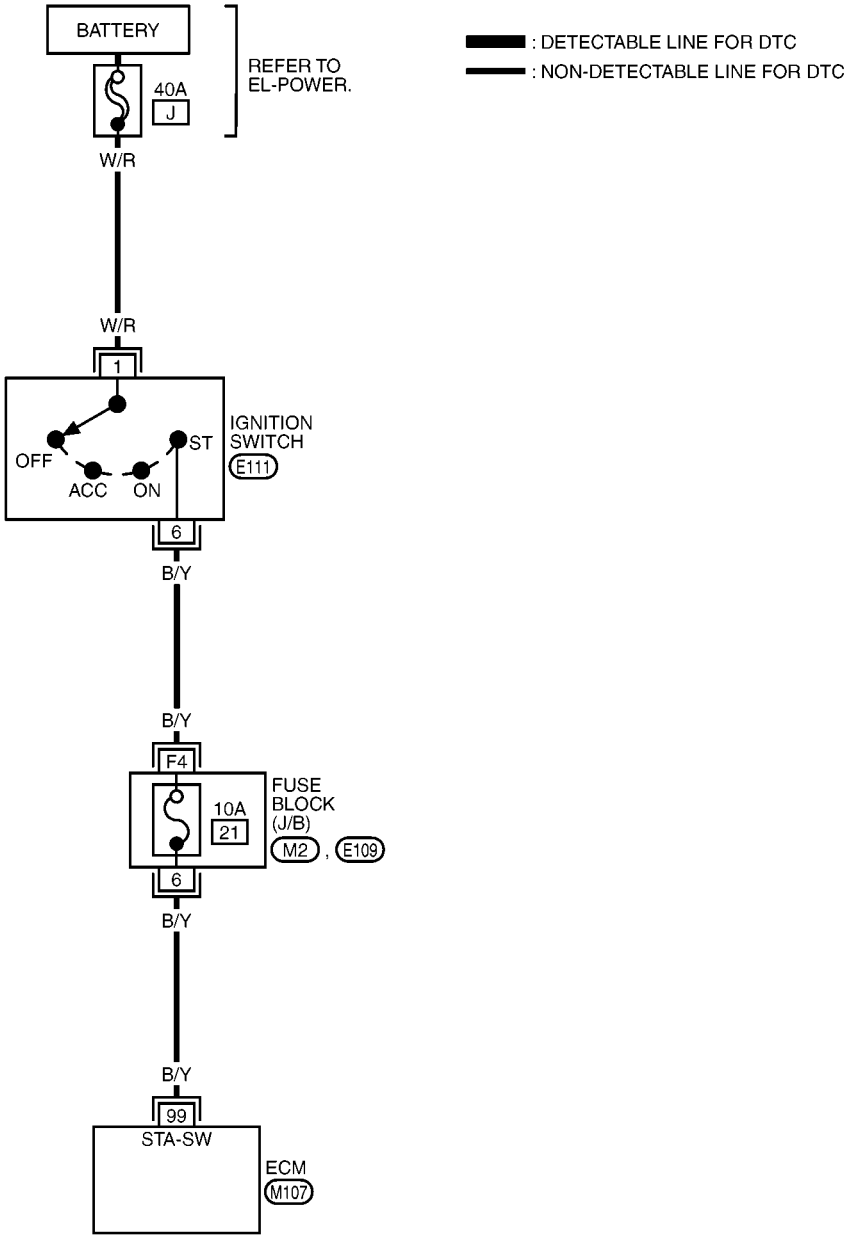
START SIGNAL

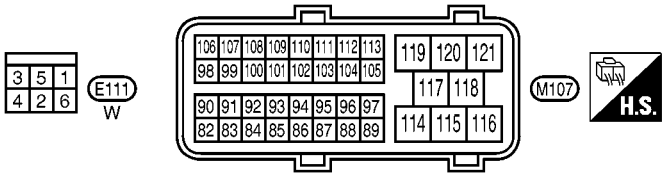
PFP:48750

Wiring Diagram

EBS01526

EC-S/SIG-01





REFER TO THE FOLLOWING.
M2 , E109 -FUSE BLOCK-JUNCTION BOX (J/B)

YEC516A

Diagnostic Procedure

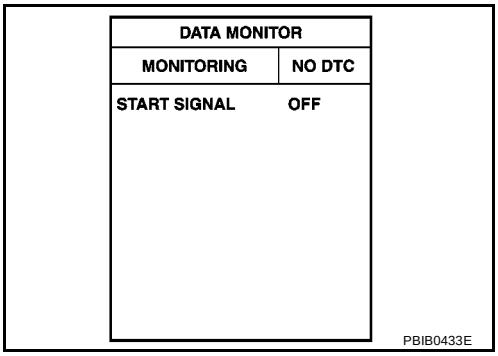
EBS01527

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	START SIGNAL
Ignition switch ON	OFF
Ignition switch START	ON



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connectors M2, E109
- Harness for open or short between ECM and ignition switch

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

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1309, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

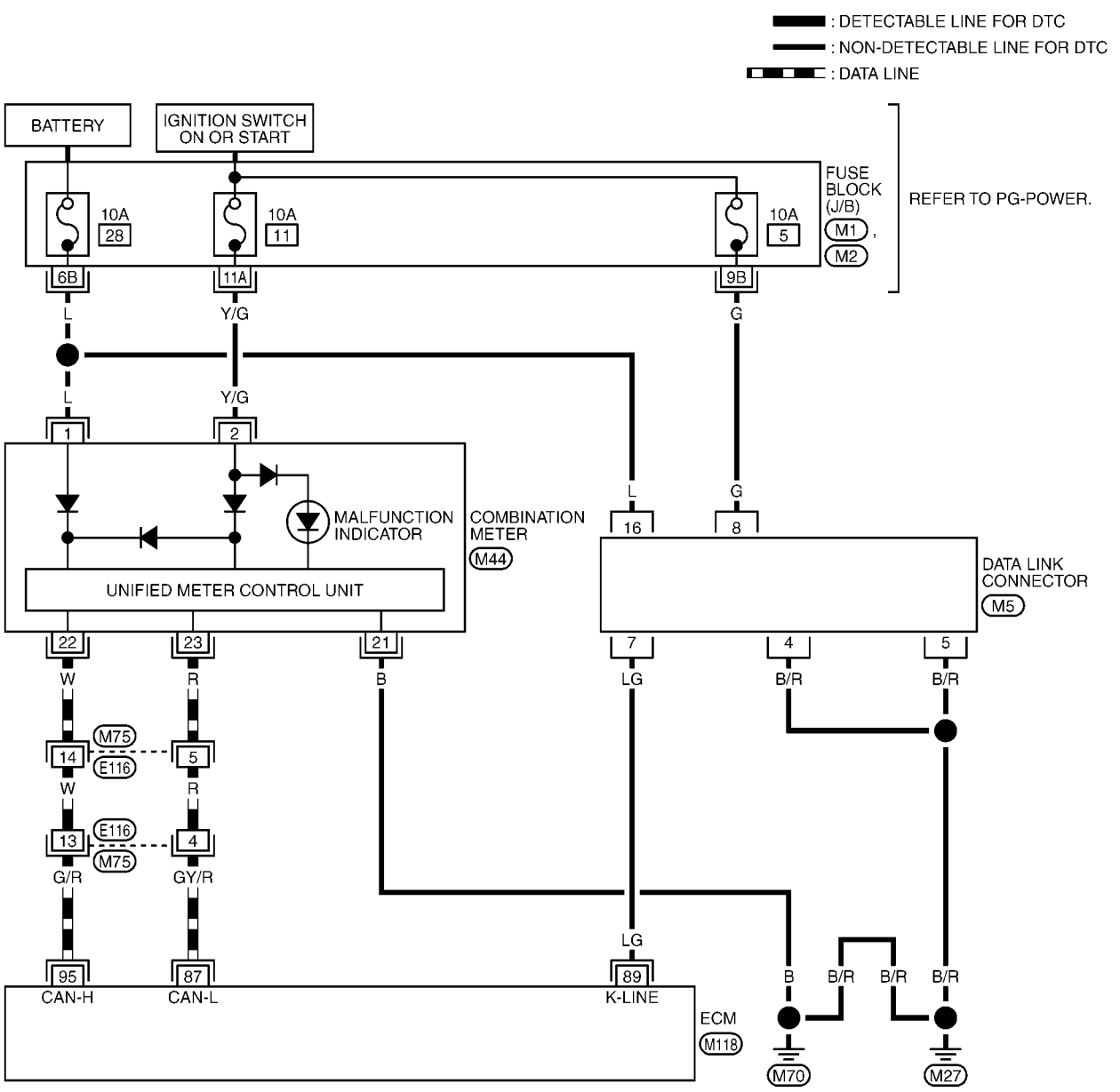
MI & DATA LINK CONNECTORS

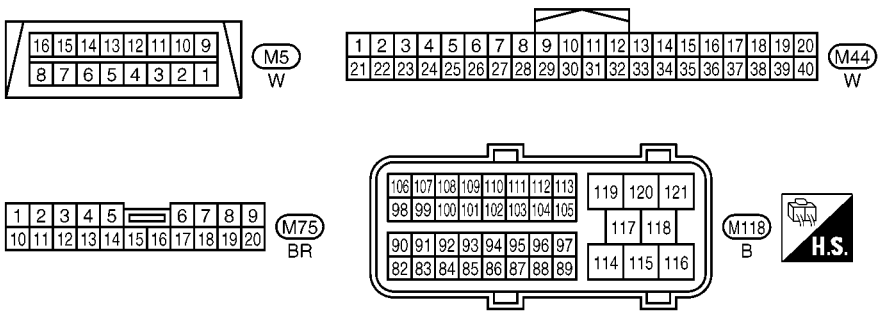
PFP:24814

Wiring Diagram

EBS01528

EC-MIL/DL-01





REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0585E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

General Specifications

EBS01529

Engine	YD22DDT/YD22DDTi
Idle speed	725 ± 25 rpm
Maximum engine speed	4,900 rpm

Mass Air Flow Sensor

EBS0152A

Supply voltage	Battery voltage (11 - 14V)
Ignition switch ON (Engine stopped.)	Approx. 0.4V
Idle (Engine is warmed up to normal operating temperature.)	1.5 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.2 - 2.7V

Engine Coolant Temperature Sensor

EBS0152B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Rail Pressure Sensor

EBS0152C

Supply voltage	Approximately 5V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3V

Glow Plug

EBS0152D

Resistance [at 25°C (77°F)] Ω	Approximately 0.8

EGR Volume Control Valve

EBS0152E

Resistance [at 25°C (77°F)] Ω	13 - 17

Crankshaft Position Sensor

EBS0152F

Refer to EC-1400, "Component Inspection" .

Camshaft Position Sensor

EBS0152G

Refer to EC-1411, "Component Inspection" .