

SECTION EF & EC

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VG30E

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When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

**EF &
EC**

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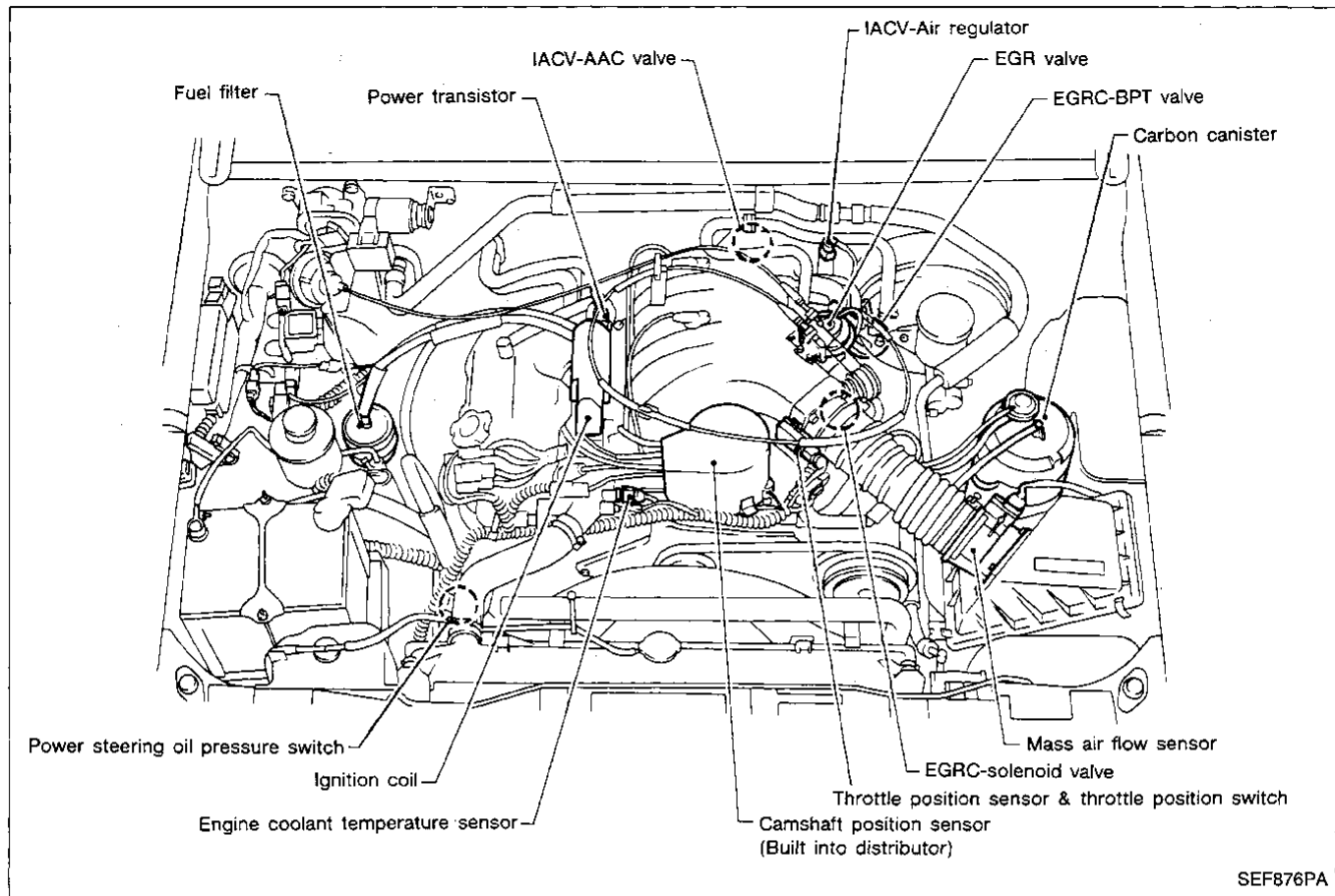
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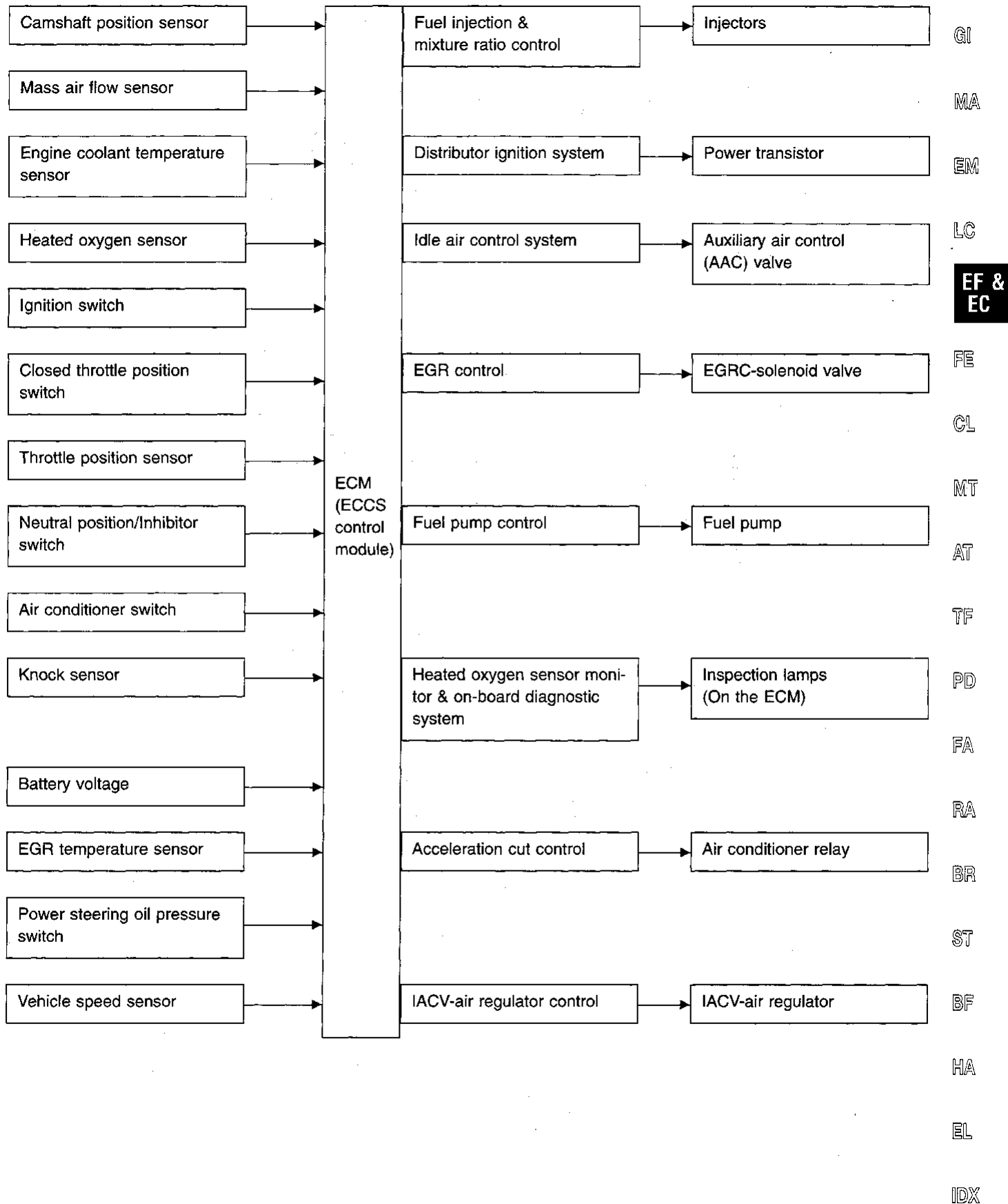
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ECCS Component Parts Location

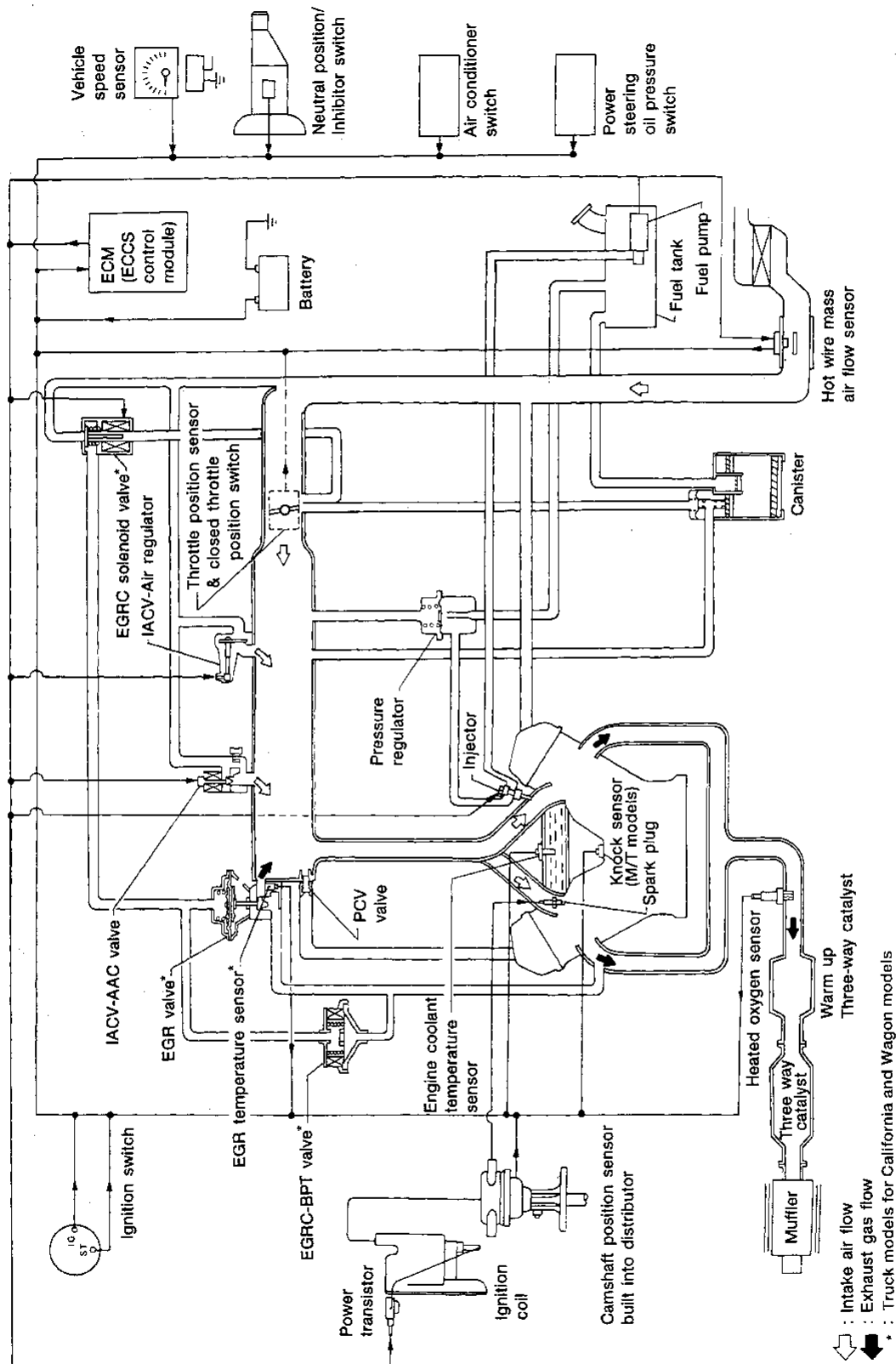


*Truck models for California and Wagon models.

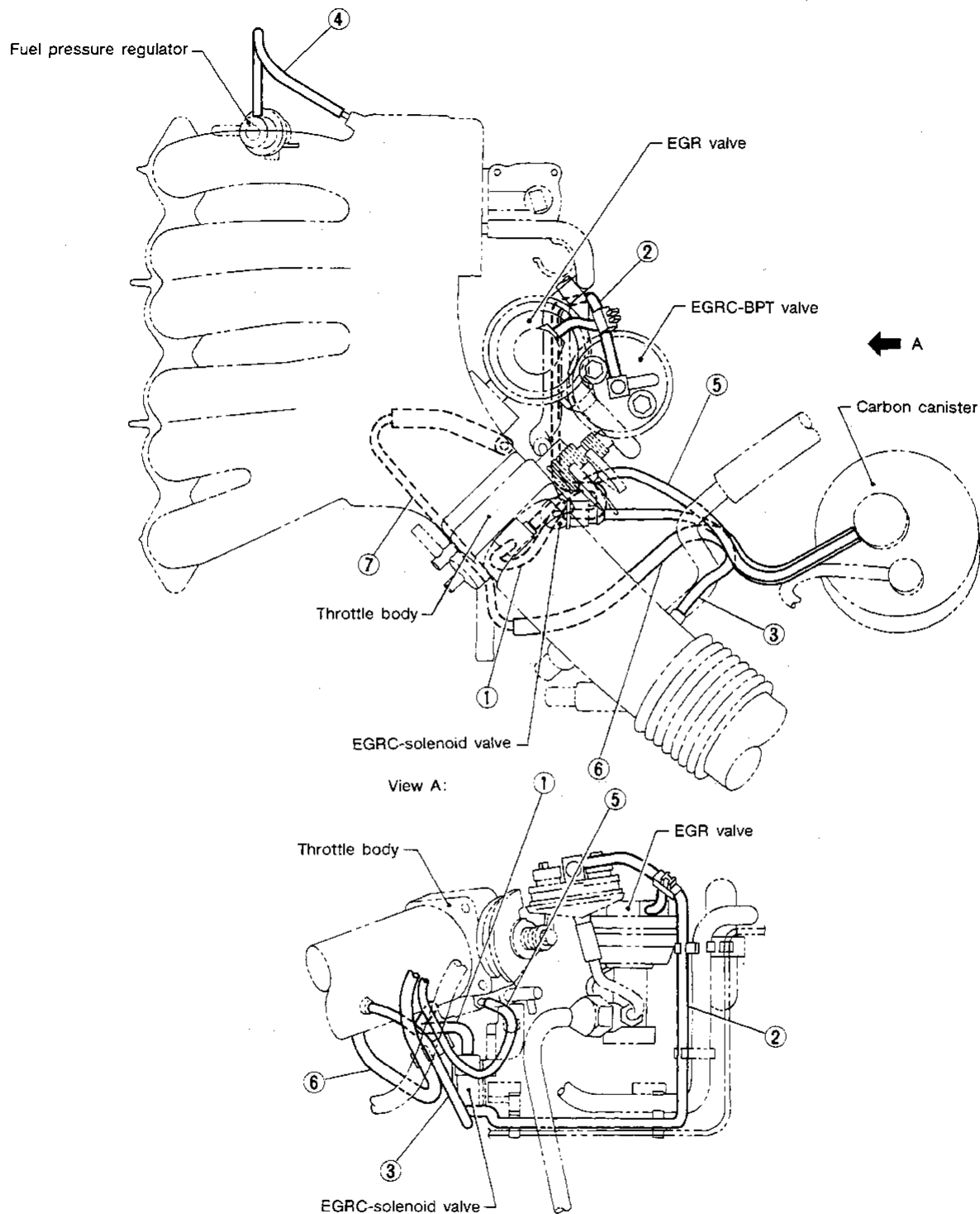
System Chart



System Diagram



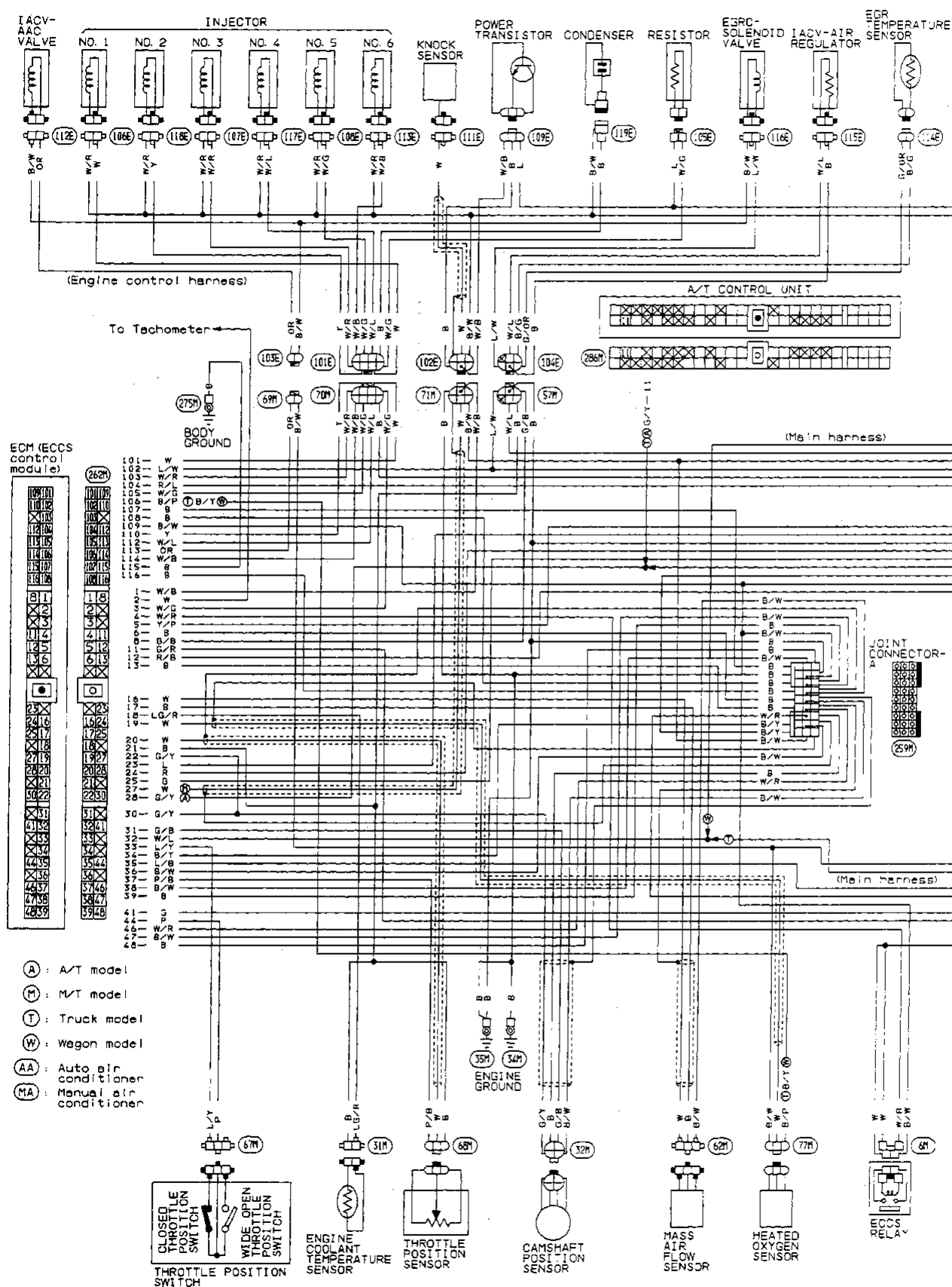
Vacuum Hose Drawing



- ① EGRC-solenoid valve to Throttle body
- ② EGRC-solenoid valve to EGR valve
- ③ EGRC-solenoid valve to Air duct
- ④ Fuel pressure regulator to intake manifold collector

- ⑤ Carbon canister vacuum port to Throttle body
- ⑥ Carbon canister purge port to Vapor purge tube
- ⑦ Vapor purge tube to Throttle body

Wiring Diagram



VG30E

GI

MA

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EC**

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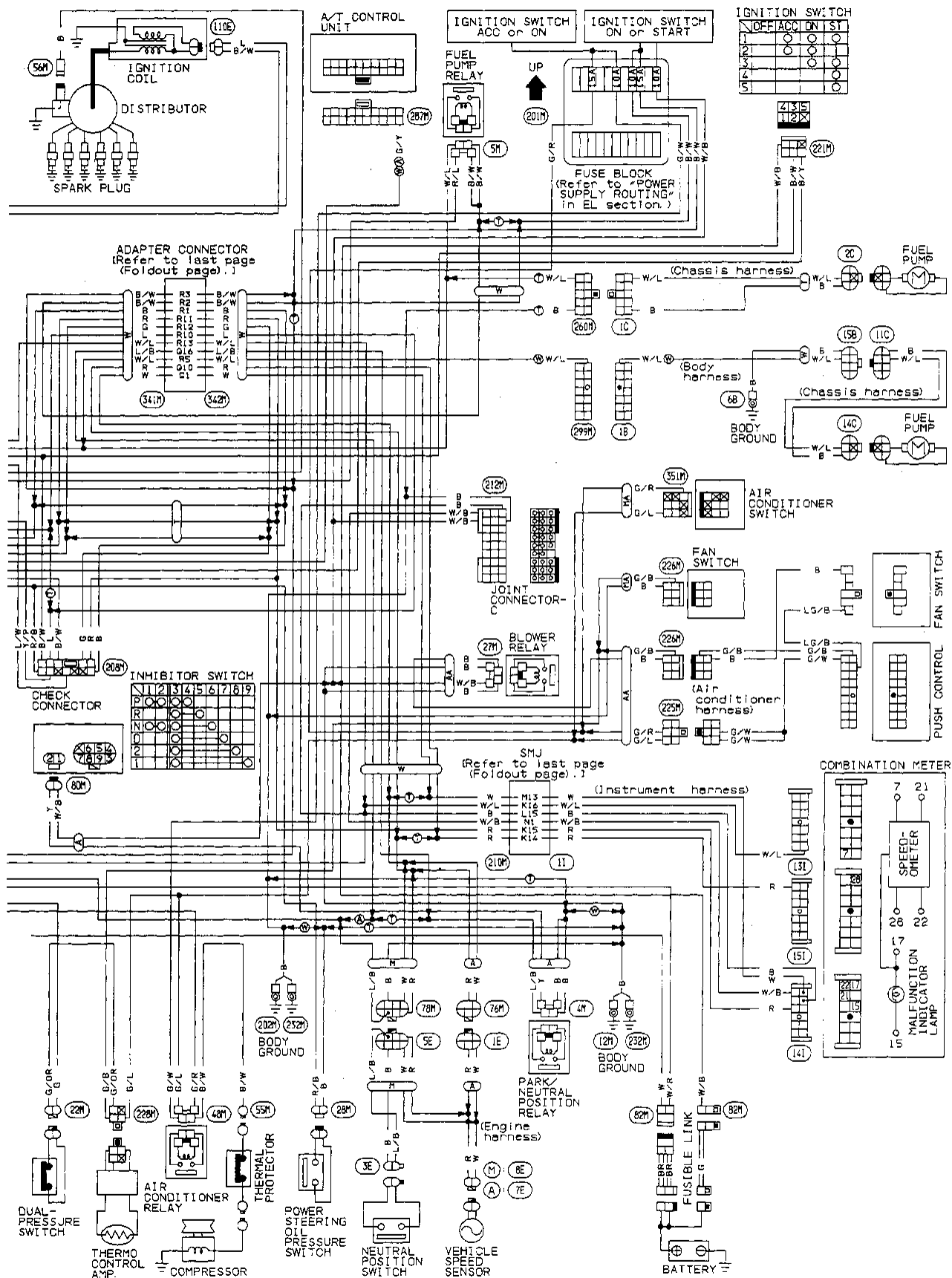
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PREPARATION

1. Make sure that the following parts are in good order.

- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM SMJ harness connector
- Vacuum hoses
- Air intake system (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".

3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.

4. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.

5. Turn off headlamps, heater blower, rear defogger.

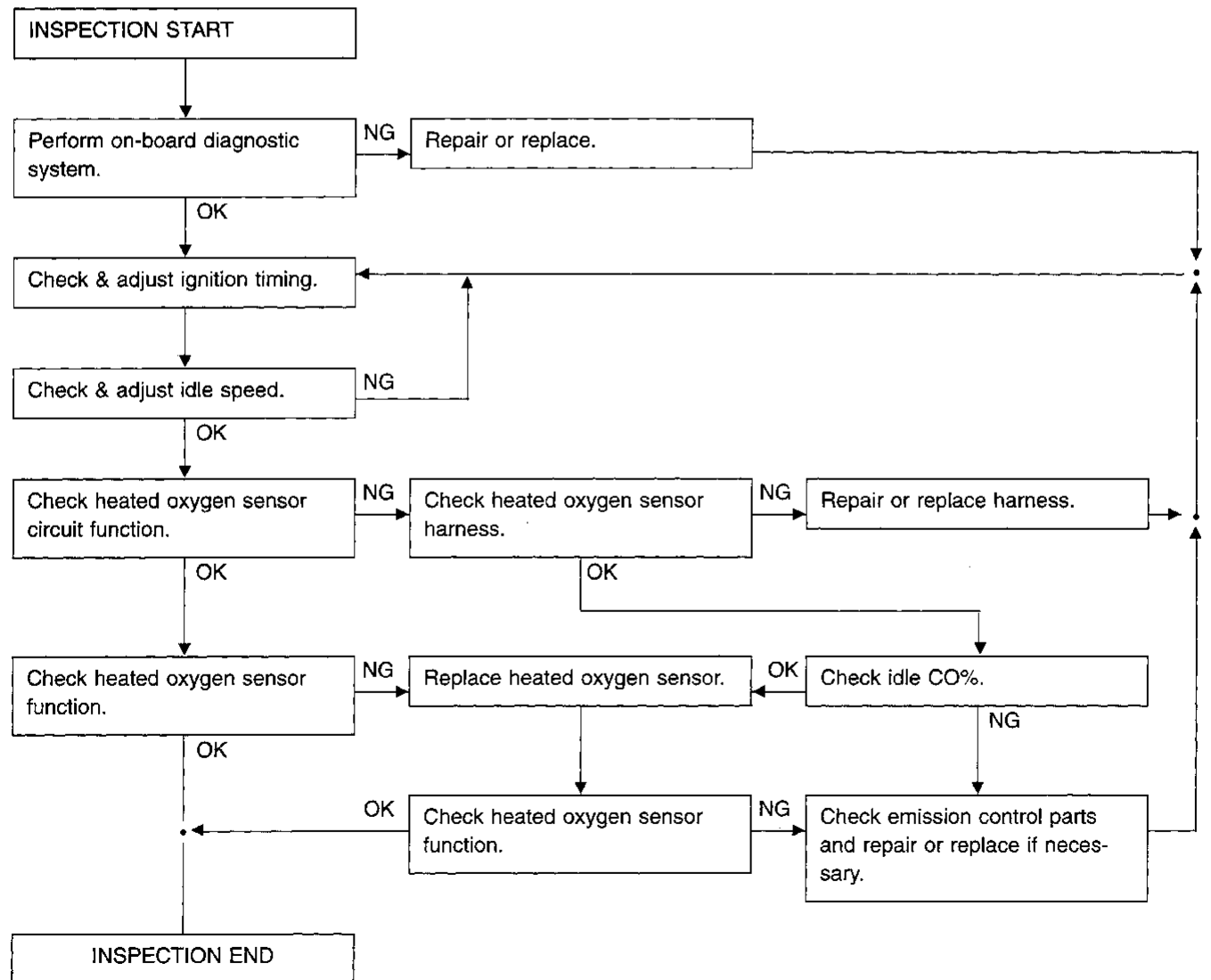
6. Keep front wheels pointed straight ahead.

7. Make the check after the cooling fan has stopped.

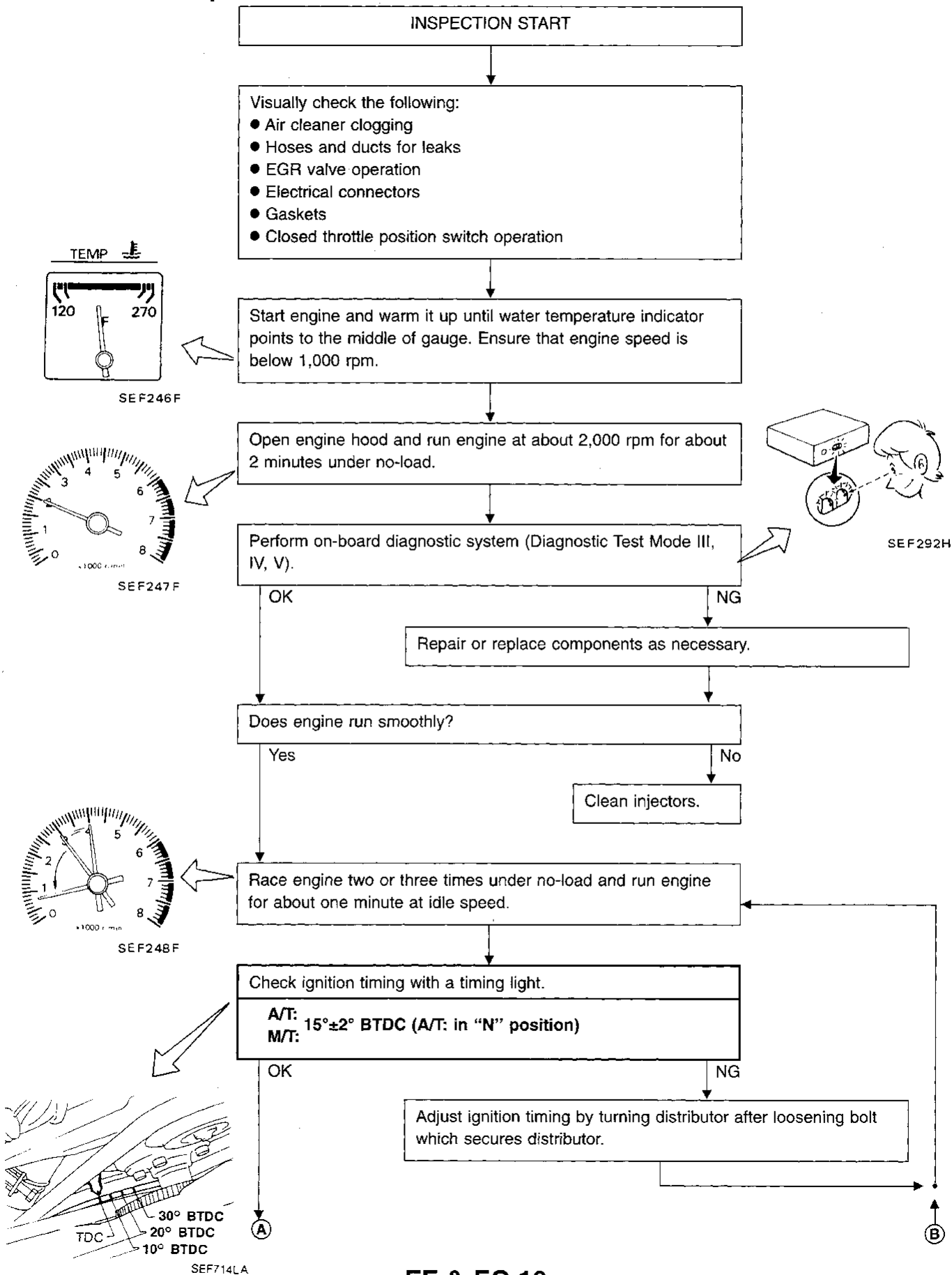
WARNING:

Apply parking brake and block both front and rear wheels with chocks.

Overall inspection sequence



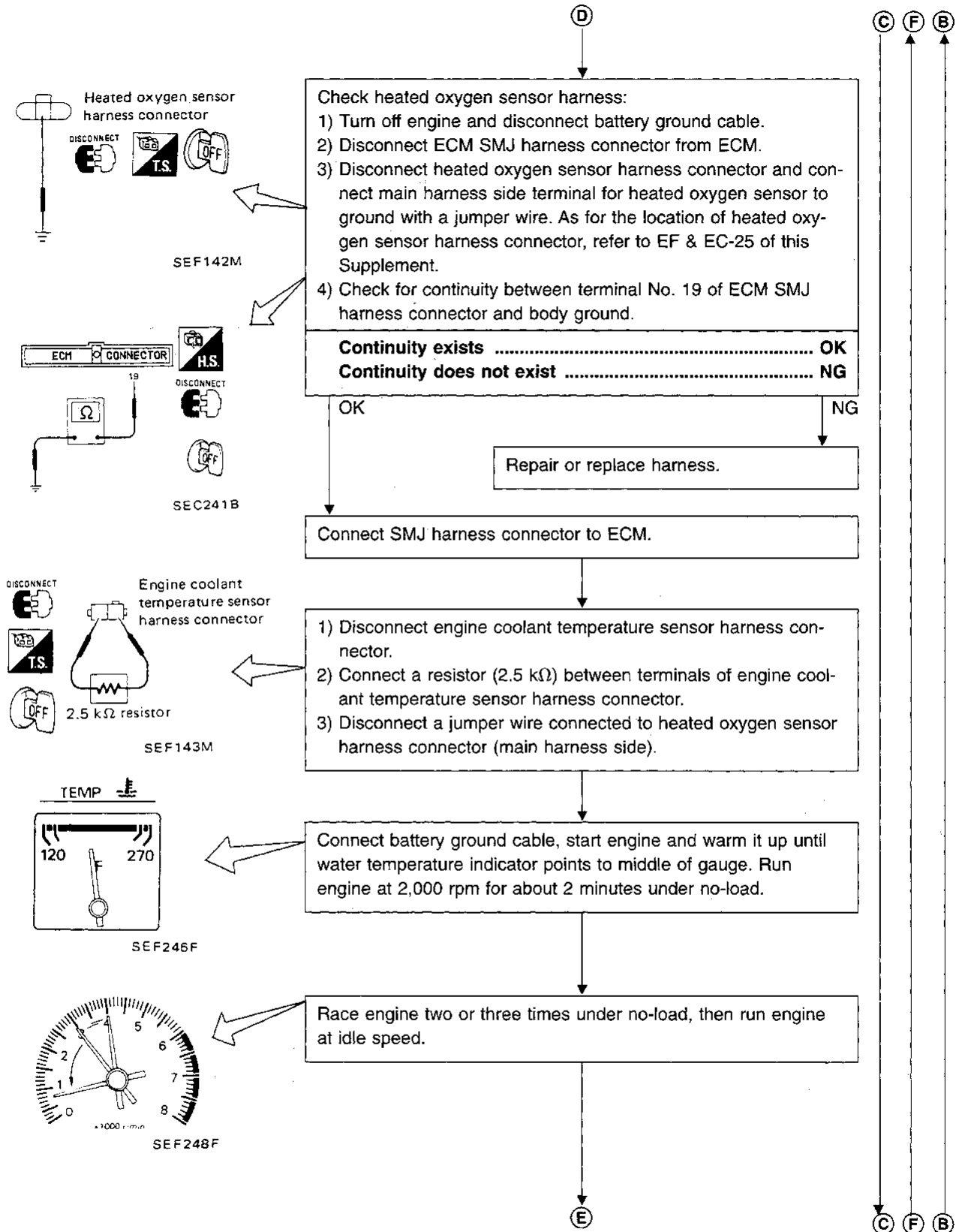
Idle check and set procedure



VG30E

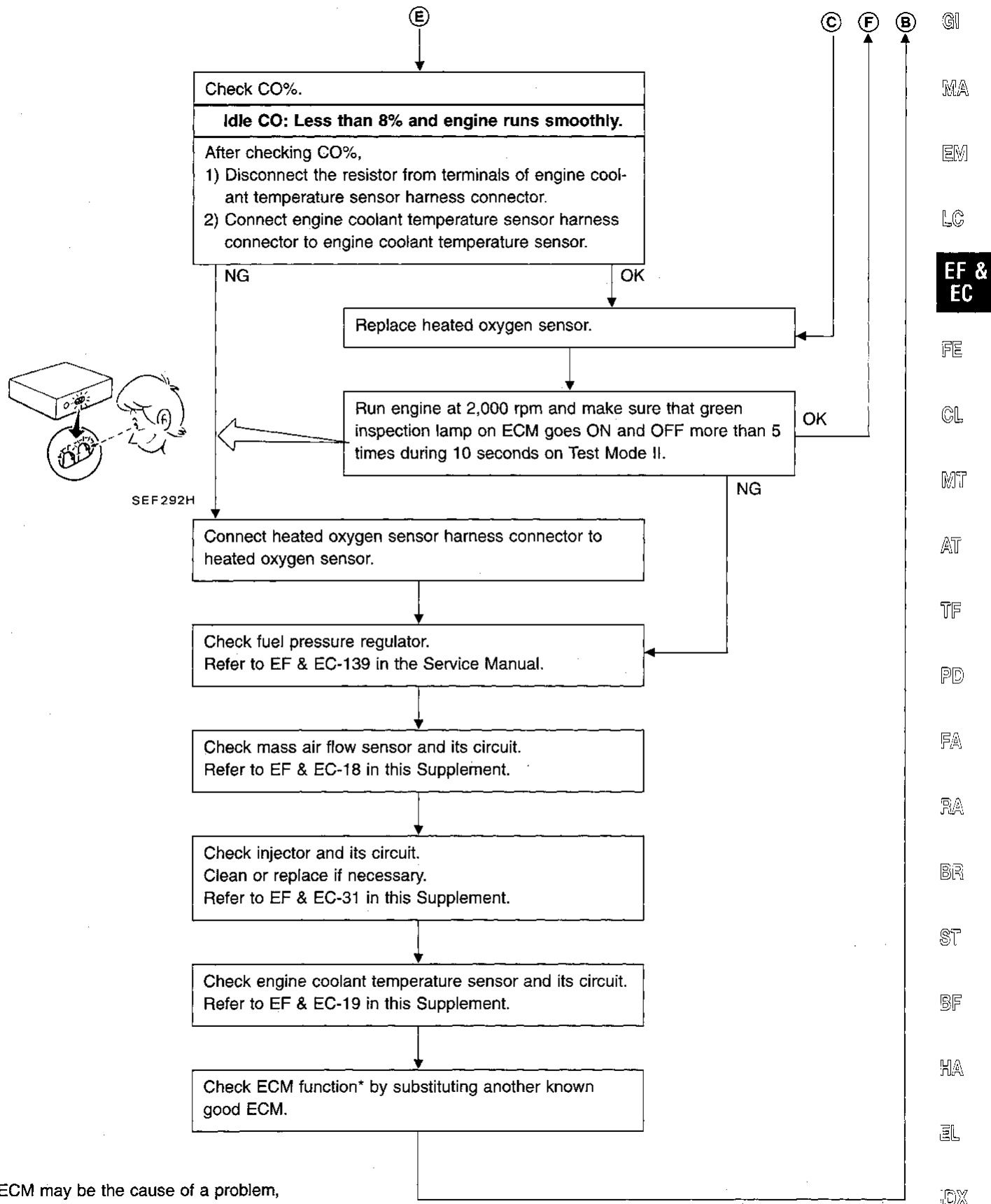
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

VG30E



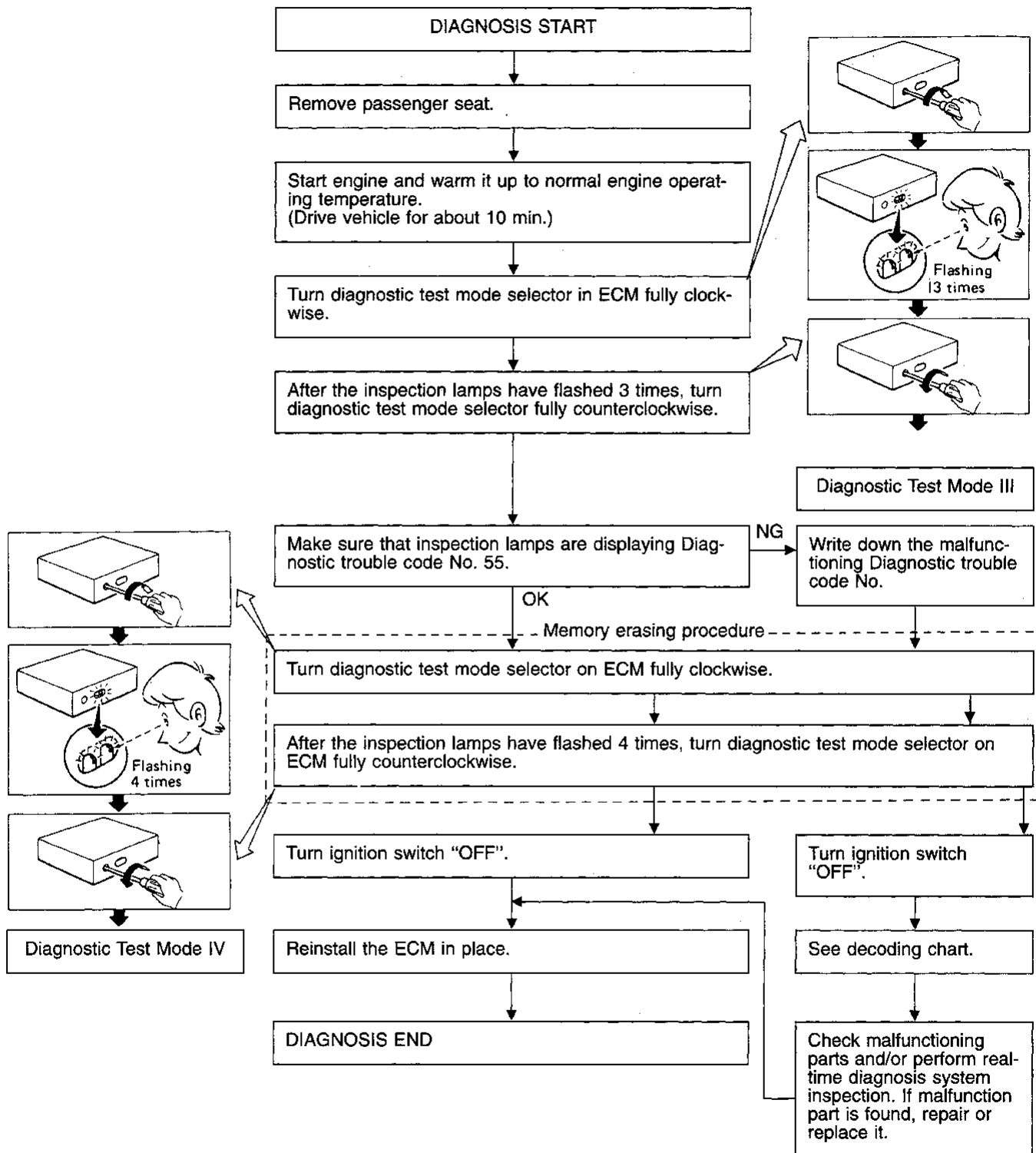
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

VG30E



*: ECM may be the cause of a problem, but this is rarely the case.

On-board Diagnostic System — Diagnostic Test Mode III Self-diagnostic Results PROCEDURE

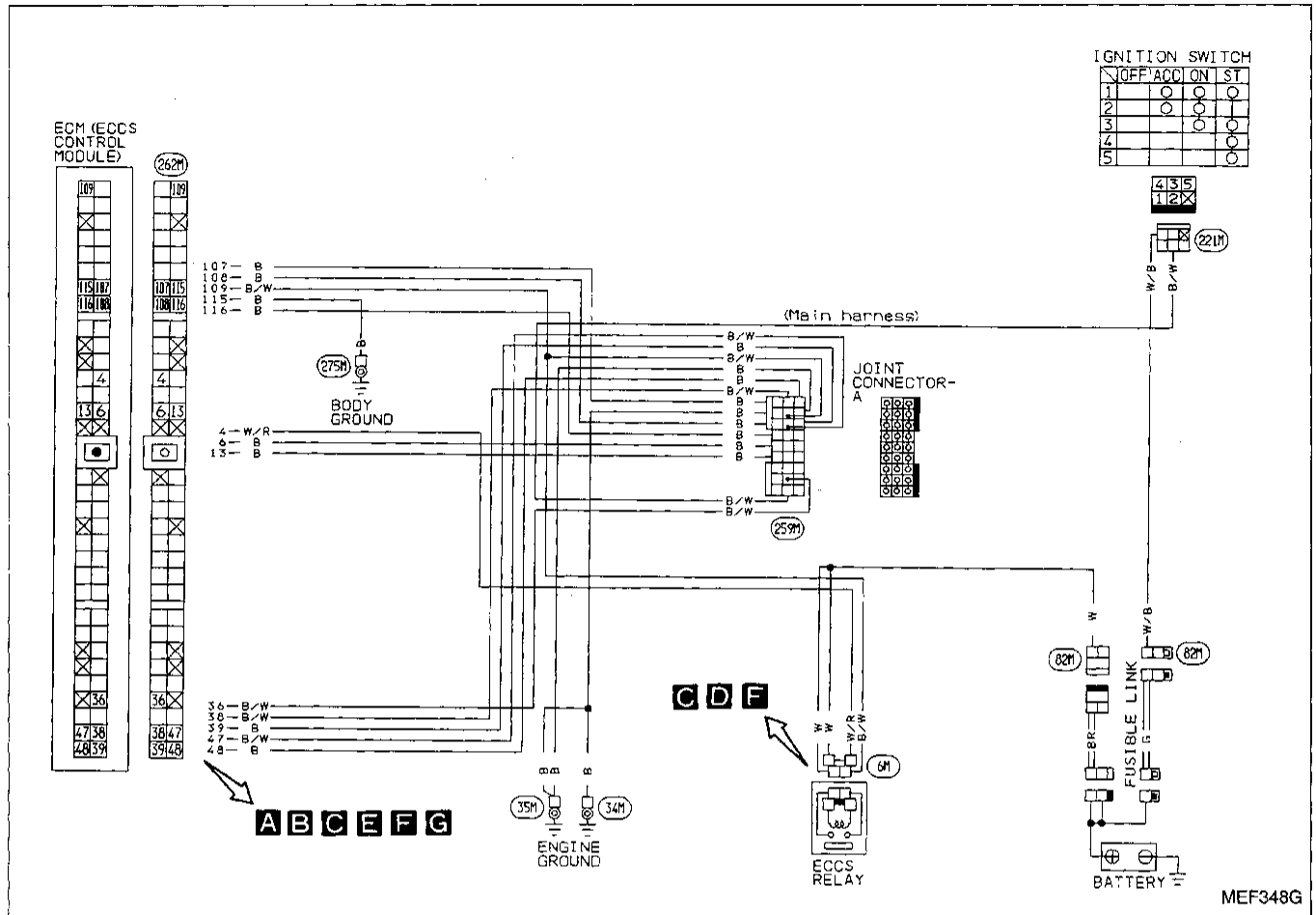


CAUTION:

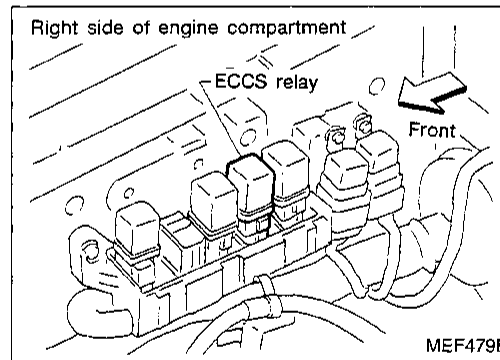
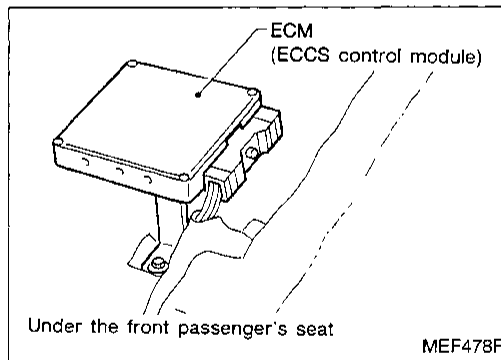
- During display of a Diagnostic trouble code No. in on-board diagnostic system mode (Diagnostic Test Mode III), if another diagnostic test mode is to be performed, be sure to note the malfunction Diagnostic trouble code No. before turning diagnostic test mode selector on ECM fully clockwise. When selecting an alternative, select the diagnosis mode after turning switch "OFF". Otherwise, on-board diagnostic system information in the ECM memory will be lost.

Diagnostic Procedure 22

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

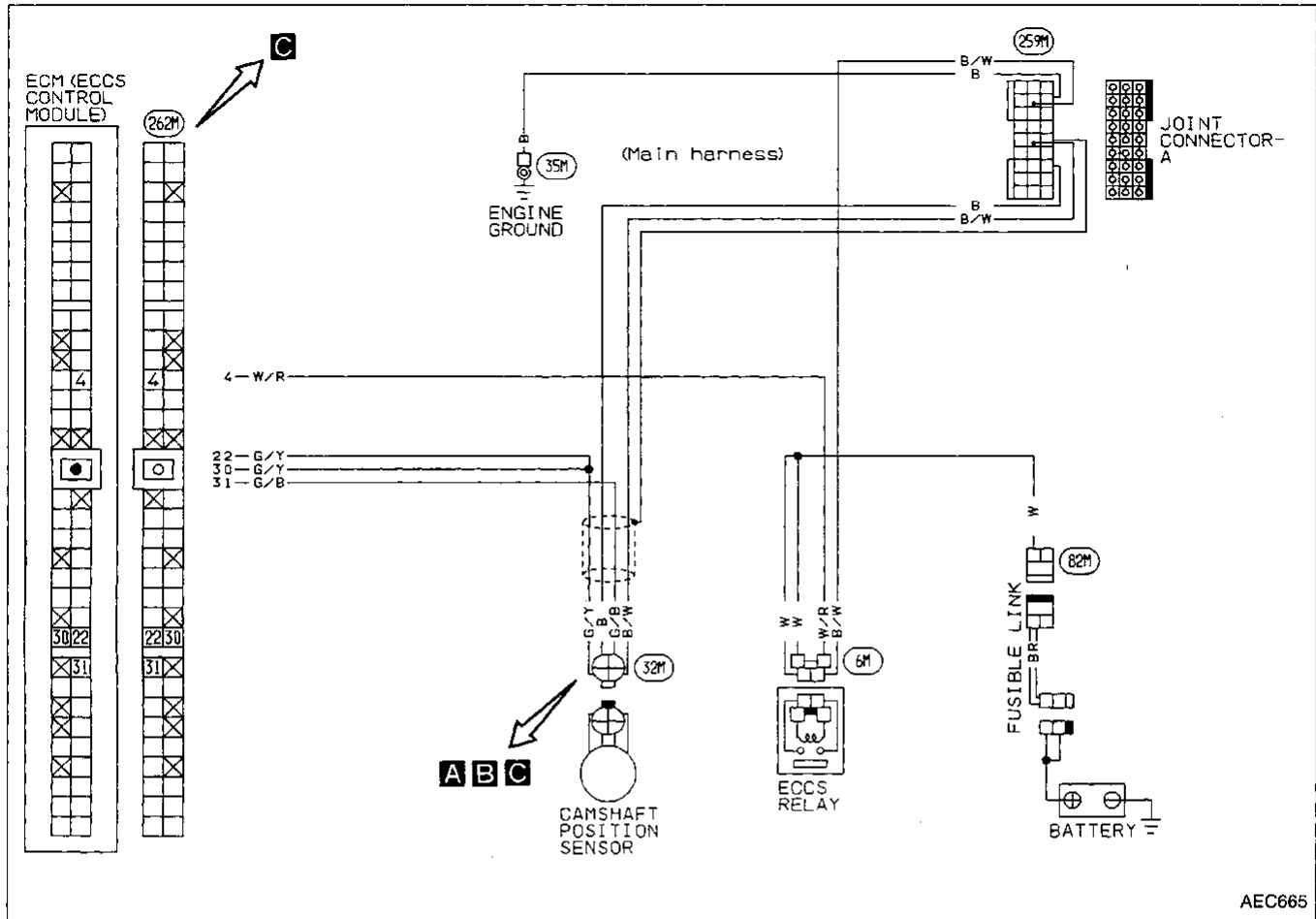


Harness layout



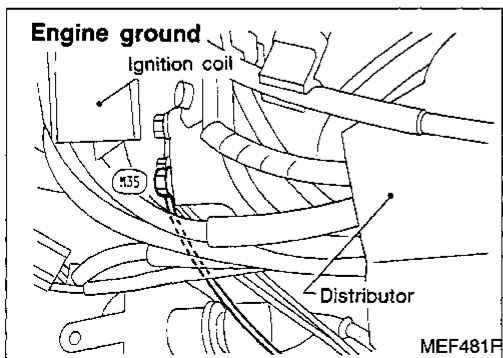
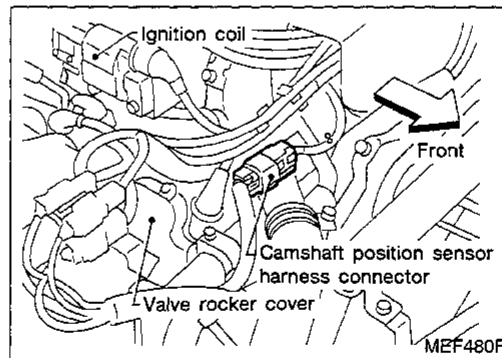
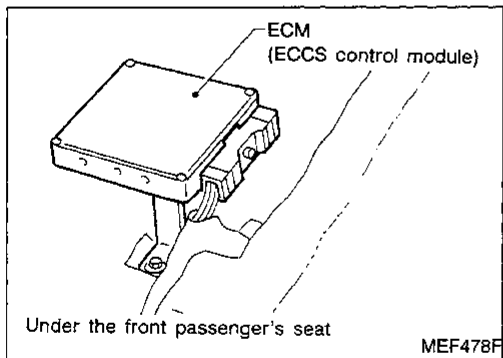
Diagnostic Procedure 23

CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

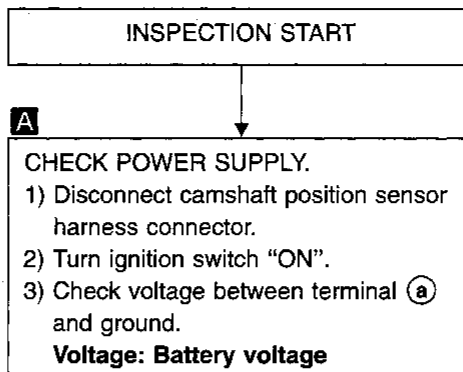
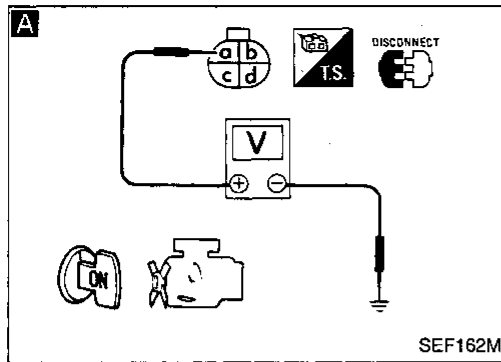


AEC665

Harness layout



Diagnostic Procedure 23 (Cont'd)

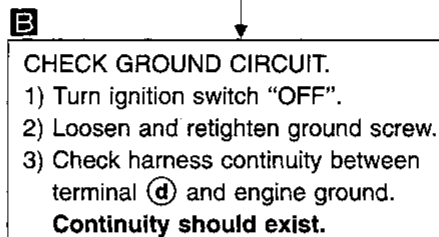
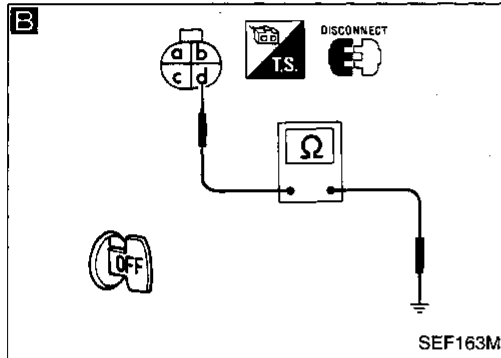


NG

Check the following.

- Joint connector-A (259M)
- Harness continuity between camshaft position sensor and ECCS relay

If NG, repair harness or connectors.

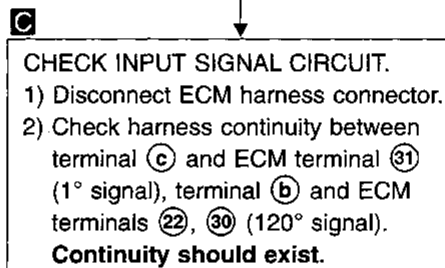
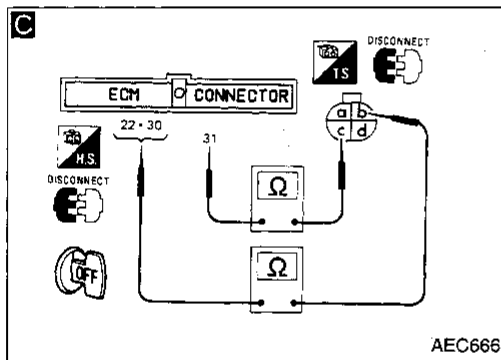


NG

Check the following.

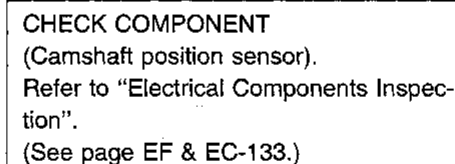
- Joint connector-A (259M)
- Harness continuity between camshaft position sensor and ground

If NG, repair harness or connectors.



NG

Repair harness or connectors.



NG

Replace camshaft position sensor.

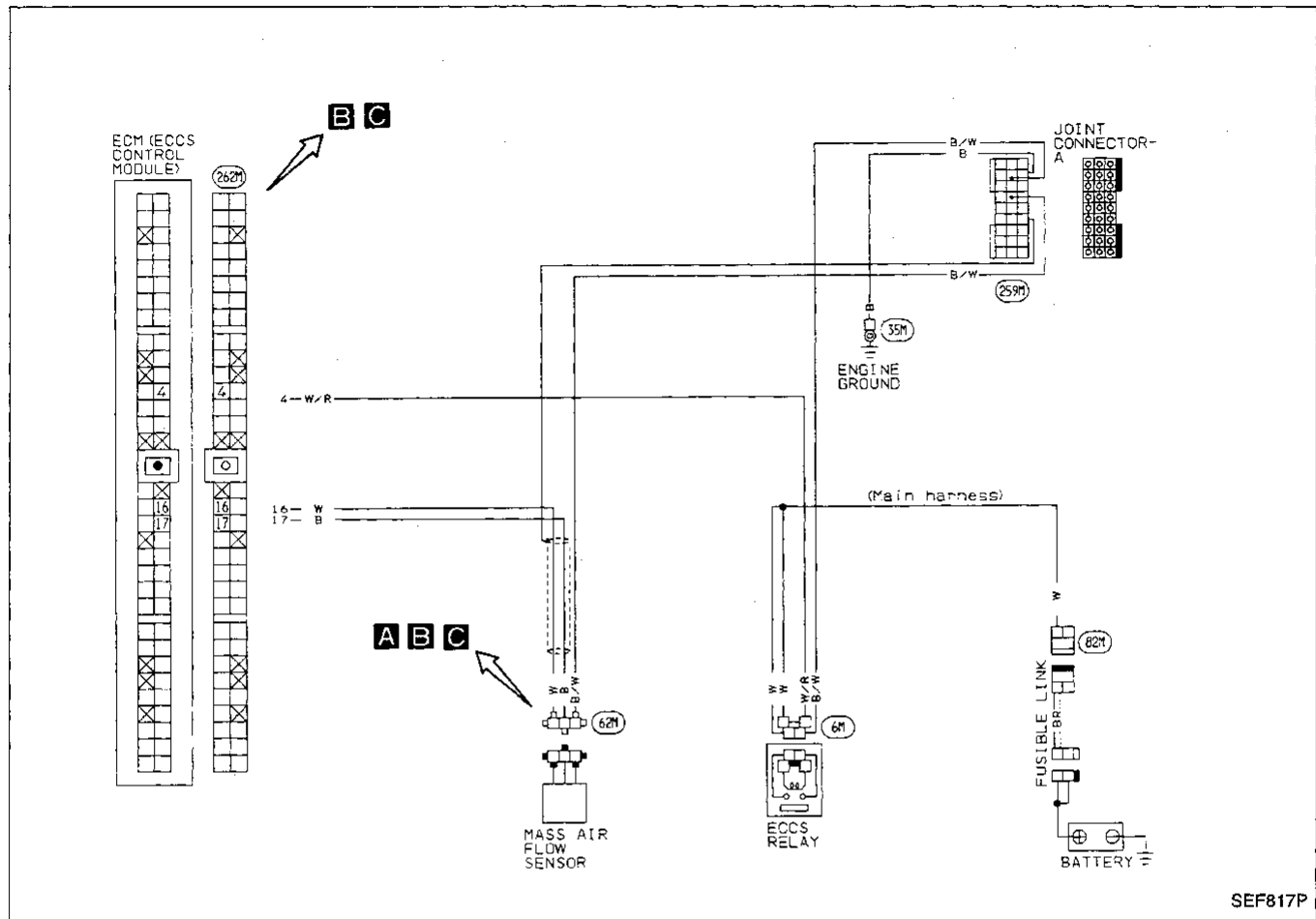
OK

Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

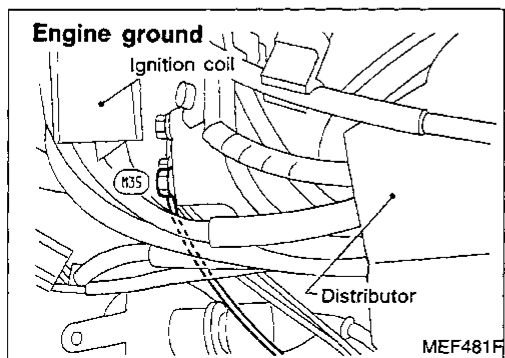
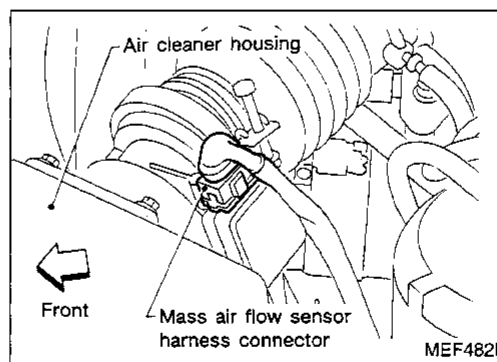
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (MALFUNCTION INDICATOR LAMP ITEM)



ECM
(ECSS control module)

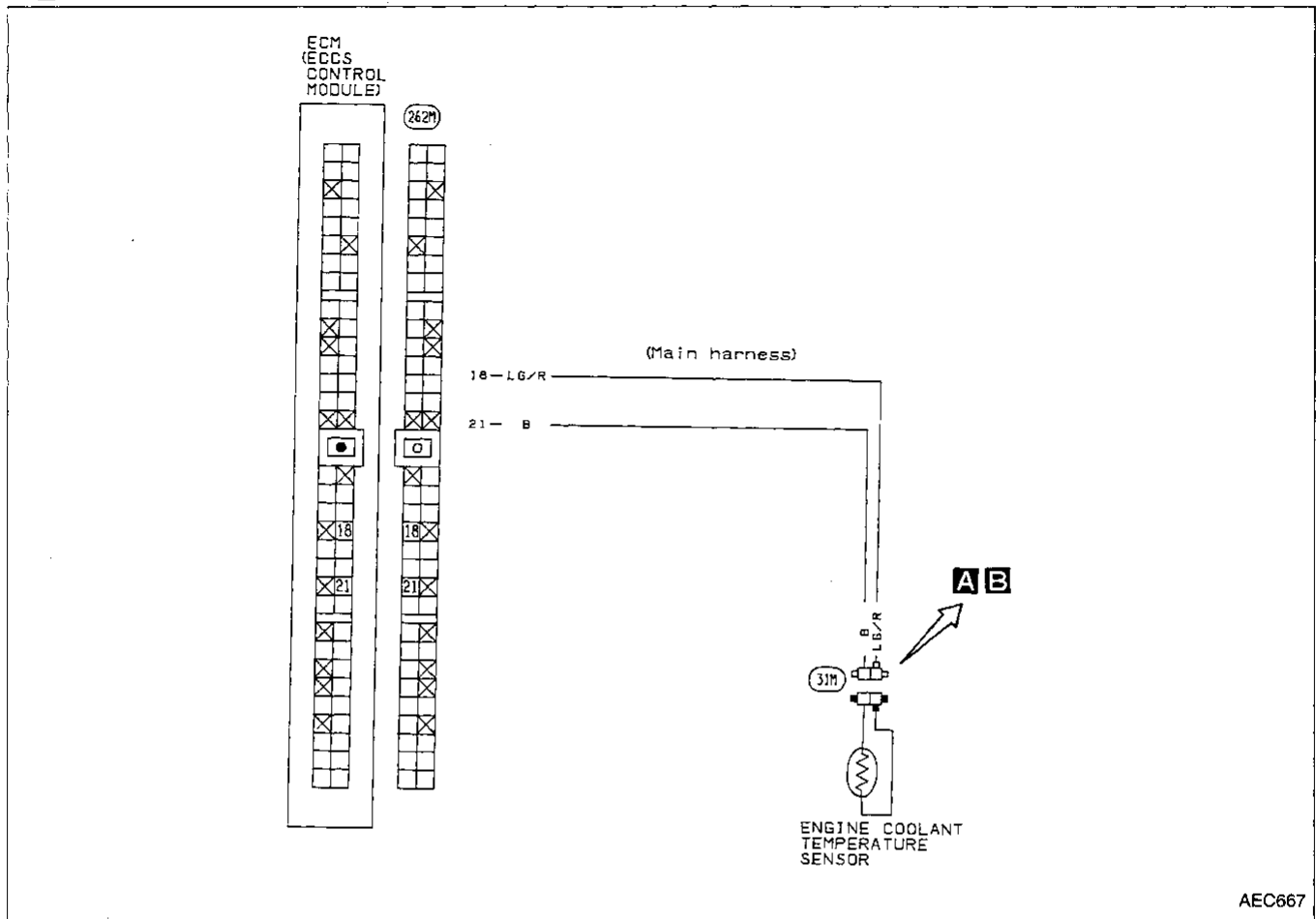
Under the front passenger's seat

MEF478F

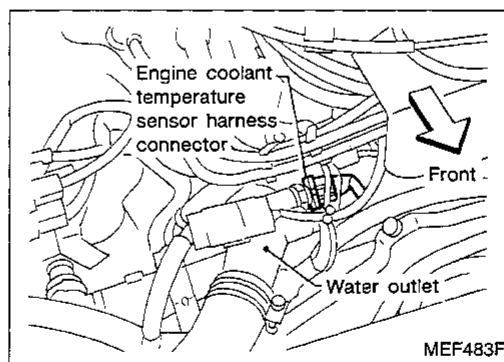
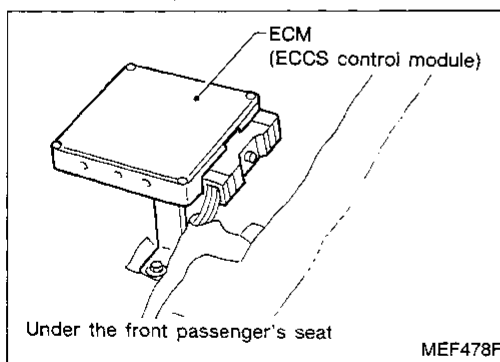


Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(MALFUNCTION INDICATOR LAMP ITEM)

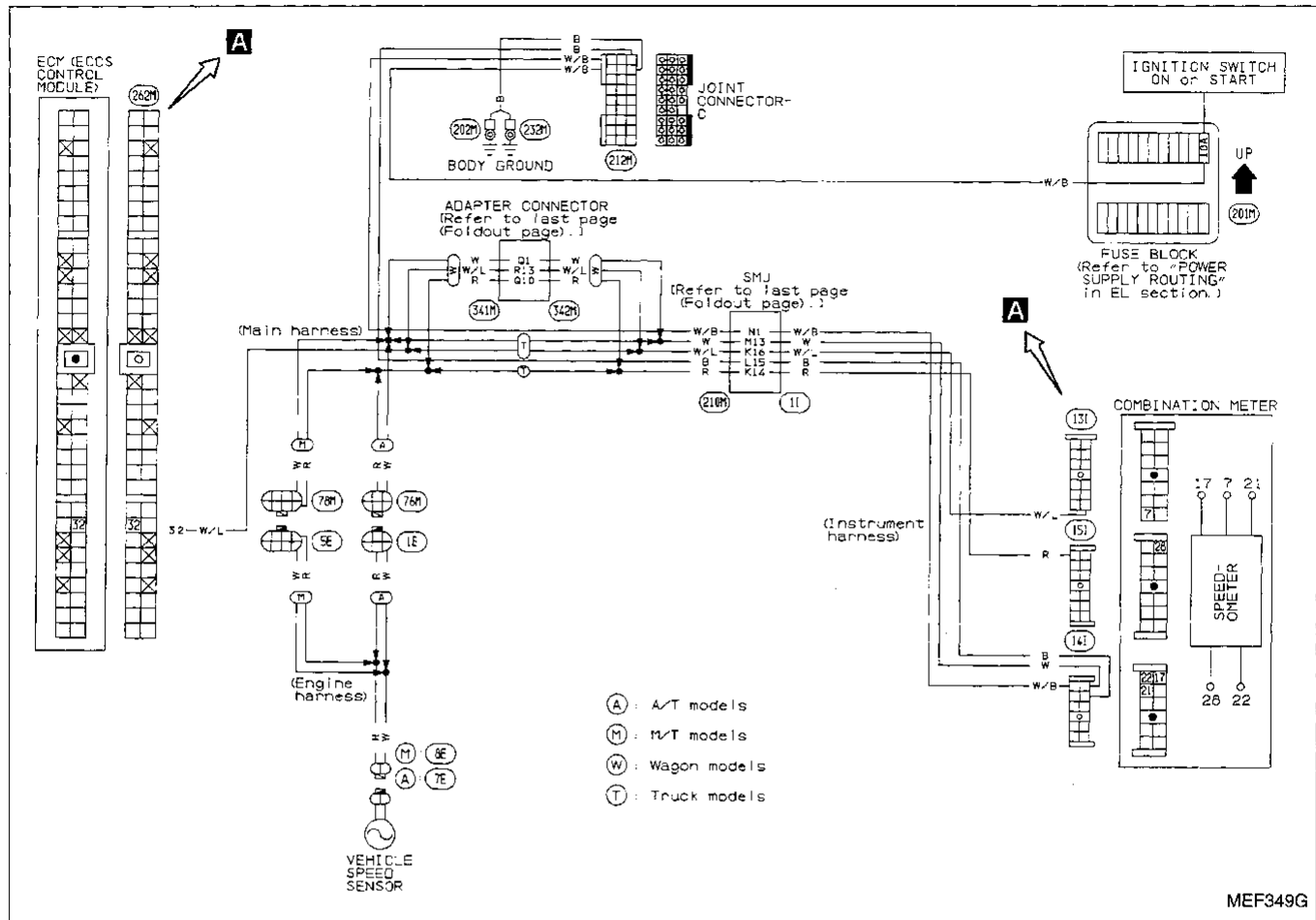


Harness layout

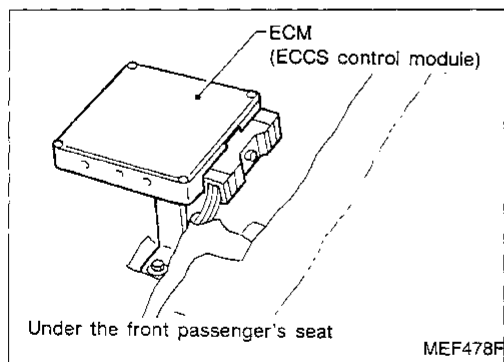


Diagnostic Procedure 26

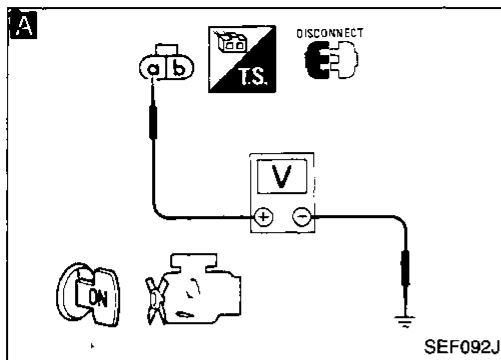
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Switch ON/OFF diagnostic item)  **(MALFUNCTION INDICATOR LAMP ITEM)**



Harness layout



Diagnostic Procedure 27 (Cont'd)



INSPECTION START

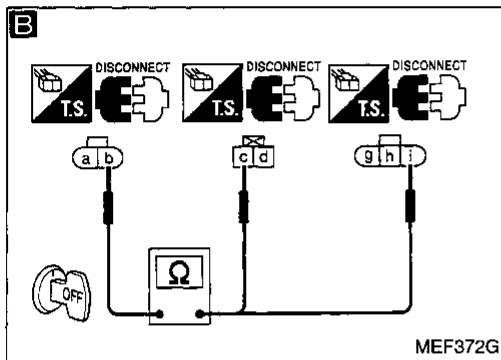
- A**
- CHECK POWER SUPPLY.**
- 1) Disconnect ignition coil harness connector.
 - 2) Turn ignition switch "ON".
 - 3) Check voltage between terminal (a) and ground.
- Voltage: Battery voltage**

NG → Check the following.

- Harness connectors (71M), (102E)
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

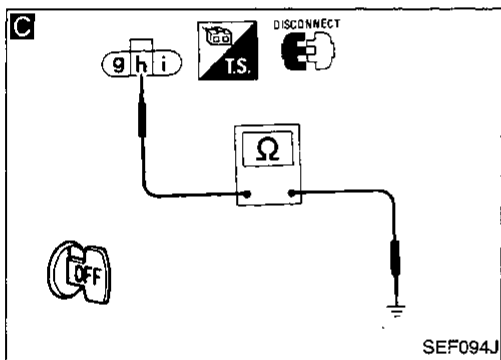
OK



- CHECK GROUND CIRCUIT-1.**
- 1) Turn ignition switch "OFF".
 - 2) Disconnect resistor harness connector.
 - 3) Disconnect power transistor harness connector.
- B** 4) Check harness continuity between terminals (b) and (c), (i).
- Continuity should exist.**

NG → Repair harness or connectors.

OK



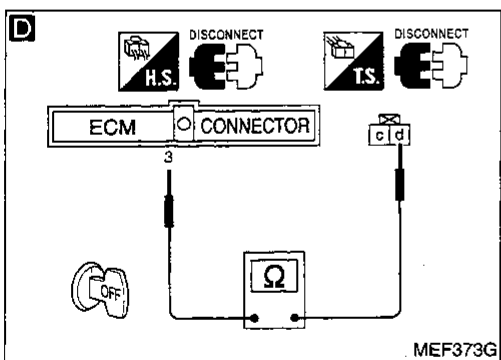
- C**
- CHECK GROUND CIRCUIT-2.**
- 1) Check harness continuity between terminal (h) and engine ground.
- Continuity should exist.**

NG → Check the following.

- Harness connectors (71M), (102E)
- Harness continuity between power transistor and engine ground

If NG, repair harness or connectors.

OK



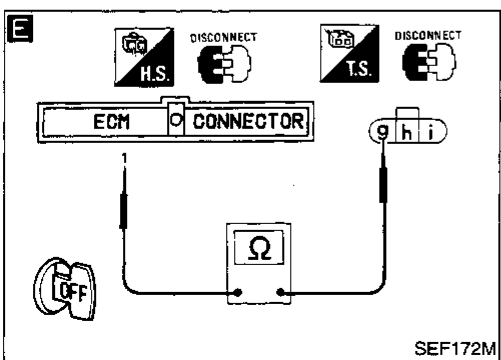
- D**
- CHECK INPUT SIGNAL CIRCUIT.**
- 1) Disconnect ECM harness connector.
 - 2) Check harness continuity between terminal (d) and ECM terminal (3).
- Continuity should exist.**

NG → Check the following.

- Harness connectors (101E), (70M)
- Harness continuity between resistor and ECM harness connector

If NG, repair harness or connectors.

OK



- E**
- CHECK OUTPUT SIGNAL CIRCUIT.**
- 1) Check harness continuity between terminal (g) and ECM terminal (1).
- Continuity should exist.**

NG → Check the following.

- Harness connectors (102E), (71M)
- Harness continuity between power transistor and ECM harness connector

If NG, repair harness or connectors.

OK

- CHECK COMPONENT**
(Ignition coil, resistor power transistor). Refer to "Electrical Components Inspection", EF & EC-134 in the Service Manual.

NG → Replace malfunctioning component(s).

OK

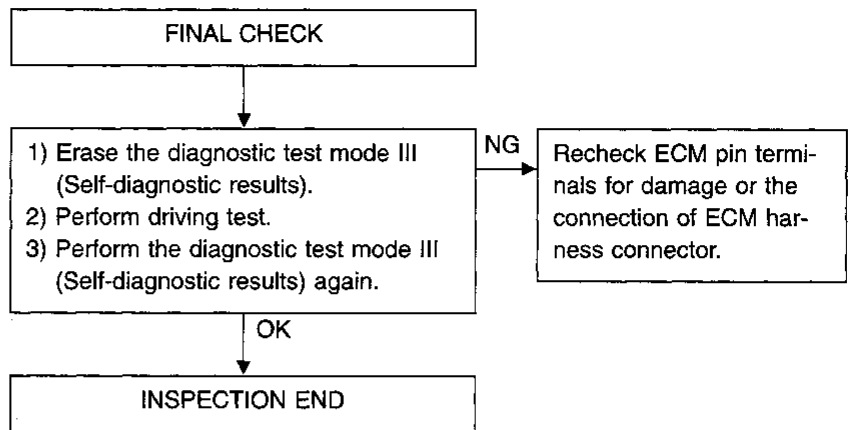
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 27 (Cont'd)

Perform **FINAL CHECK** by the following procedure after repair is completed.



GI

MA

EM

LG

**EF &
EC**

FE

CL

MT

AT

TF

PD

FA

RA

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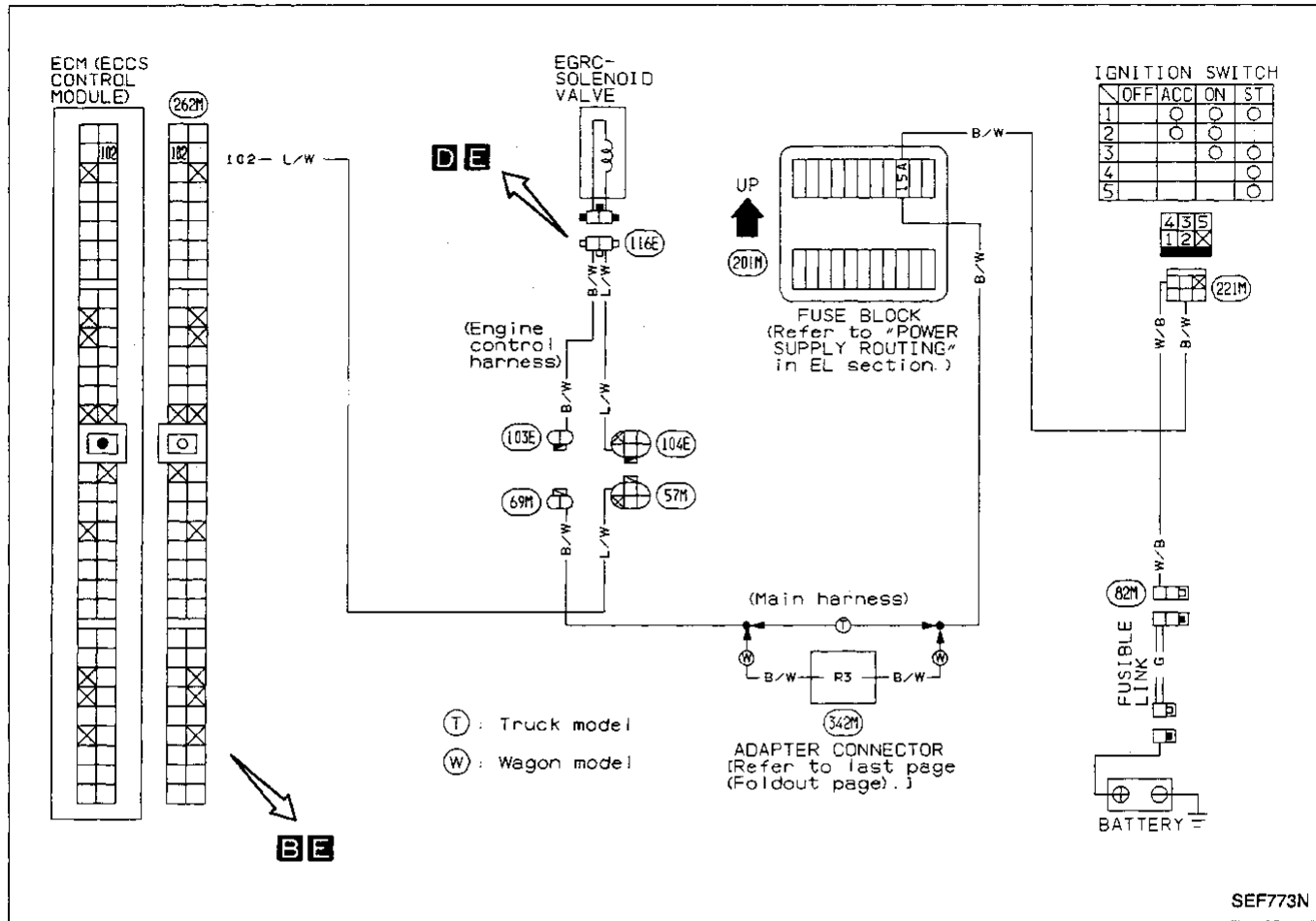
HA

EL

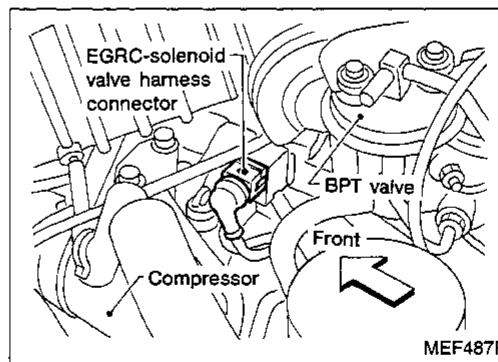
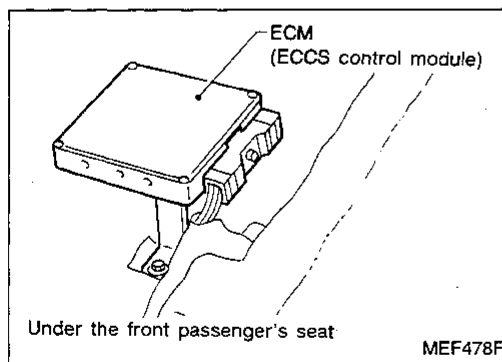
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Diagnostic Procedure 29

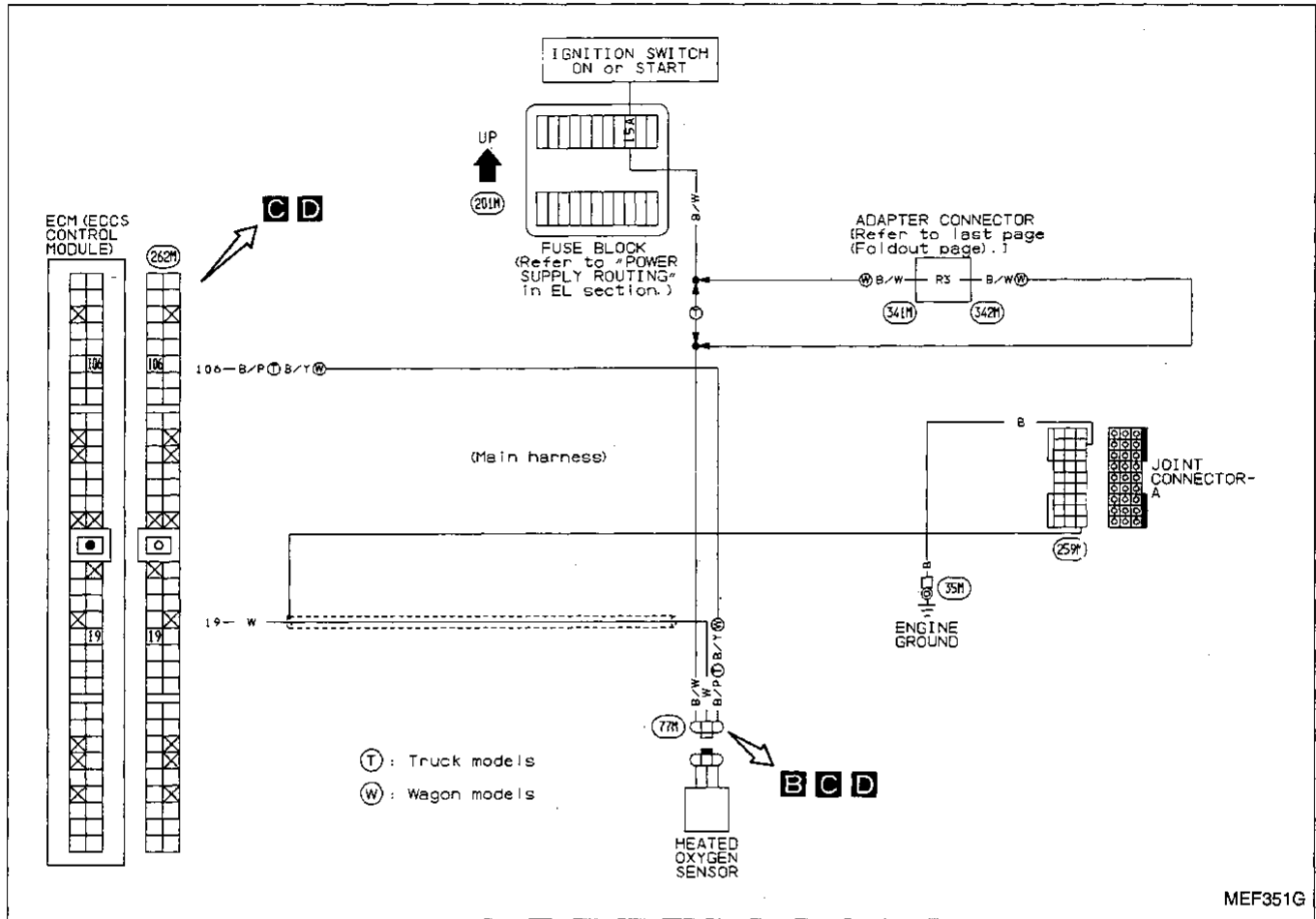
EGR FUNCTION (Diagnostic trouble code No. 32)  (MALFUNCTION INDICATOR LAMP ITEM)



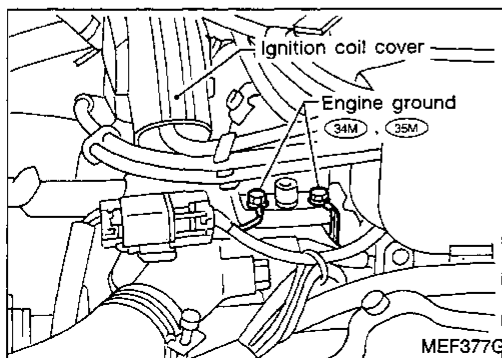
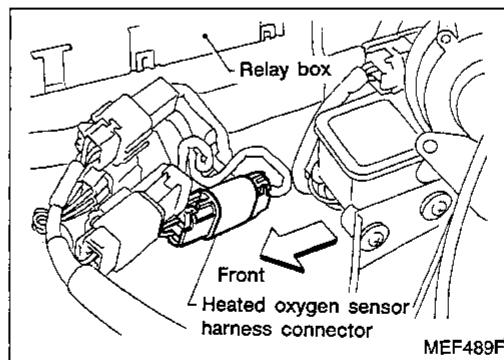
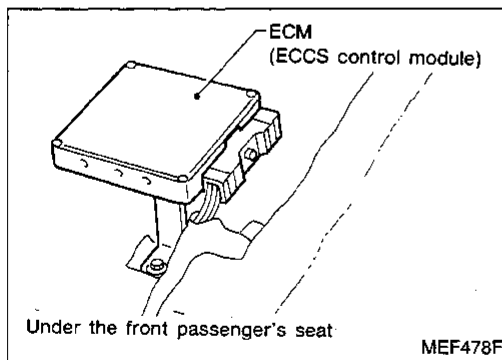
Harness layout



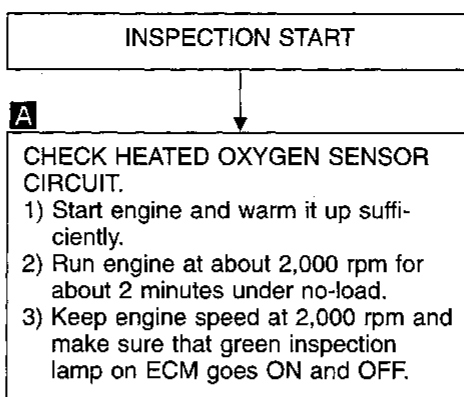
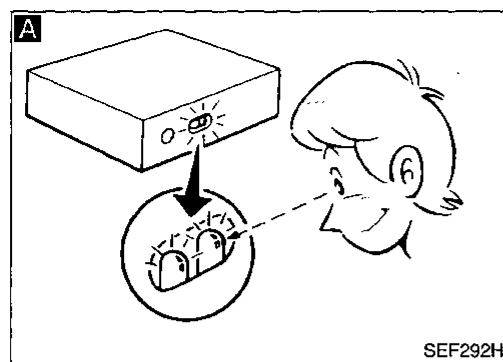
Diagnostic Procedure 30

HEATED OXYGEN SENSOR (Diagnostic trouble code No. 33) (MALFUNCTION INDICATOR LAMP ITEM)

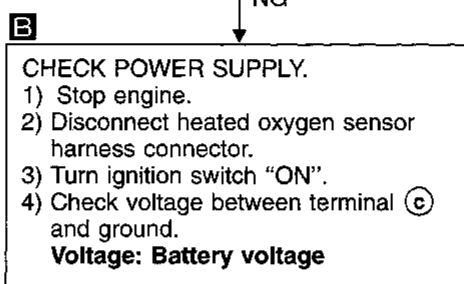
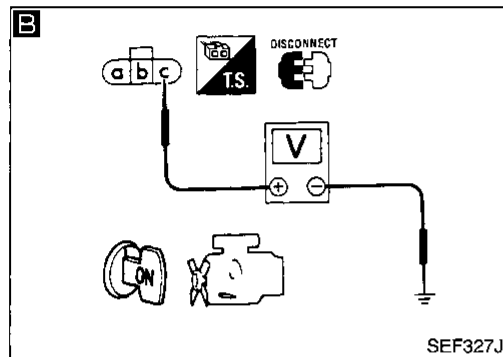
Harness layout



Diagnostic Procedure 30 (Cont'd)



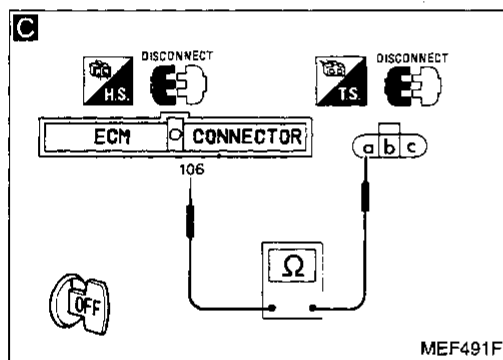
OK → INSPECTION END



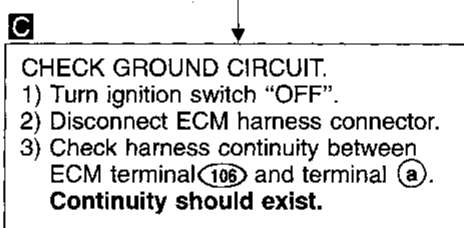
NG → Check the following.

- Adapter connector (341M, 342M) (Wagon models)
- 15A fuse
- Harness continuity between heated oxygen sensor and ignition switch

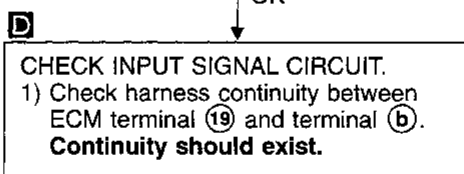
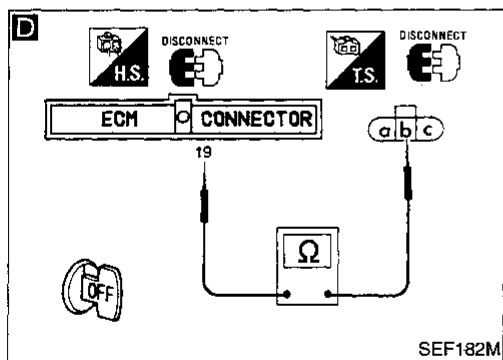
If NG, repair harness or connectors.



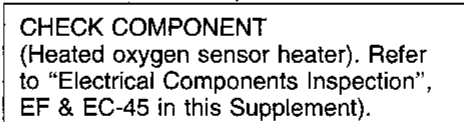
OK → Loosen and retighten ground screw.



NG → Repair harness or connectors.



NG → Repair harness or connectors.



NG → Replace heated oxygen sensor.

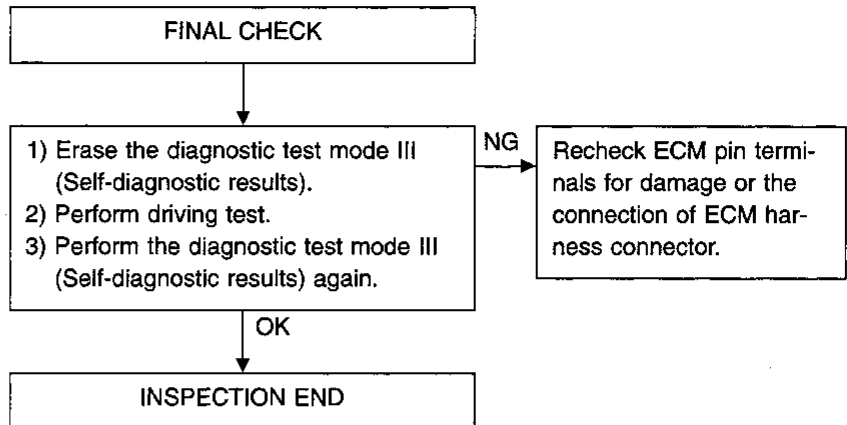
OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 30 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.



GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

BF

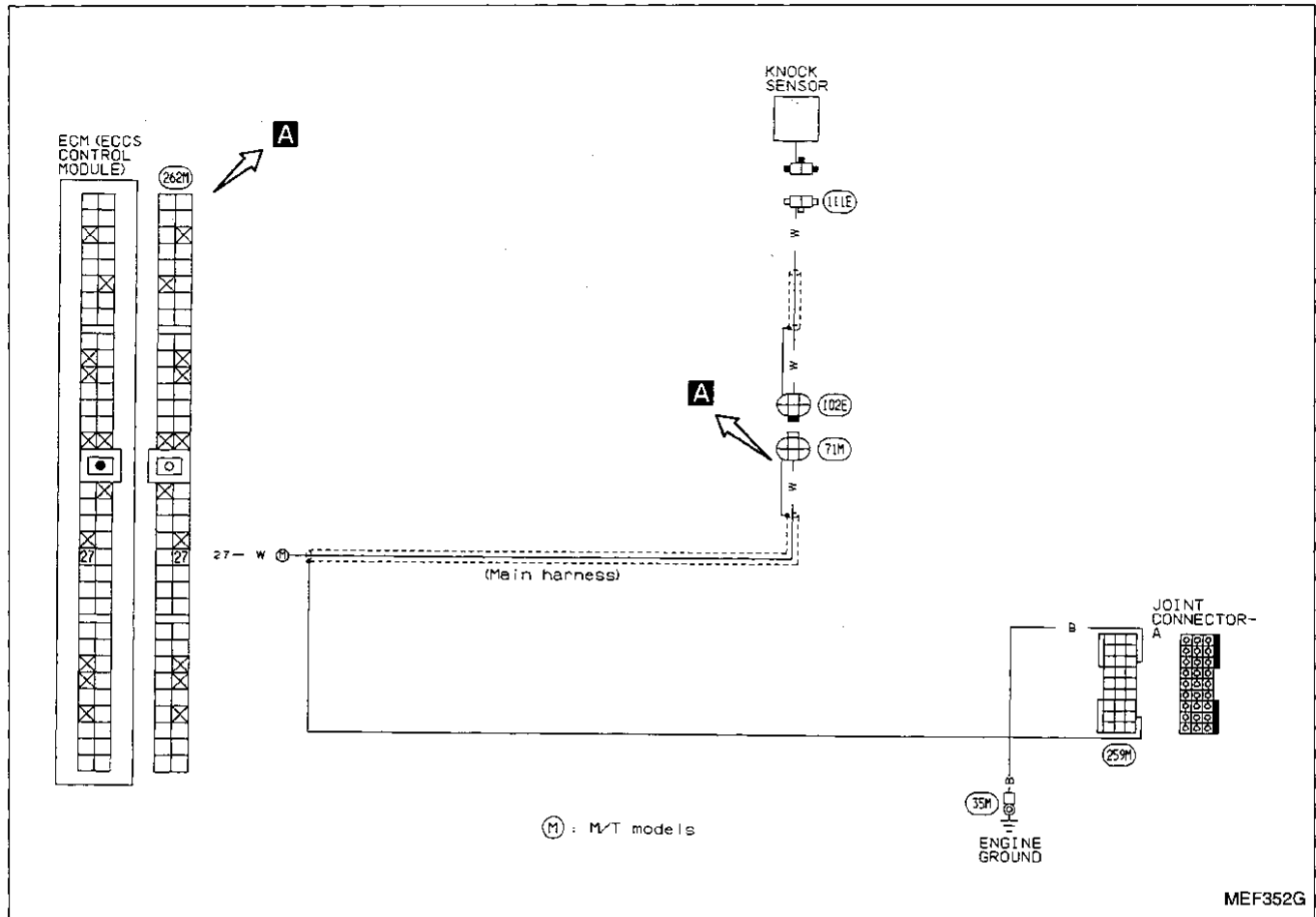
HA

EL

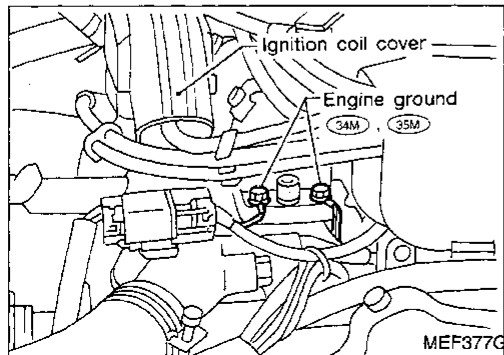
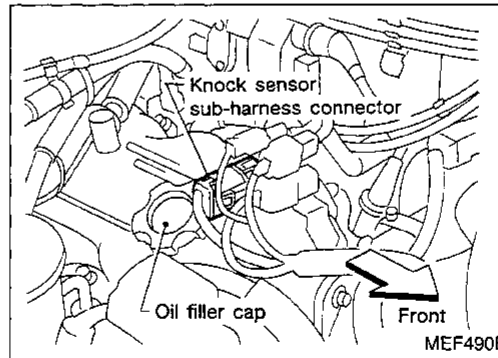
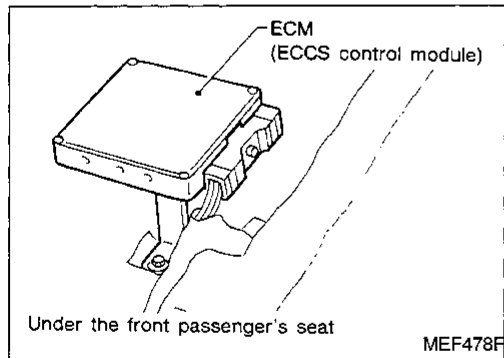
IDX

Diagnostic Procedure 31

KNOCK SENSOR (Diagnostic trouble code No. 34)

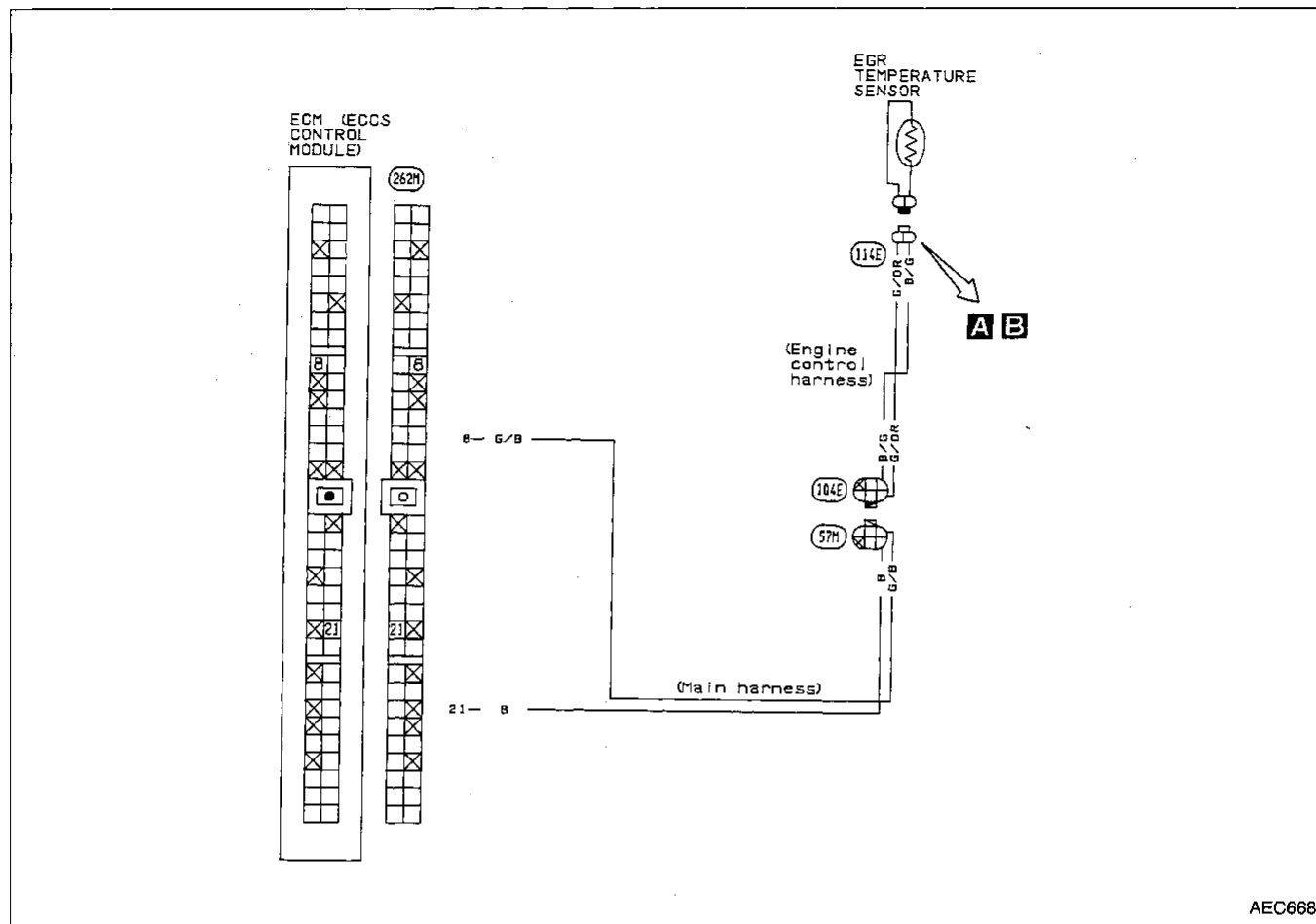


Harness layout

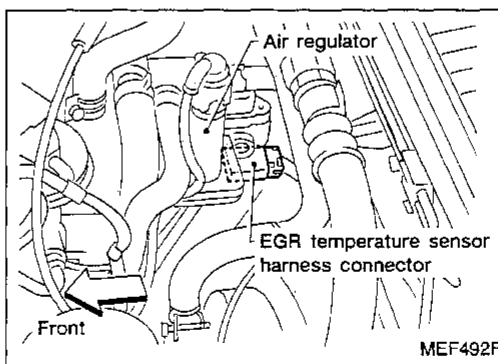
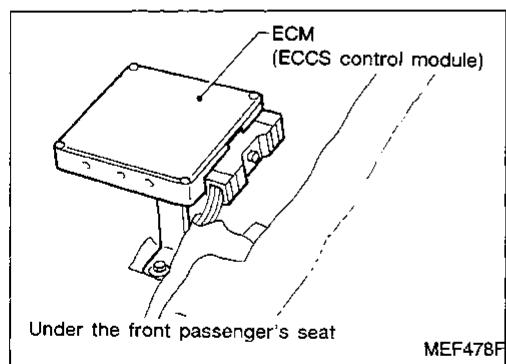


Diagnostic Procedure 32

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (MIL CHECK) (MALFUNCTION INDICATOR LAMP ITEM)

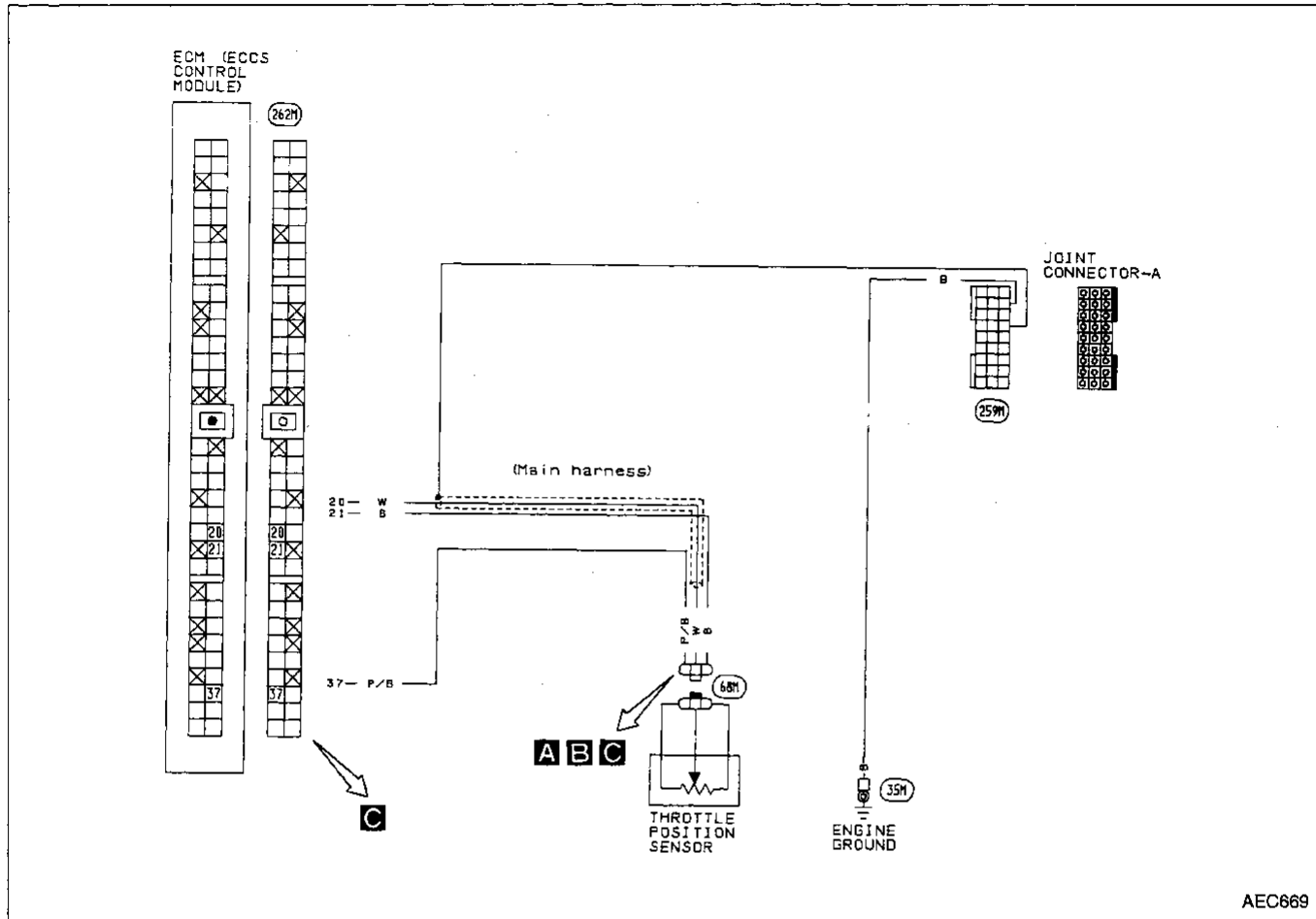


Harness layout

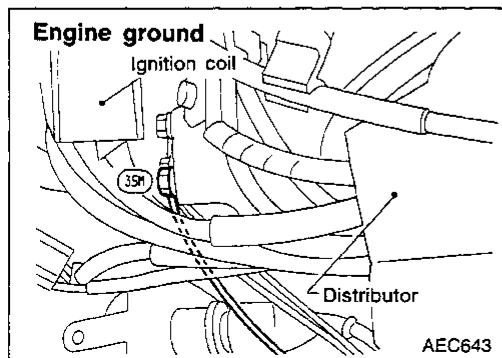
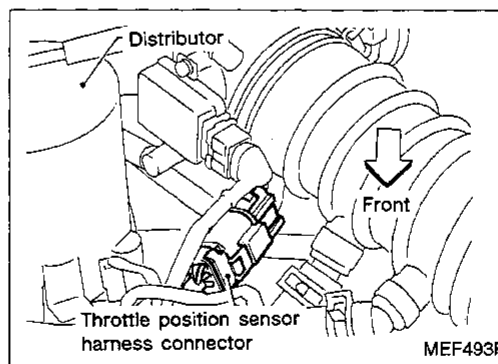
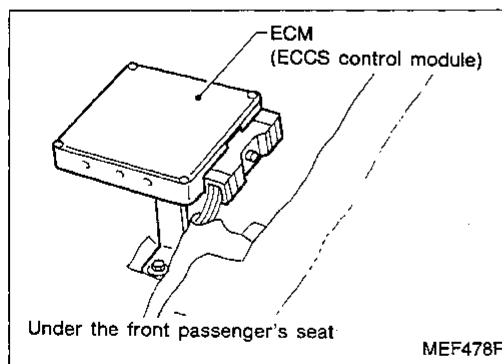


Diagnostic Procedure 33

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (MALFUNCTION INDICATOR LAMP ITEM)

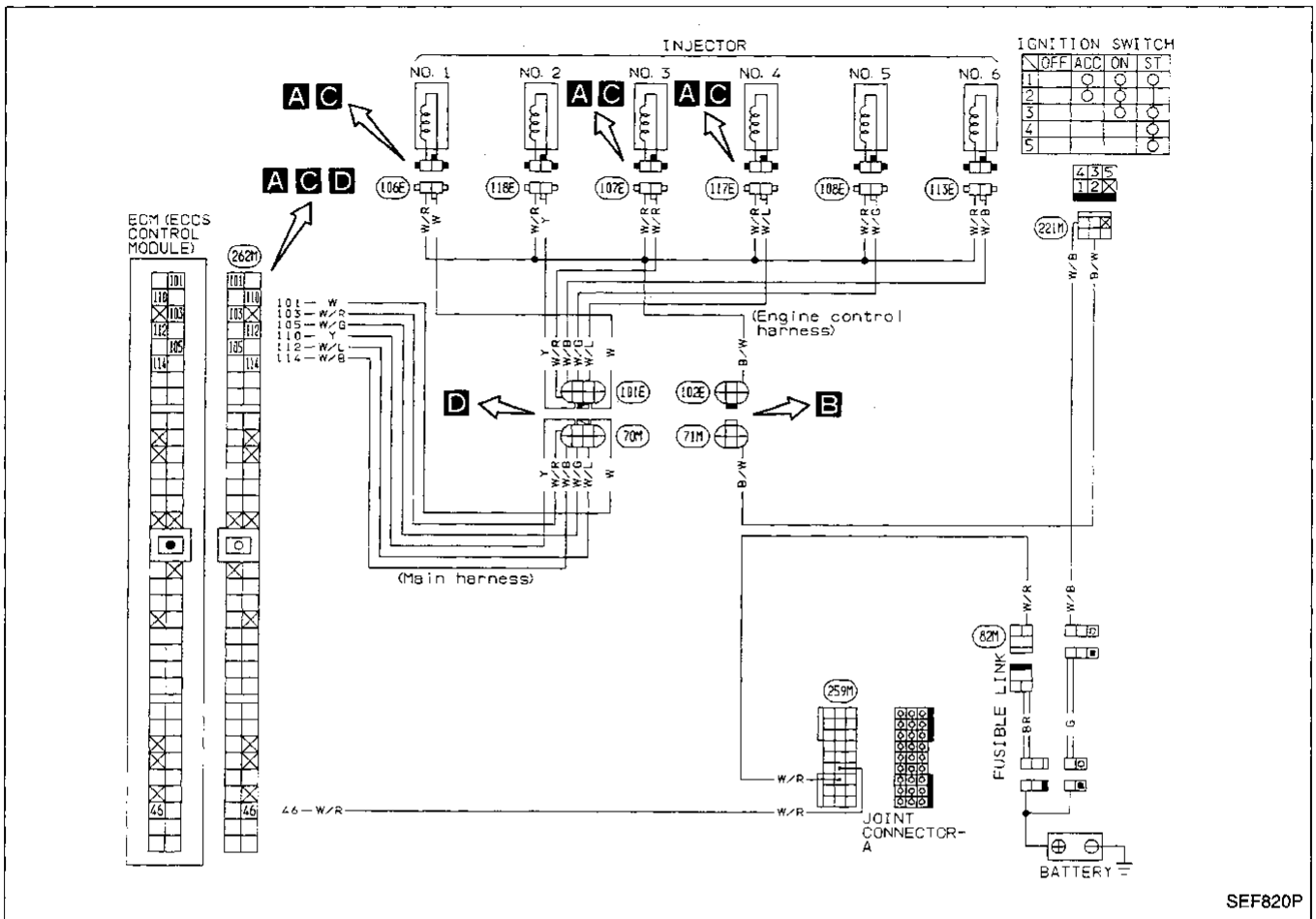


Harness layout

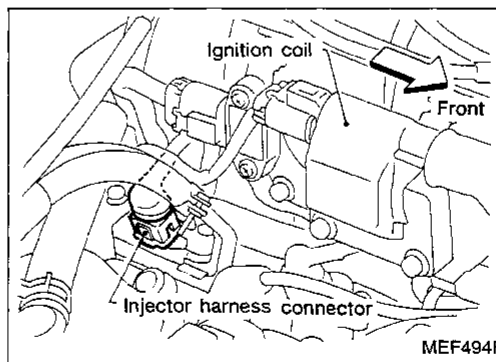
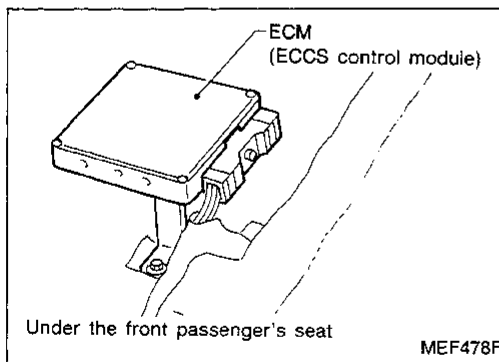


Diagnostic Procedure 35

INJECTOR CIRCUIT (Diagnostic trouble code No. 51)  (MALFUNCTION INDICATOR LAMP ITEM)

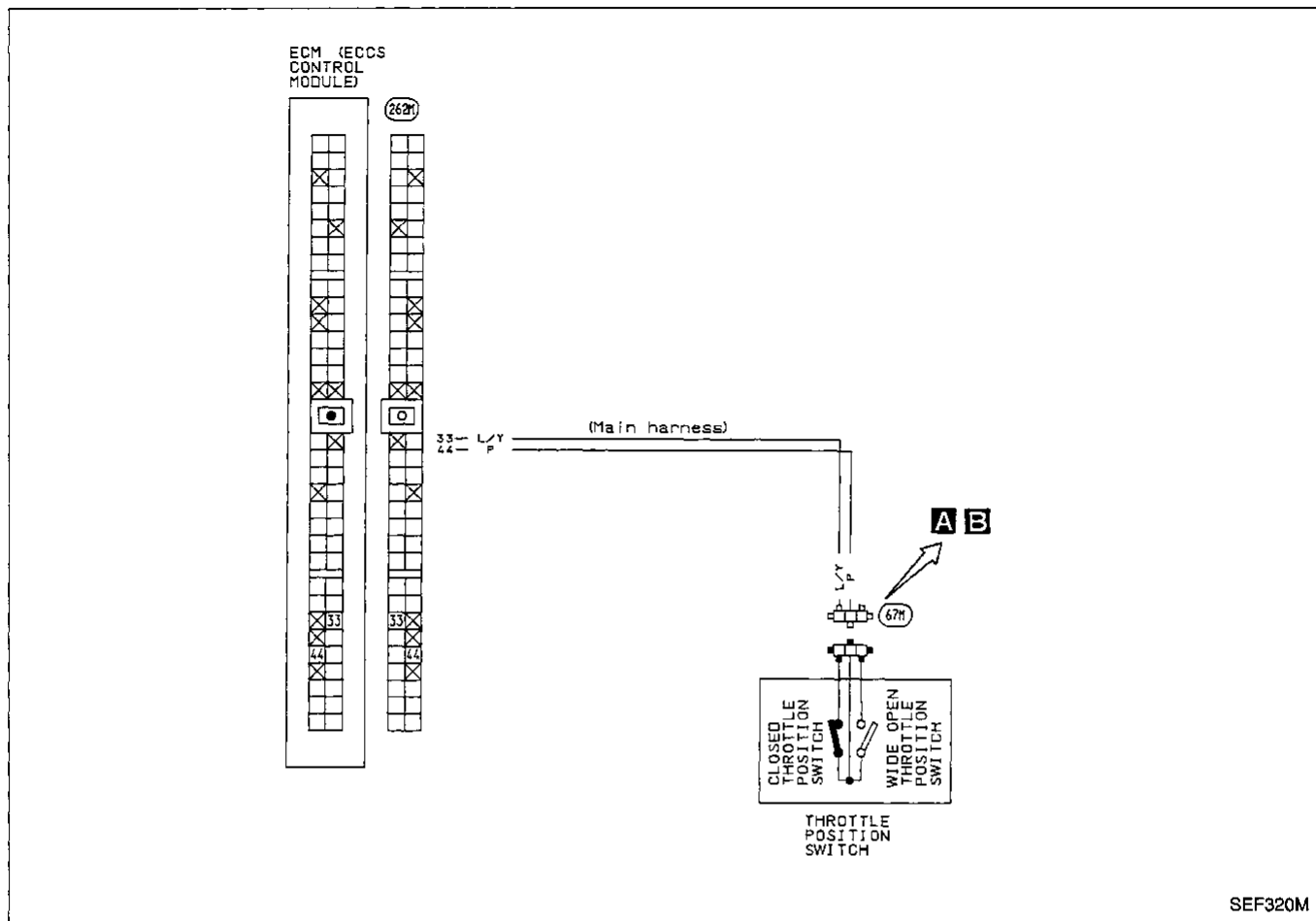


Harness layout

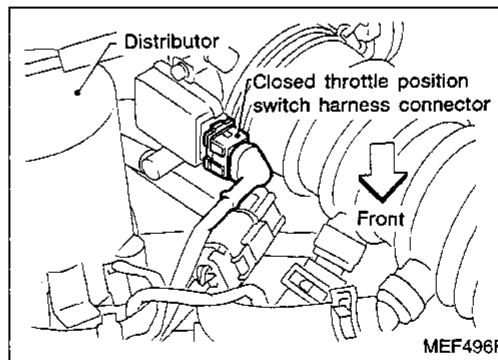
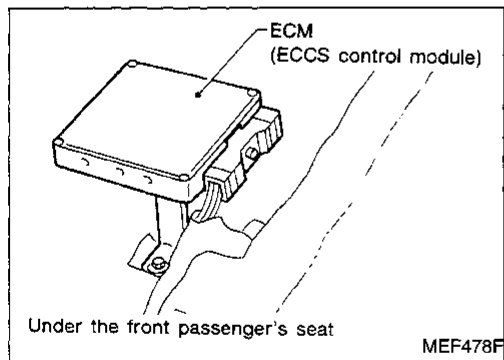


Diagnostic Procedure 36

CLOSED THROTTLE POSITION SWITCH (Switch ON/OFF diagnostic item)

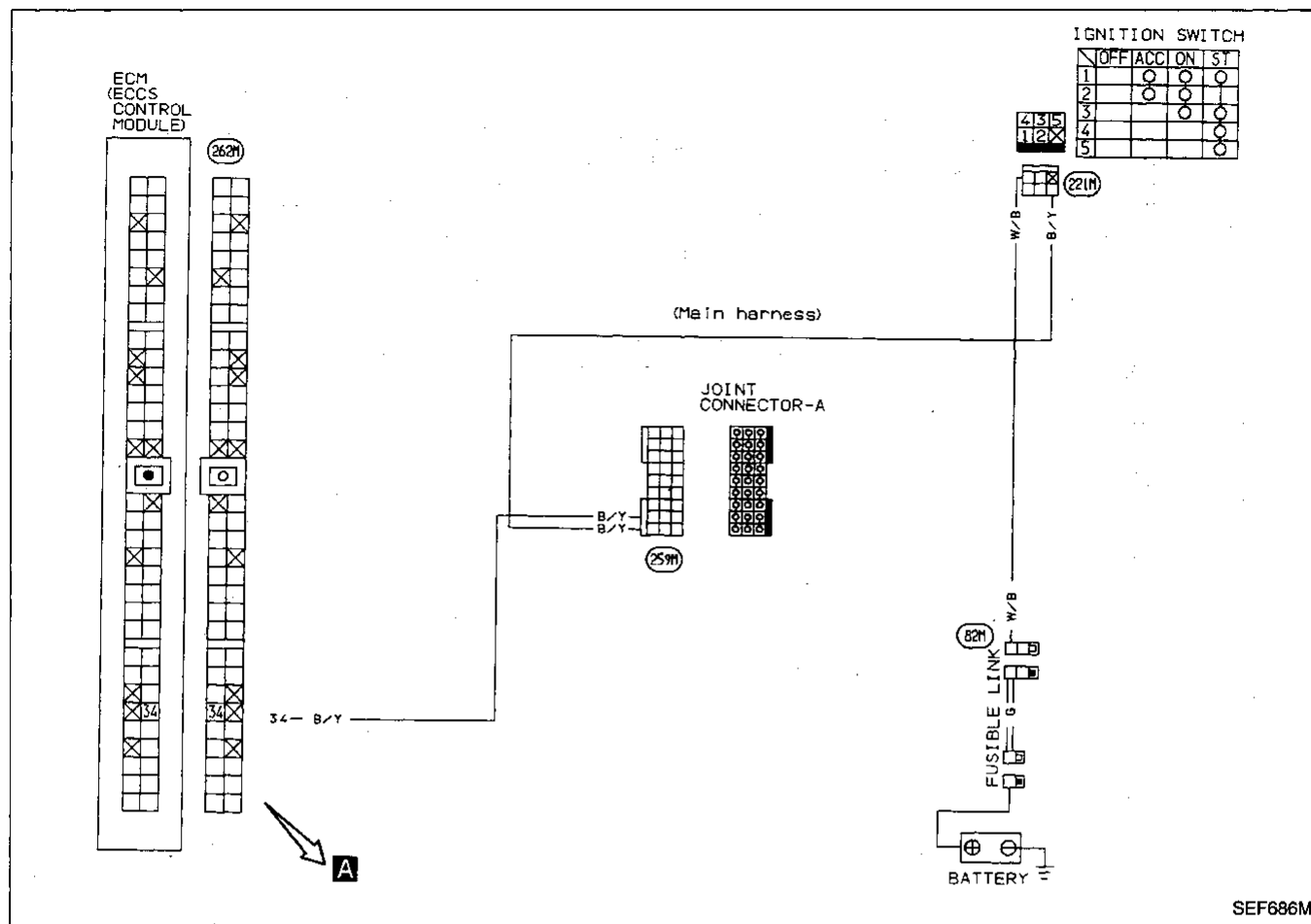


Harness layout

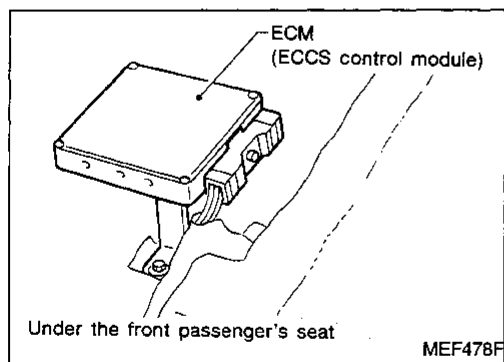


Diagnostic Procedure 37

START SIGNAL (Switch ON/OFF diagnostic item)

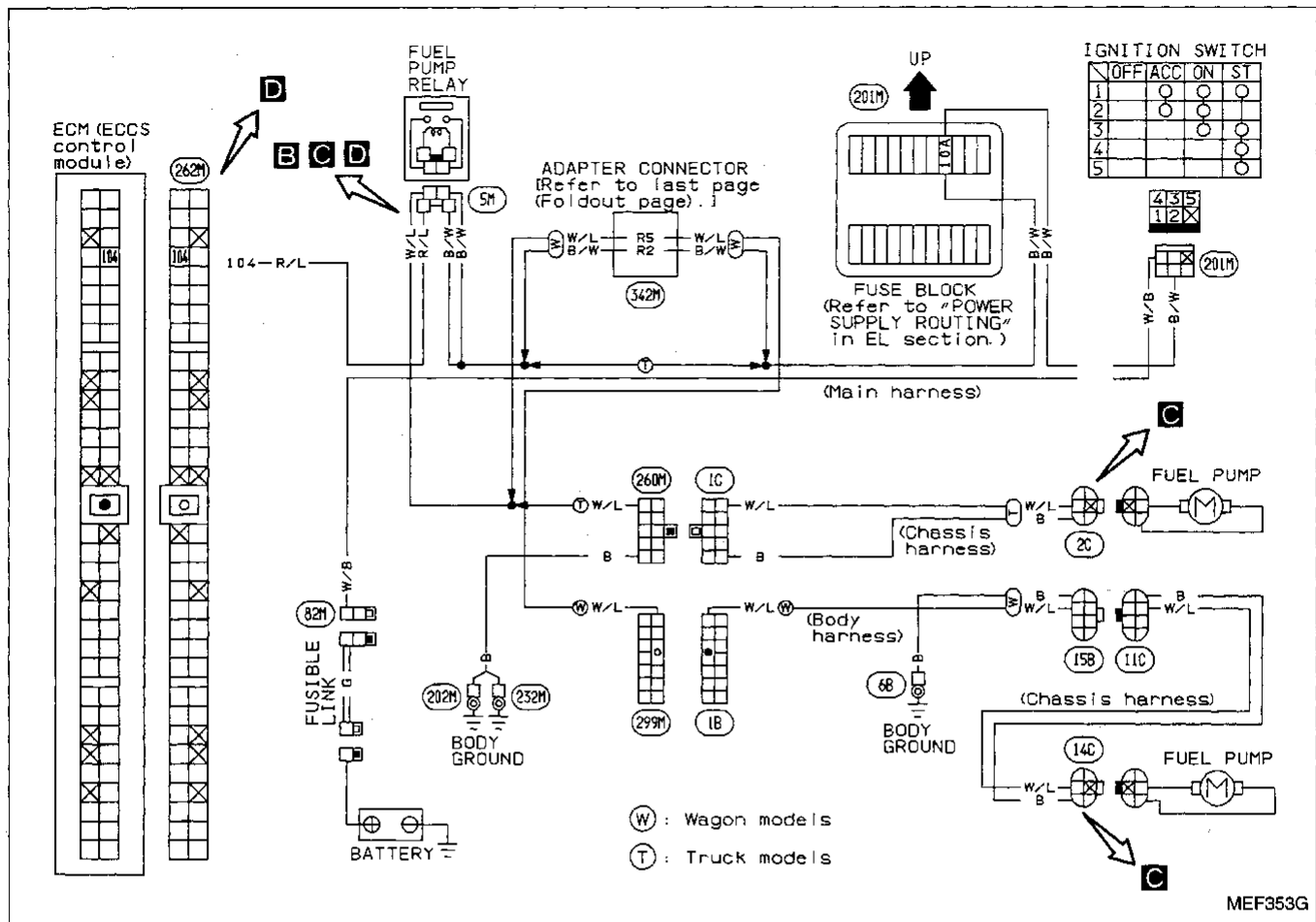


Harness layout

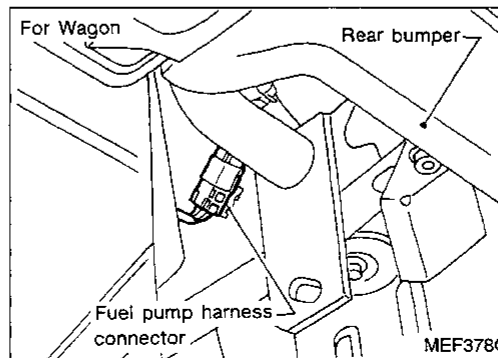
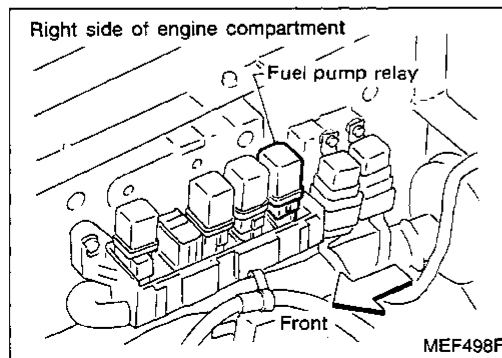
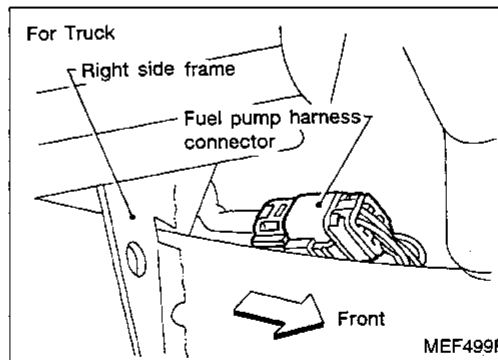
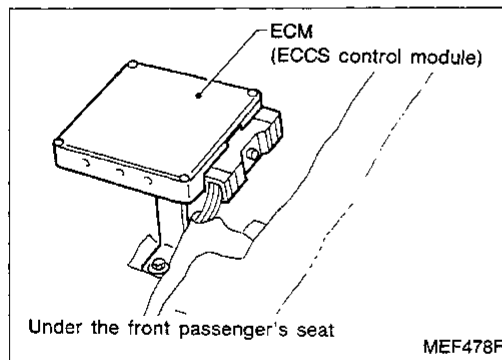


Diagnostic Procedure 38

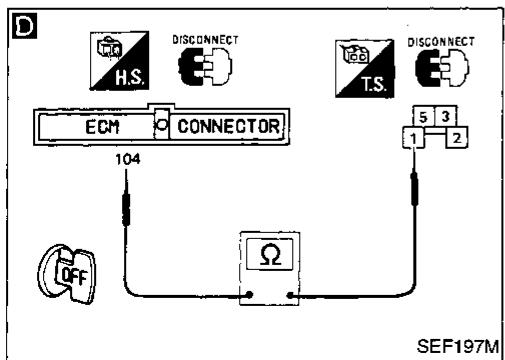
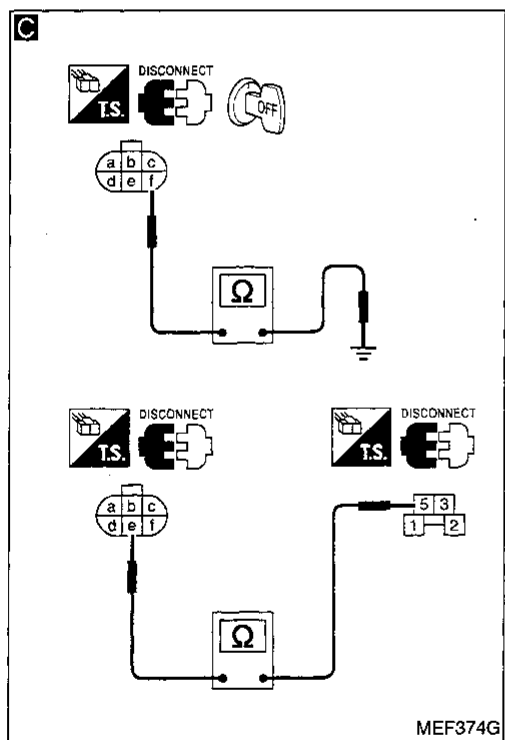
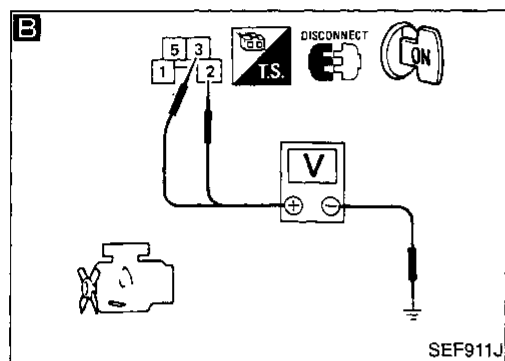
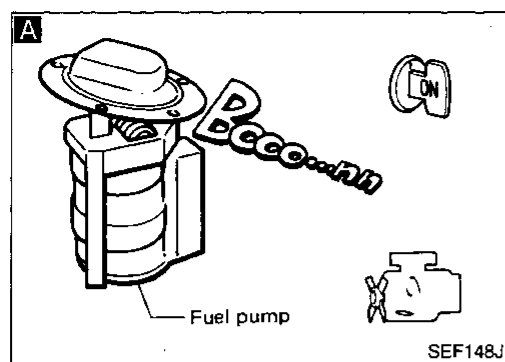
FUEL PUMP (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 38 (Cont'd)



INSPECTION START

A

CHECK OVERALL FUNCTION.

- 1) Turn ignition switch "ON".
- 2) Listen to fuel pump operating sound.

Fuel pump should operate for 5 seconds after ignition switch is turned "ON".

OK

INSPECTION END

NG

B

CHECK POWER SUPPLY.

- 1) Turn ignition switch "OFF".
- 2) Disconnect fuel pump relay.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminals ②, ③ and ground.

Voltage: Battery voltage

NG

Check the following.

- Adapter connector ③41M, ③42M (Wagon models)
- 10A fuse
- Harness continuity between fuse switch and fuel pump relay

If NG, repair harness or connectors.

OK

C

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect fuel pump harness connector.
- 3) Check harness continuity between terminal ① and body ground, terminal ⑤ and terminal ⑤.

Continuity should exist.

NG

Check the following.

- Adapter connector ③41M, ③42M (Wagon models)
- Harness connectors ②99M, ①B, ①5B, ①1C (Wagon models)
- Harness connectors ②60M, ①C (Truck models)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.

OK

D

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ①04 and terminal ①.

Continuity should exist.

NG

Repair harness or connectors.

OK

CHECK COMPONENTS
(Fuel pump and fuel pump relay).
Refer to "Electrical Components Inspection".

NG

Replace malfunctioning component(s).

OK

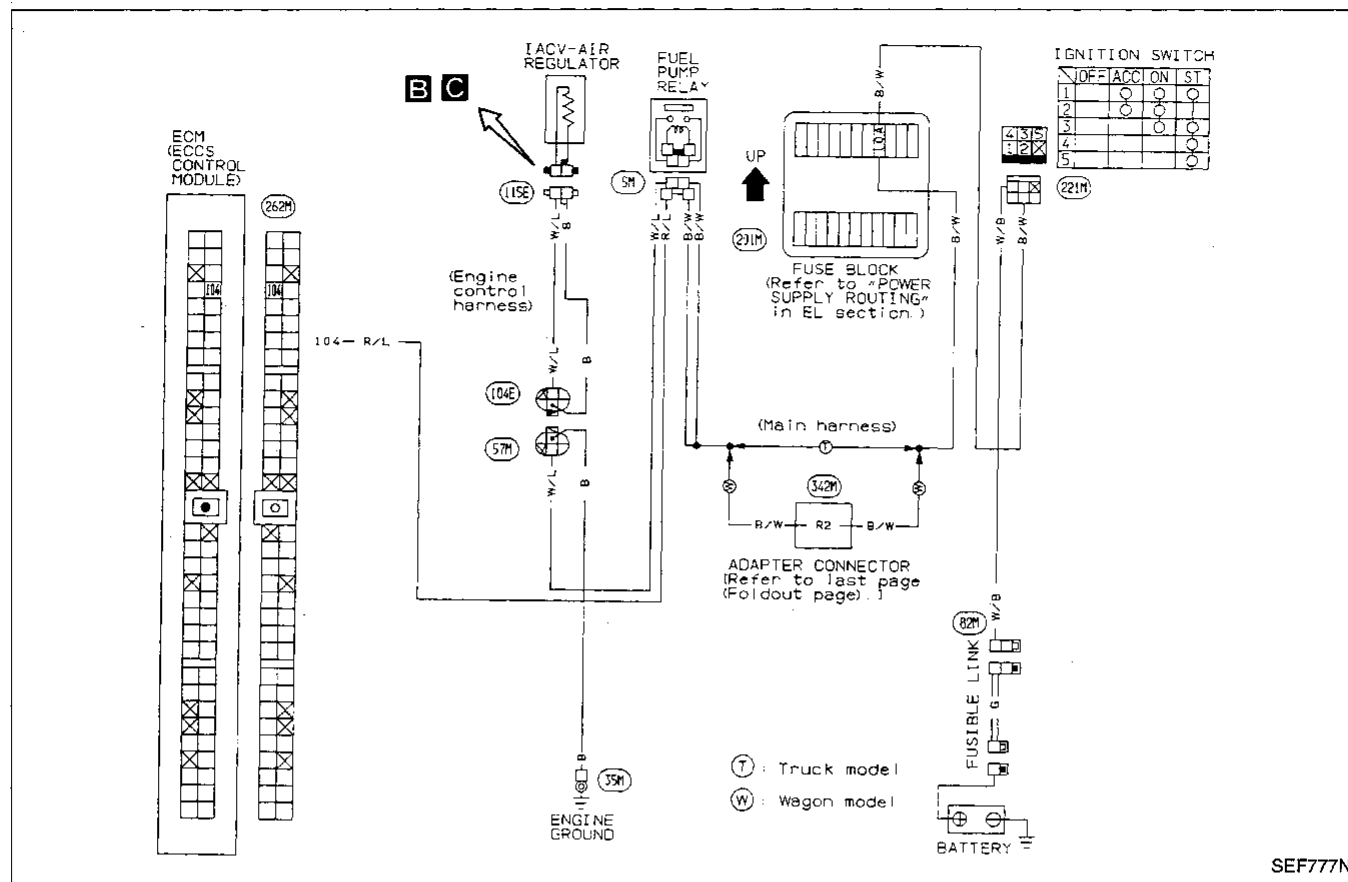
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

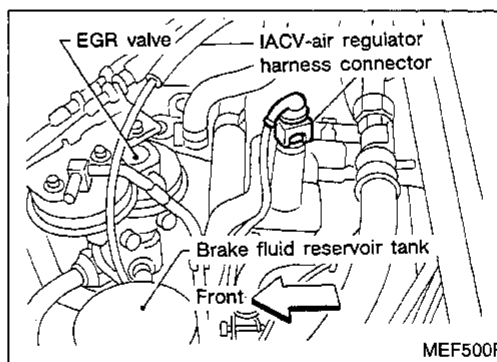
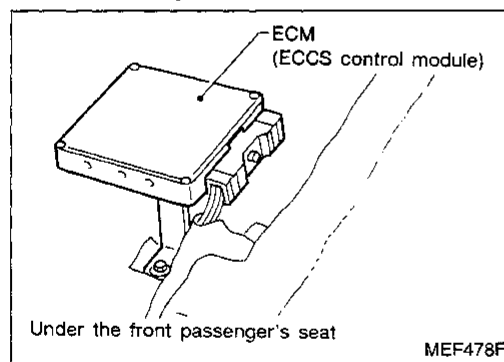
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 39

IACV-AIR REGULATOR (Not self-diagnostic item)

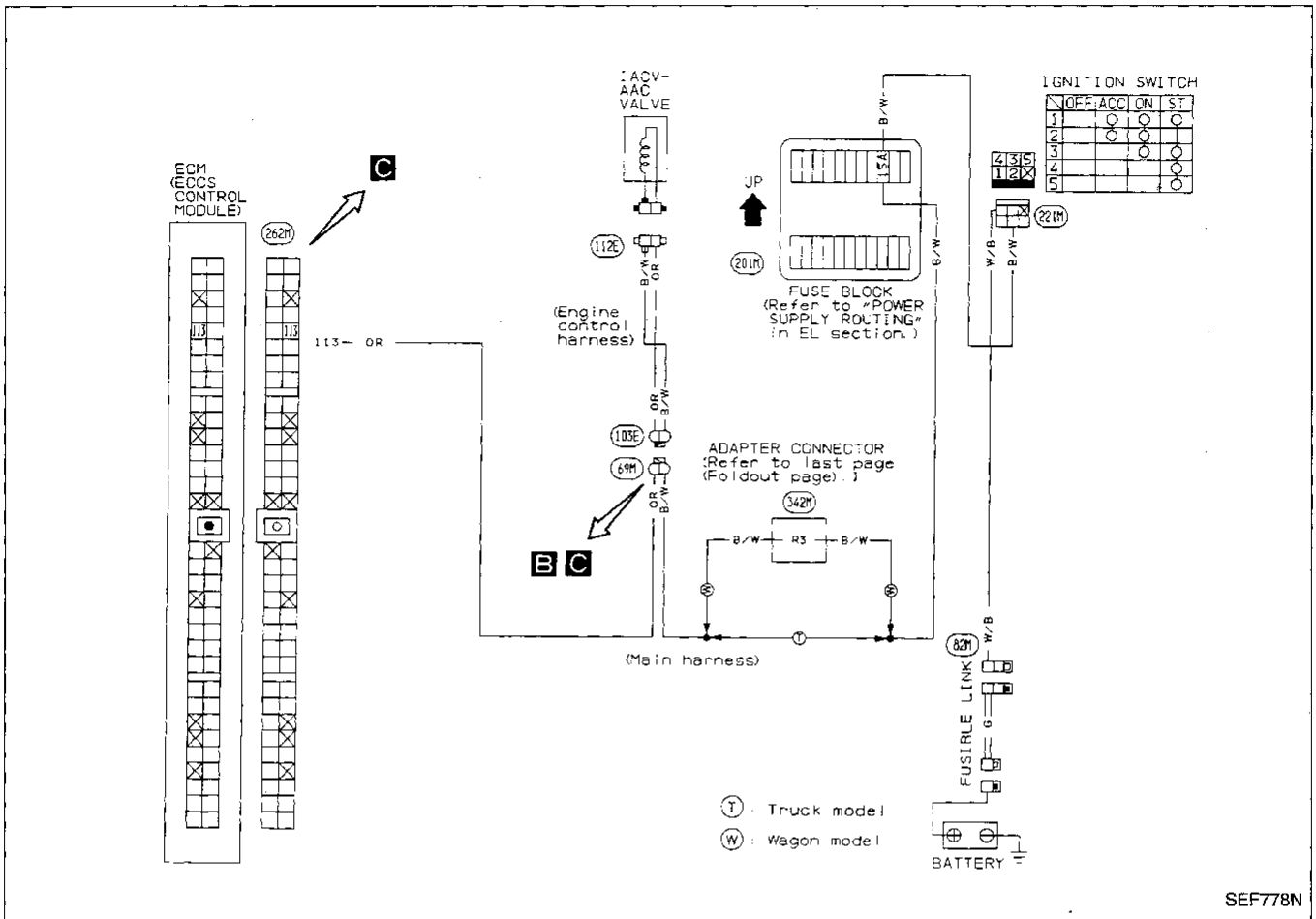


Harness layout

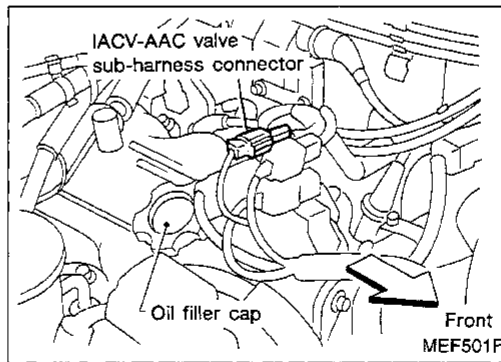
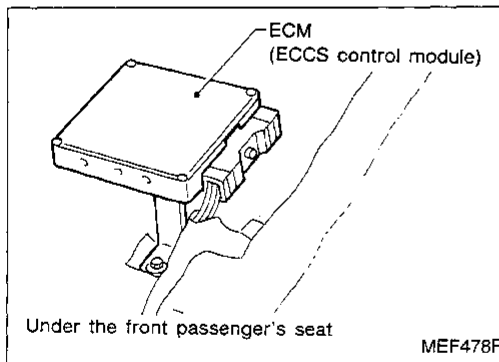


Diagnostic Procedure 40

IACV-AAC VALVE (Not self-diagnostic item)

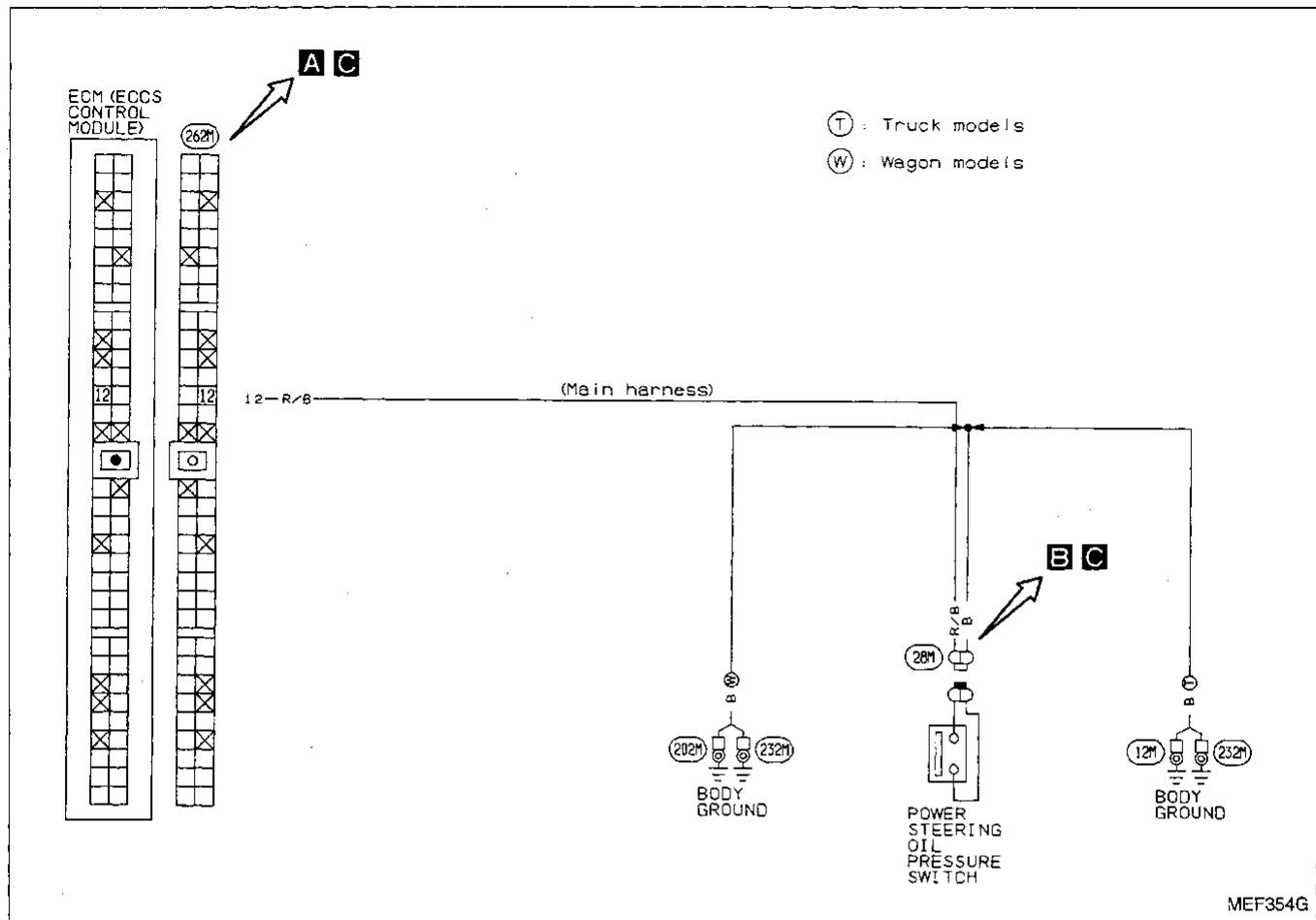


Harness layout

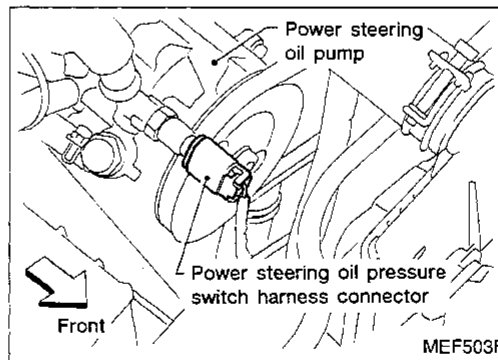
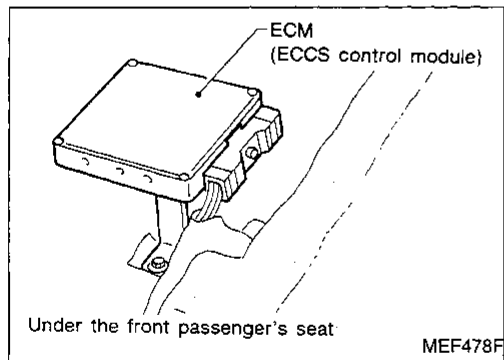


Diagnostic Procedure 41

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

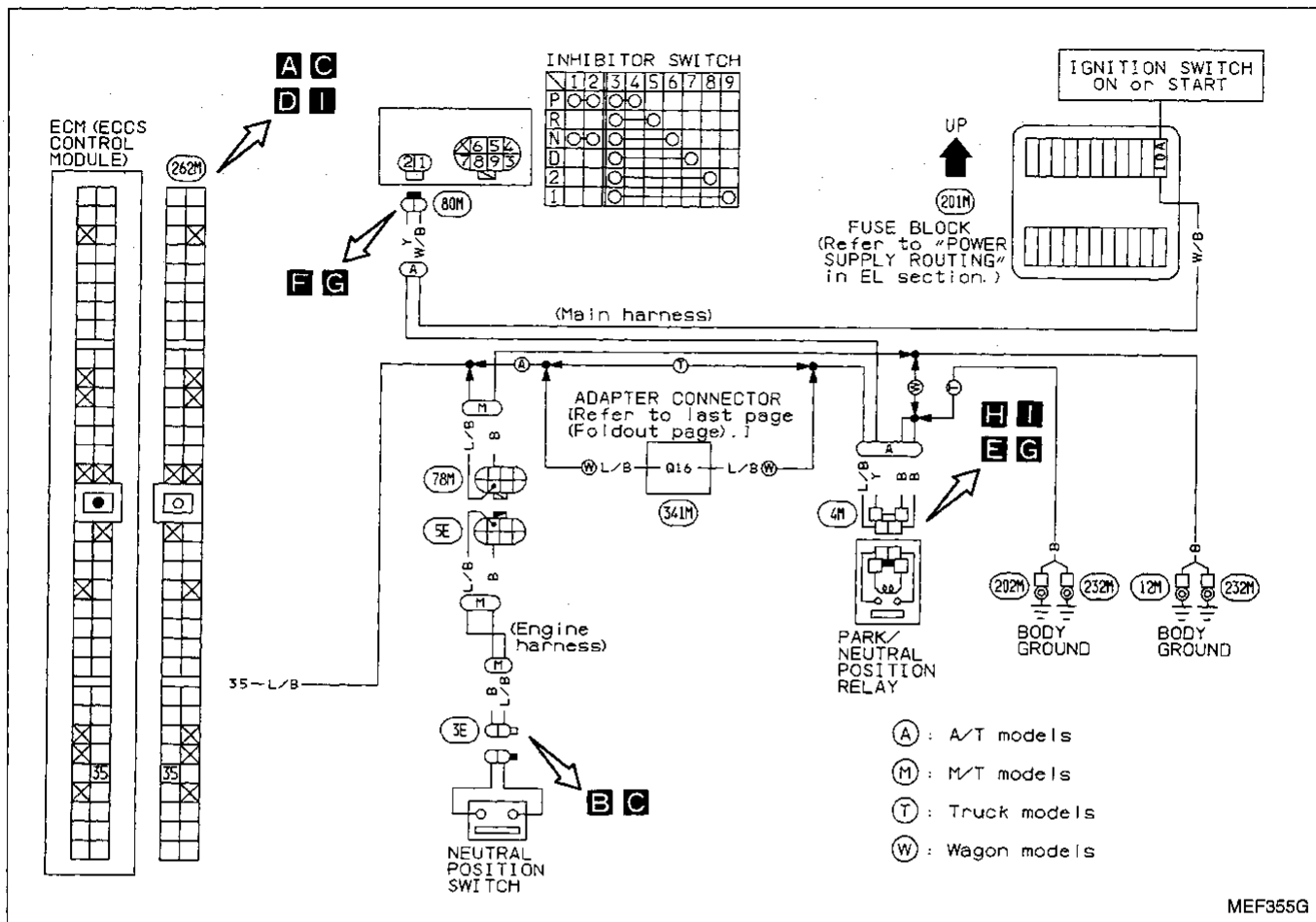


Harness layout

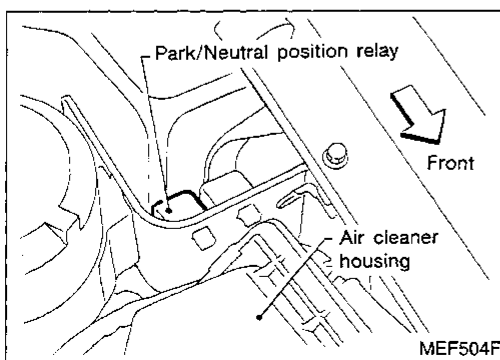
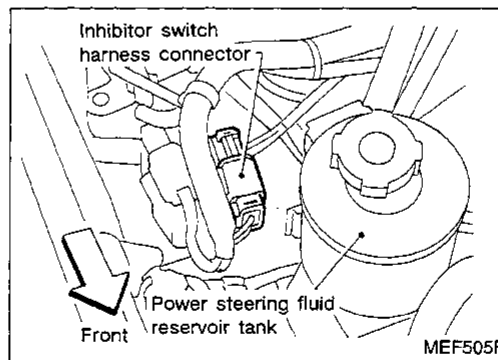
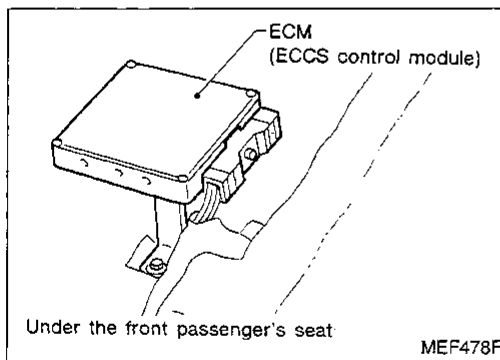


Diagnostic Procedure 42

NEUTRAL POSITION/INHIBITOR SWITCH (Not self-diagnostic item)



Harness layout



Electrical Components Inspection

ECM HARNESS CONNECTOR TERMINAL LAYOUT

101	102	103	104	105	106	107	108	1	2	3	4	5	6	×		×	16	17	18	19	20	21	22	31	32	33	34	35	36	37	38	39
109	110	×	112	113	114	115	116	8	×	×	11	12	13	×		23	24	25	×	27	28	×	30	×	41	×	×	44	×	46	47	48



CONNECT



AEC671

Electrical Components Inspection (Cont'd)

ECM Inspection table

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA	
1	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V	GI MA EM
		Engine is running. └ Engine speed is 2,000 rpm.	1.0 - 1.3V	LC
2	Tachometer	Engine is running. └ Idle speed	Approximately 1.0V	EF & EC
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 4V	FE
3	Ignition check	Engine is running. └ Idle speed	9 - 12V	CL MT
4	ECM power source (Self-shutoff)	Ignition switch "ON". Engine is running. └ Idle speed	0 - 1V	AT
		Ignition switch "OFF". └ A few seconds after turning ignition switch "OFF" and thereafter.	BATTERY VOLTAGE (11 - 14V)	TF PD
8	EGR temperature sensor	Engine is running. └ Idle speed	3.0 - 4.0V	FA
		Engine is running. (Racing) └ After warming up	0 - 1.0V	RA BR
11	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0 - 1.0V	ST
		Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)	BF HA
12	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	Approximately 0V	EL
		Engine is running. └ Steering wheel is not being turned.	Approximately 5V	IDX

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
16	Mass air flow sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine coolant temperature.
19	Heated oxygen sensor	Engine is running. └ After warming up sufficiently.	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.4 - Approximately 4V Output voltage varies with the throttle valve opening angle.
22 30	Camshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	0.2 - 0.5V
27	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
28	Throttle opening signal	Ignition switch "ON"	0.3 - Approximately 3V
31	Camshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 3.0V
33	Closed throttle position switch (⊖ side)	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 8 - 10V
		Ignition switch "ON" └ Throttle valve: Any position except idle position	0V
34	Start signal	Cranking	8 - 12V
35	Neutral position switch & Inhibitor switch	Ignition switch "ON" └ Neutral position/Parking	0V
		Ignition switch "ON" └ Except the above gear position	Approximately 5V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0V
		Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
44	Closed throttle position switch (⊕ side)	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 9 - 10V
		Ignition switch "ON" └ Throttle valve: Except idle position	BATTERY VOLTAGE (11 - 14V)
46	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
105	Injector No. 5		
110	Injector No. 2		
112	Injector No. 4		
114	Injector No. 6		

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

BF

HA

EL

IDX

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed (Jack up drive wheels and set shift lever to 1st position.)	0.7 - 0.9V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm. (Jack up drive wheels and set shift lever to 1st position.)	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Engine speed is above 3,100 rpm. (A/T model) Engine speed is above 2,600 rpm. (M/T model) (Jack up drive wheels and set shift lever to 1st position.)	0.8 - 0.9V
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	0.7 - 0.9V
		Engine is running. Ignition switch "ON" └ 5 seconds after turning ignition switch "ON" and thereafter.	BATTERY VOLTAGE (11 - 14V)
106	Heated oxygen sensor heater	Engine is running. └ Engine speed is below 4,200 rpm.	Approximately 0V
		Engine is running. └ Engine speed is above 4,200 rpm.	BATTERY VOLTAGE (11 - 14V)
113	IACV-AAC valve	Engine is running. └ Idle speed	7 - 10V
		Engine is running. └ Steering wheel is being turned. └ Air conditioner is operating. └ Rear defogger is "ON". └ Headlamps are in high position.	4 - 7V

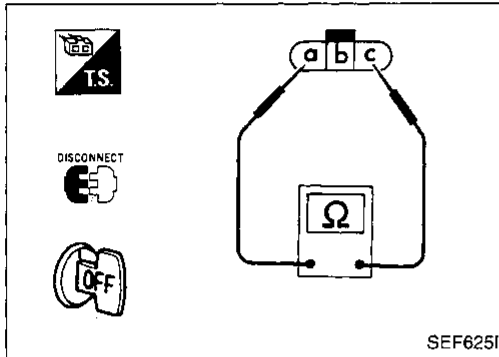
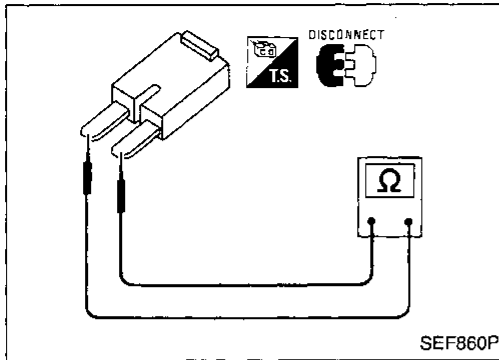
Electrical Components Inspection (Cont'd)

RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals.

Resistance: Approximately 2.2Ω

If NG, replace resistor.



HEATED OXYGEN SENSOR

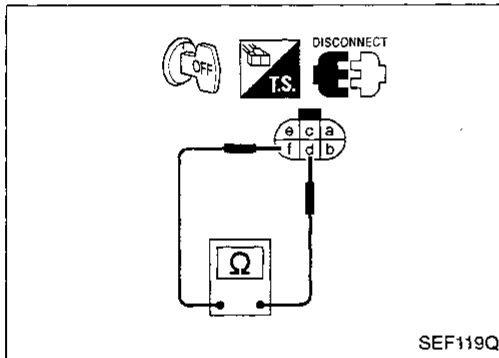
Refer to "Diagnostic Procedure 30".

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals (a) and (c)

Resistance: 3 - $1,000\Omega$

If NG, replace heated oxygen sensor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals (e) and (f).

Resistance: 0.2 - 5Ω

If NG, replace fuel pump.

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

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ST

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HA

EL

IDX

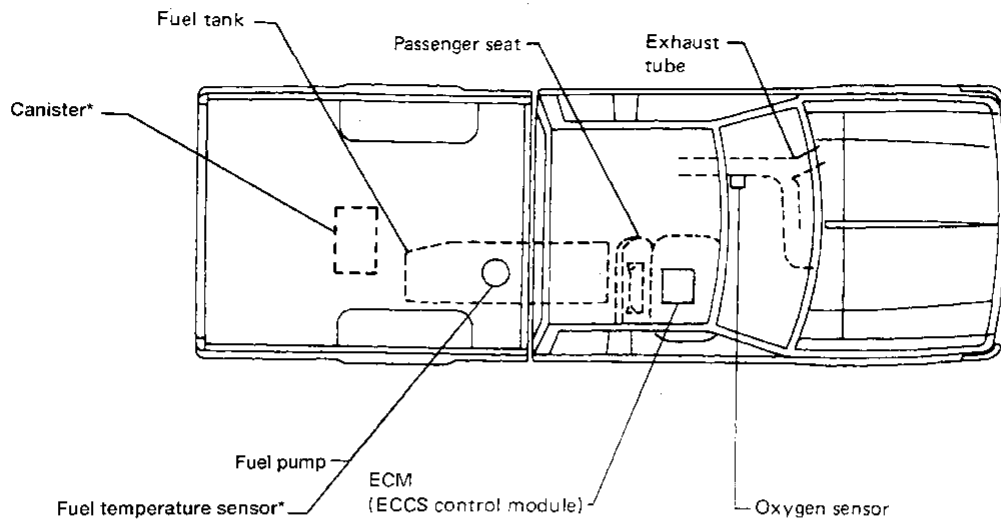
Inspection and Adjustment**FUEL PUMP**

Resistance	Ω	0.2 - 5
------------	----------	---------

HEATED OXYGEN SENSOR HEATER

Resistance	Ω	3 - 1,000
------------	----------	-----------

ECCS Component Parts Location



*2WD M/T models for California

AEC644

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

BF

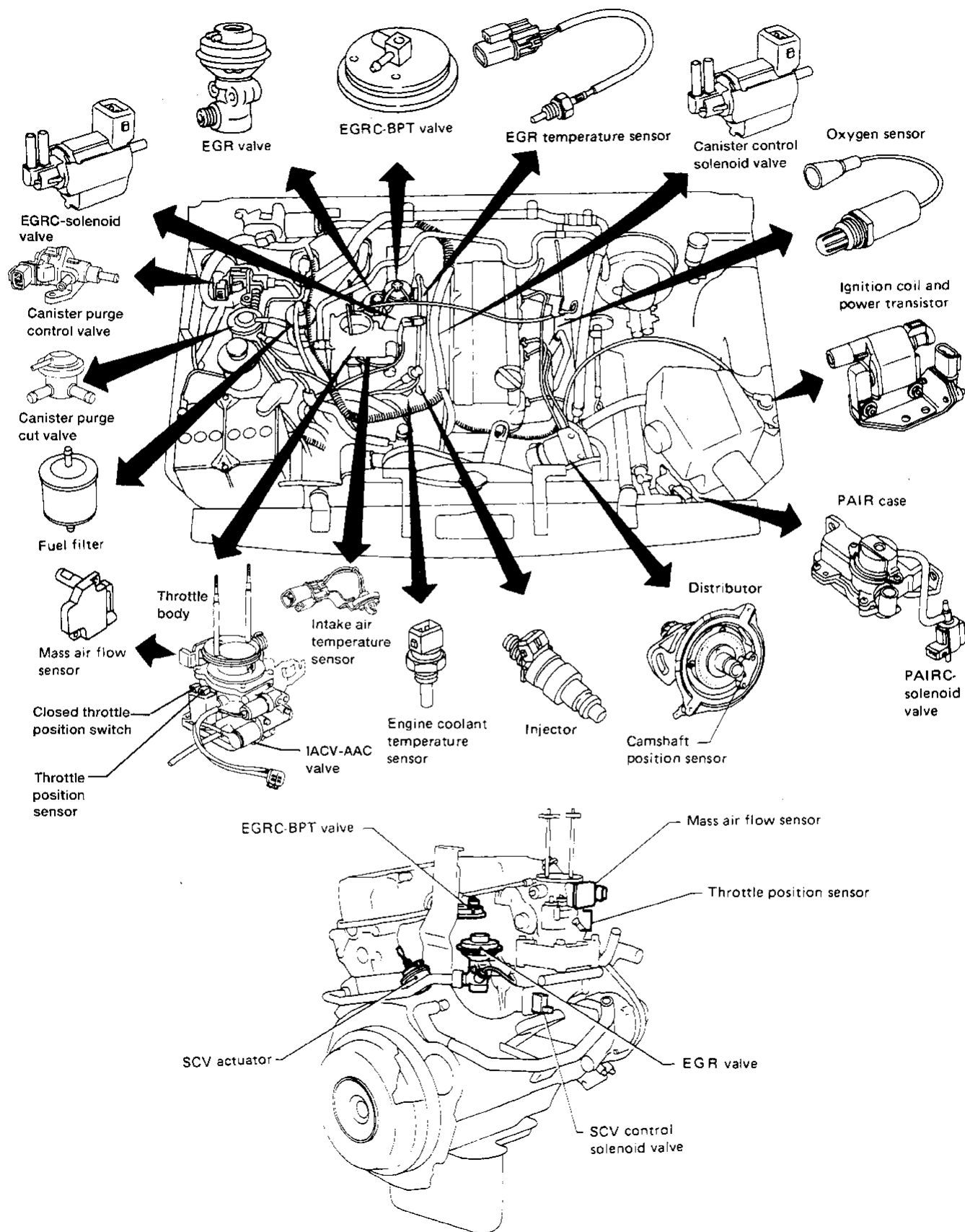
HA

EL

IDX

ECCS Component Parts Location (Cont'd)

2WD M/T MODELS FOR CALIFORNIA



ECCS Component Parts Location (Cont'd)

EXCEPT 2WD M/T MODELS FOR CALIFORNIA

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

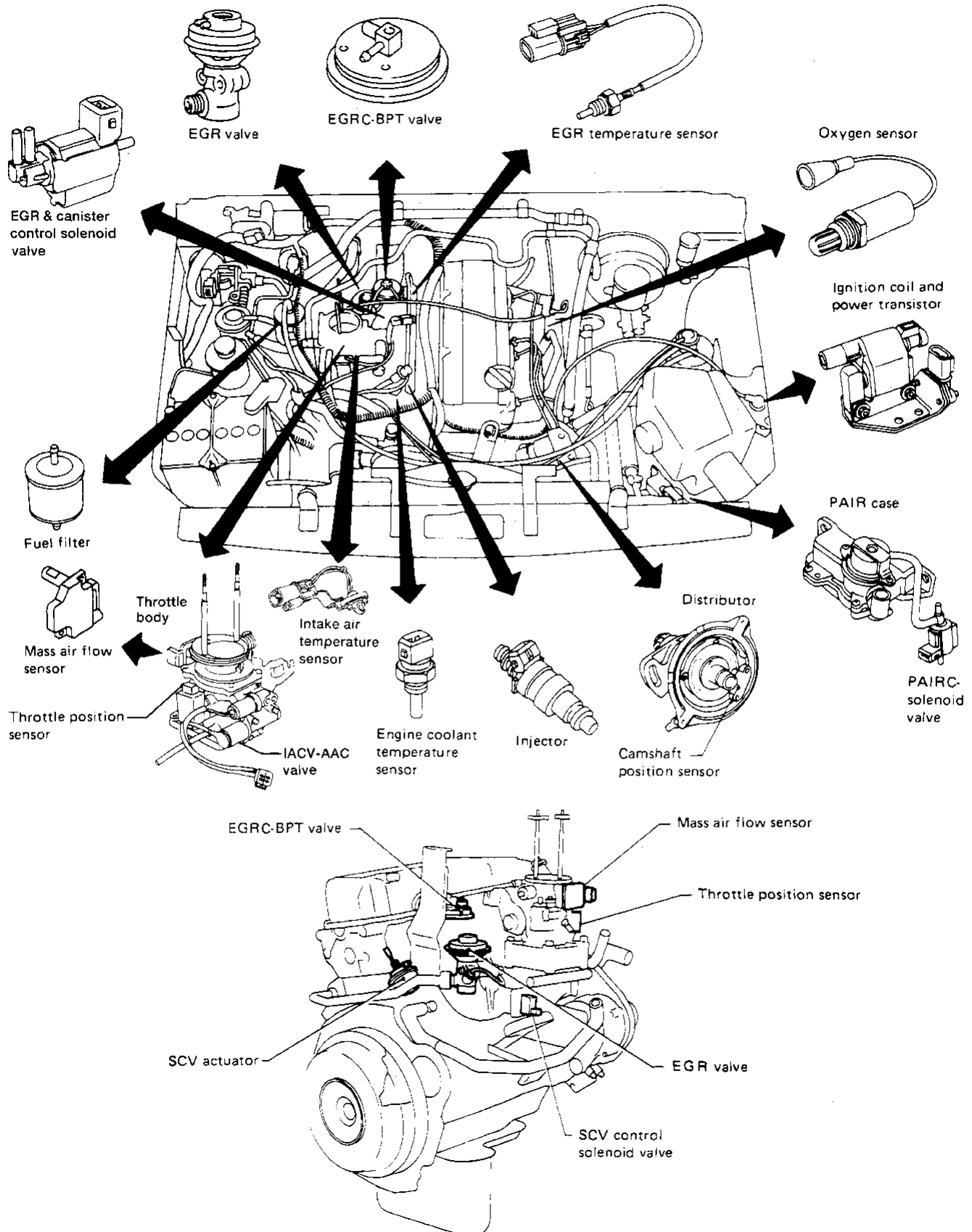
ST

BF

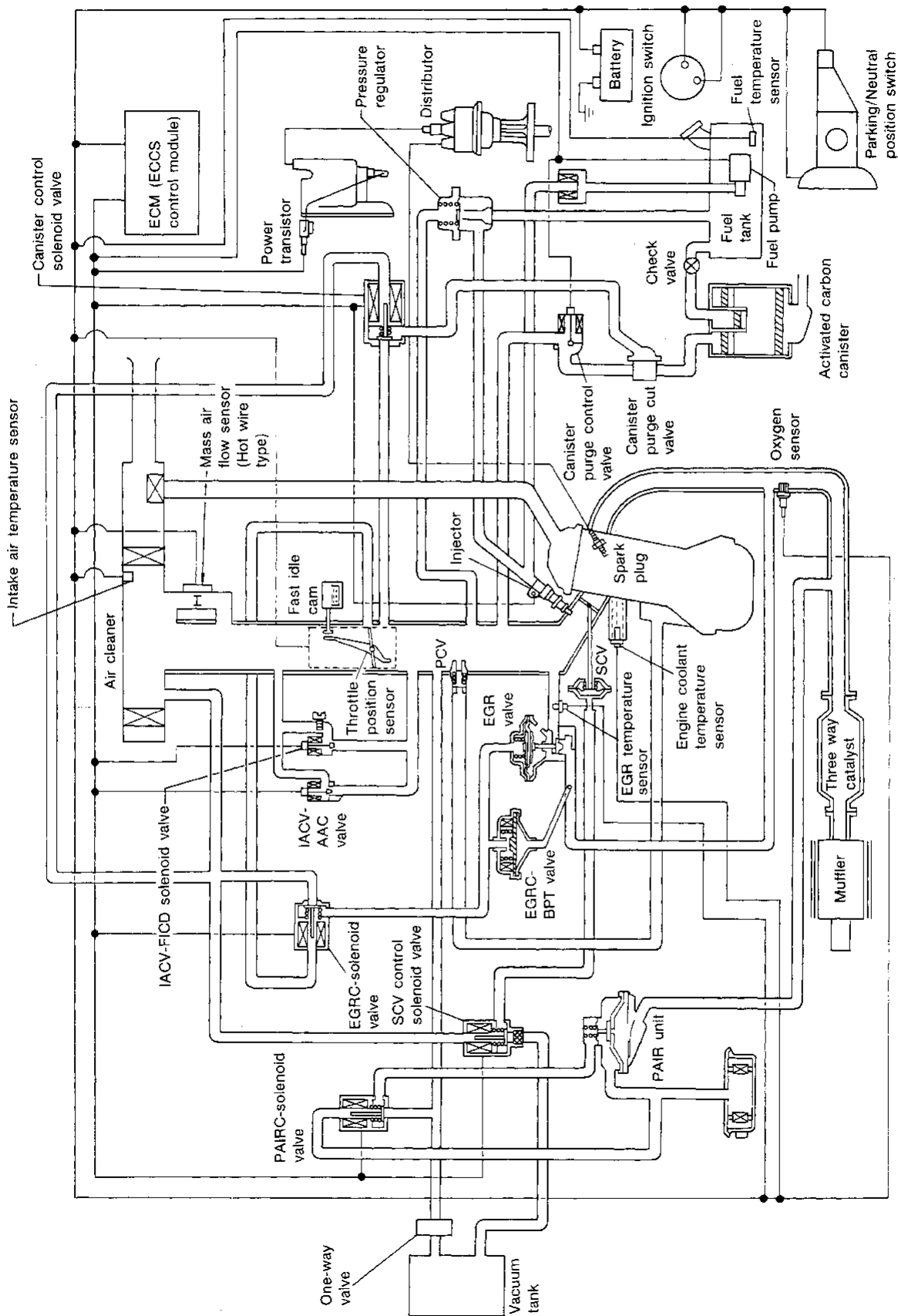
HA

EL

IDX

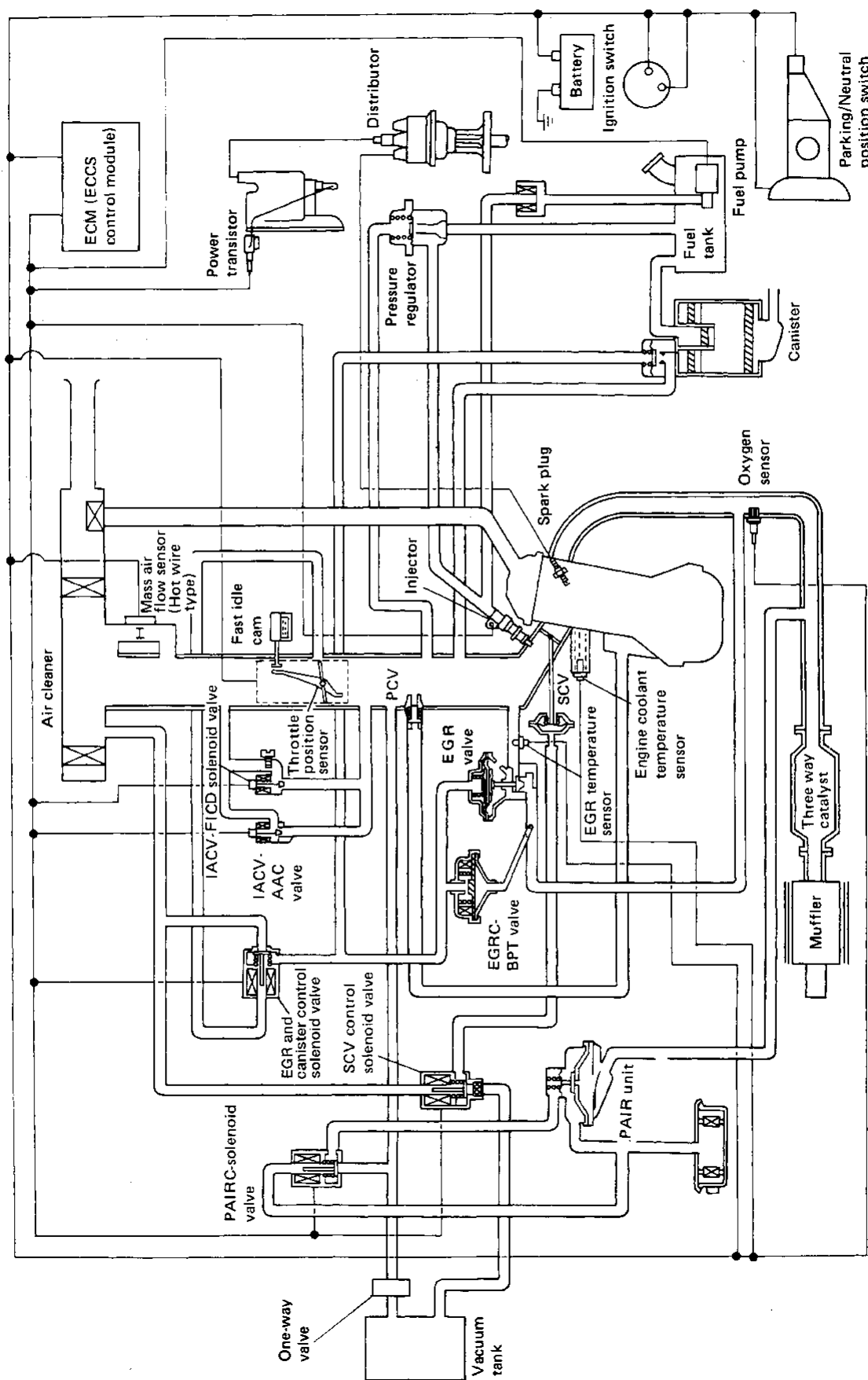


System Diagram (2WD M/T models for California)



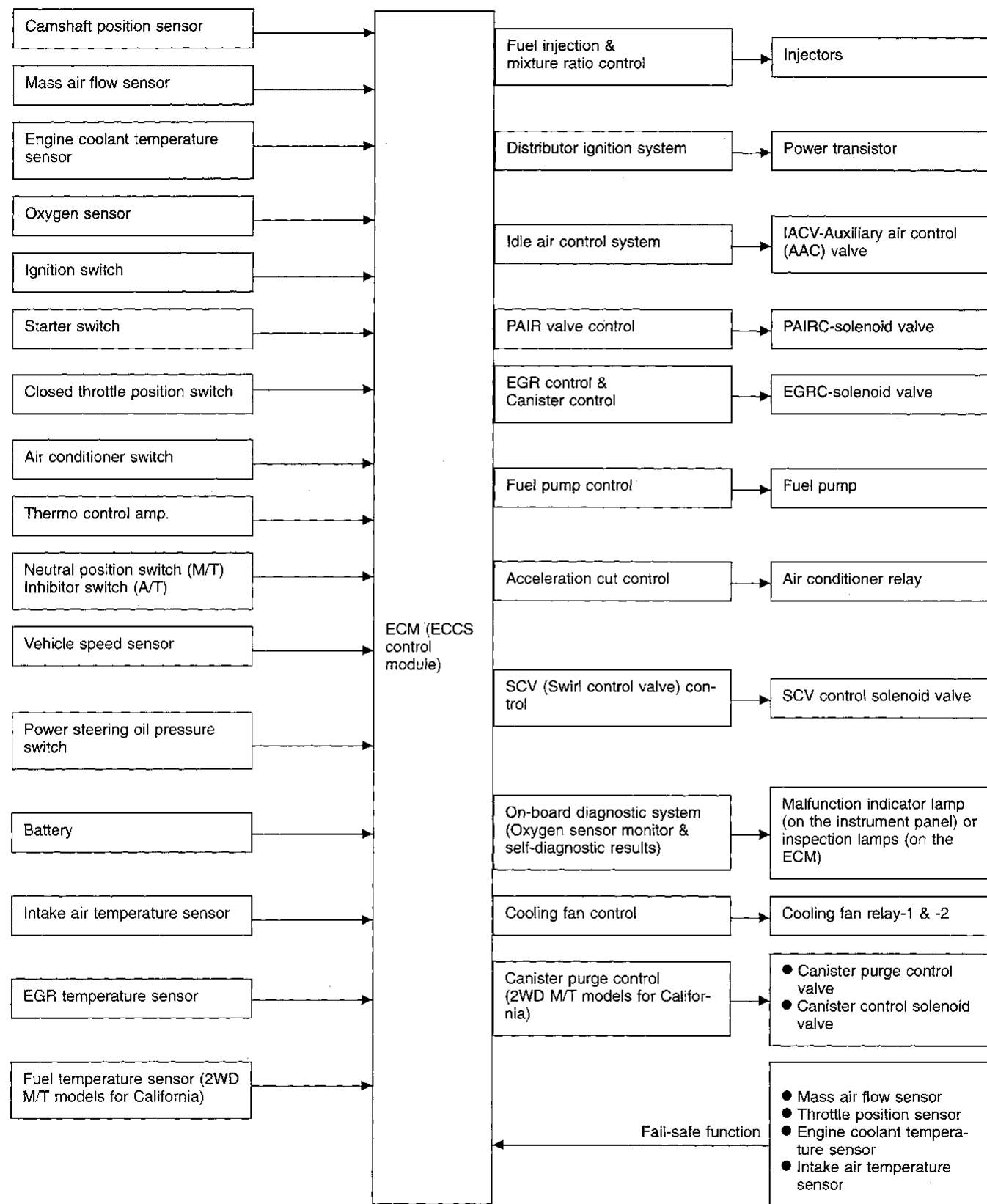
SEF125Q

System Diagram (Except 2WD M/T models for California)

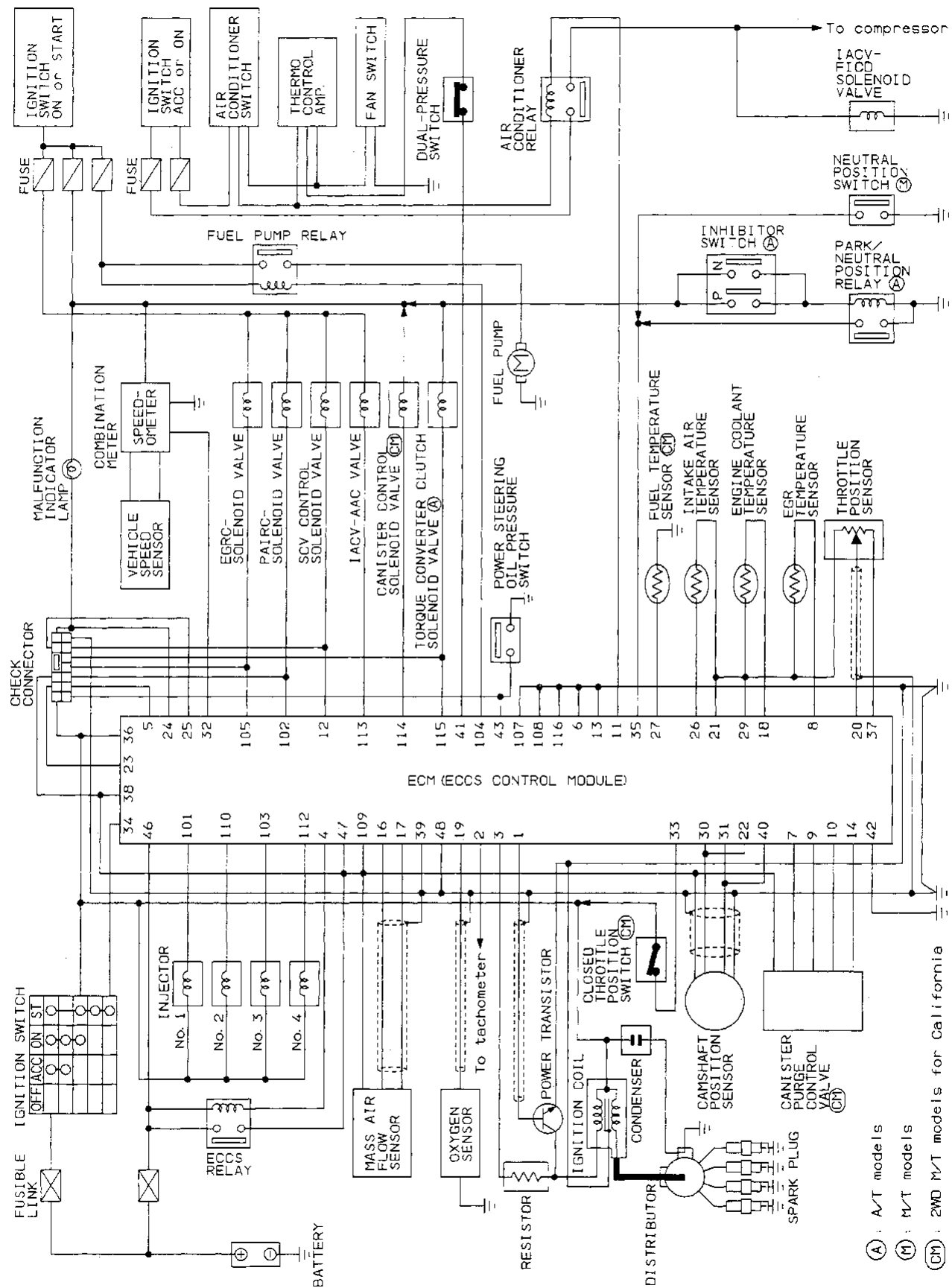


System Chart

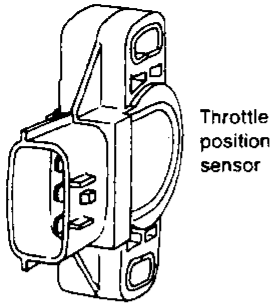
ECCS CONTROL SYSTEM



Circuit Diagram



Except 2WD M/T models for California



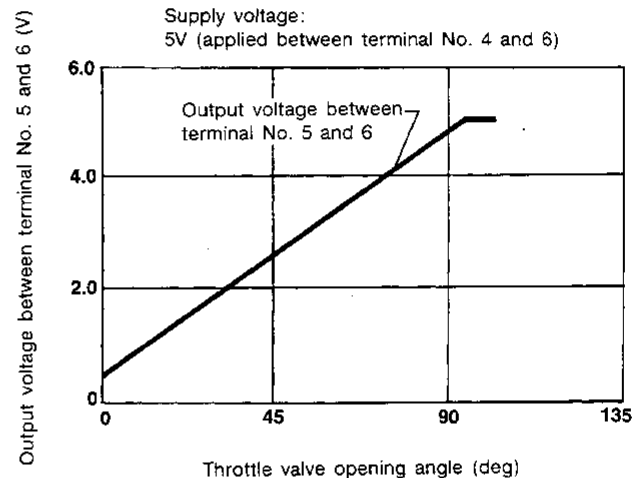
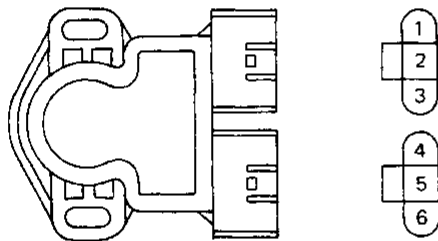
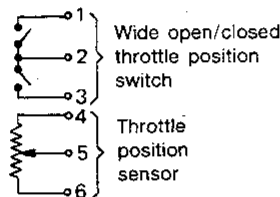
AEC654

Throttle Position Sensor (TPS) & Soft Closed Throttle Position (CTP) Switch

The throttle position sensor responds to the throttle position which, in turn, is determined by accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into an output voltage, and transmits it to the ECM. The sensor also detects the opening and closing speed of the throttle valve and feeds this information as a voltage signal to the ECM too.

Closed throttle position is determined by the ECM. This positioning system is called the "soft closed throttle position switch" and controls engine operations such as fuel cut.

2WD M/T models for California

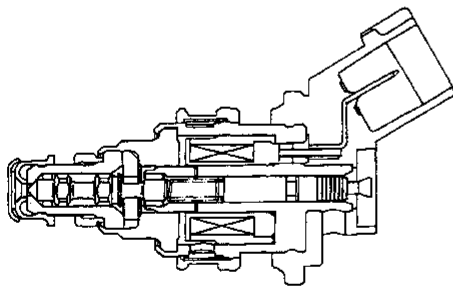


SEF232Q

Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration.

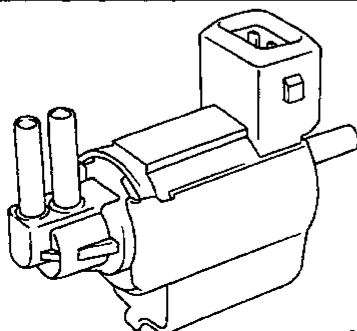
Brass wire is used in the injector coil and thus the resistance is higher than a conventional injector.



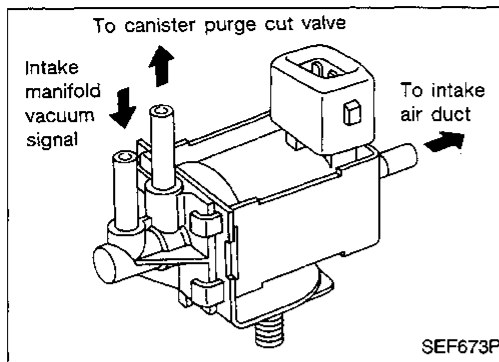
AEC646

EGR Control (EGRC)-Solenoid Valve

The EGR system is controlled only by the ECM. At both low- and high-speed engine speeds, the solenoid valve turns on and accordingly the EGR valve cuts the exhaust gas leading to the intake manifold.



SEF317I

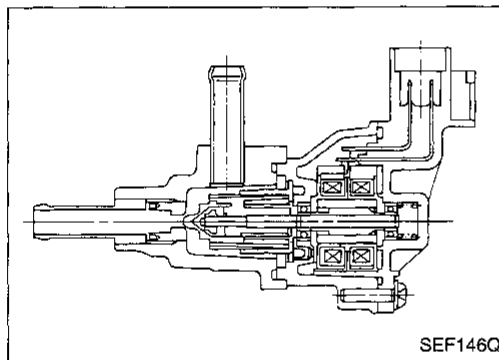


Canister Control Solenoid Valve

The canister control solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal (from the intake manifold to the canister purge cut valve) is cut. When the ECM sends an ON (ground) signal, the vacuum signal passes through the solenoid valve. The signal then reaches the canister purge cut valve.

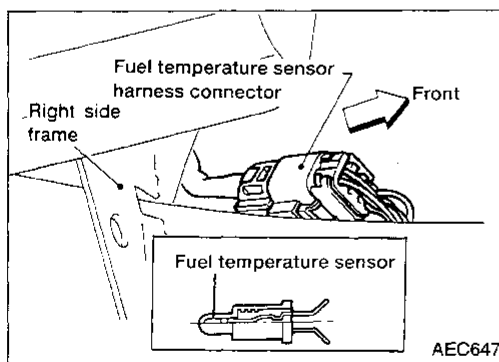
SCV Control Solenoid Valve

The SCV control solenoid valve cuts the intake manifold vacuum signal for swirl control valve. It responds to the ON/OFF signal from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger and feeds the vacuum signal to the swirl control valve actuator.



Canister Purge Control Valve

The canister purge control valve is operated by a step motor. This motor has four winding phases. It is actuated by the output pulse signal of the ECM which turns ON and OFF two windings each in sequence. Each time the valve opens or closes to change the flow rate, an ON pulse is issued. When no change in the flow rate is needed, the valve remains at a certain opening, hence no pulse signal is issued.

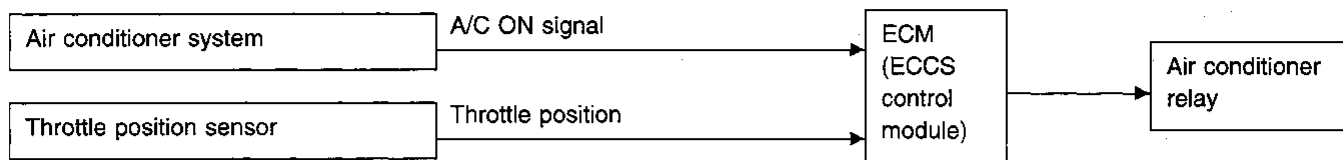


Fuel Temperature Sensor

The fuel temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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.

Air Conditioner Cut Control

INPUT/OUTPUT SIGNAL LINE



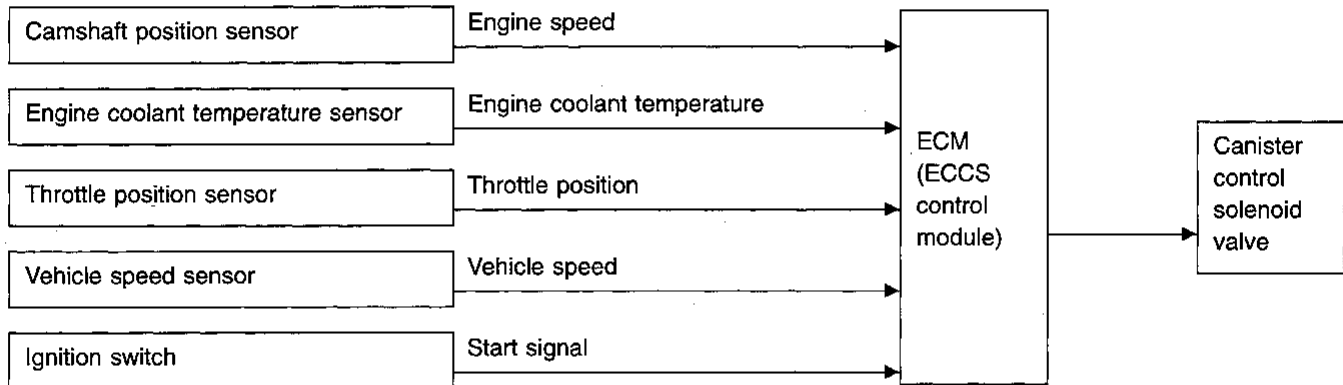
SYSTEM DESCRIPTION

When accelerator pedal is fully depressed, air conditioner is turned off for a few seconds.

This system improves acceleration when air conditioner is used.

Canister Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The system precisely cuts and controls the vacuum applied to the canister purge cut valve to suit engine operating conditions.

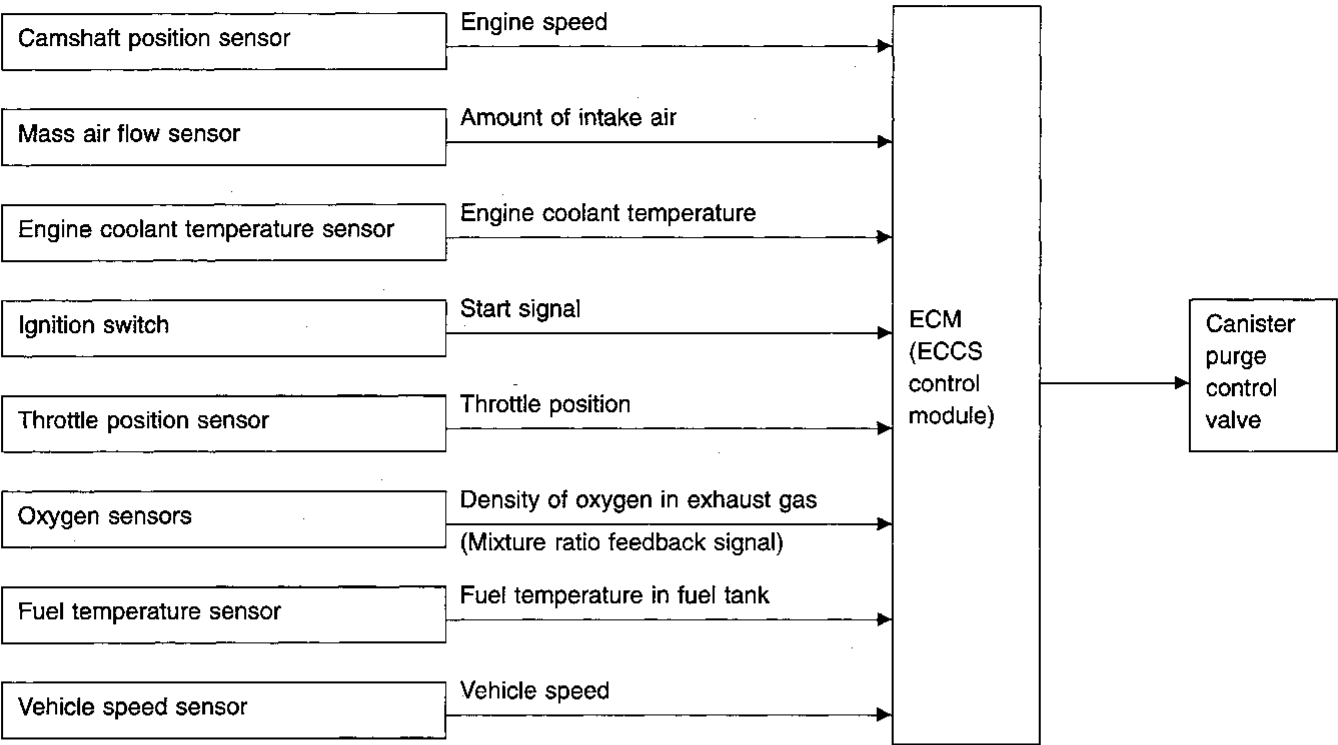
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current does not flow through the solenoid valve.

This causes the port vacuum to be discharged into the atmosphere so that the canister purge cut valve remains closed.

- 1) Start switch "ON"
- 2) Closed throttle position
- 3) Low and high engine coolant temperature
- 4) During deceleration
- 5) Engine stopped
- 6) Low vehicle speed

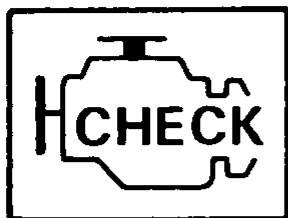
Canister Purge Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

This system controls flow rate of fuel vapor from canister. The canister purge control valve changes the opening of the vapor by-pass passage to control the flow rate. This valve is actuated by a step motor built inside in the axial direction corresponding to the ECM output pulses. The opening of the valve is varied to allow for optimum engine control. When the engine operates, the flow rate is proportionally regulated as the air flow increases.



MALFUNCTION INDICATOR LAMP

SEF177M

On-board Diagnostic System — Description

MALFUNCTION INDICATOR LAMP

This vehicle has a malfunction indicator lamp on the instrument panel. This light comes ON under the following conditions:

- 1) When ignition switch is turned "ON" (for bulb check).
- 2) When systems related to emission performance malfunction in Diagnostic Test Mode I (with engine running).
- **This malfunction indicator lamp always illuminates and is synchronous with red LED.**
- **Malfunction systems related to emission performance can be detected by on-board diagnostic system, and they are clarified as diagnostic trouble codes in Diagnostic Test Mode III.**
- 3) Malfunction indicator lamp will come "ON" only when malfunction is sensed.

The malfunction indicator lamp will turn off when normal operation is resumed. Diagnostic Test Mode III memory must be cleared as the contents remain stored.

Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module)
32	EGR function
33	Oxygen sensor circuit
35	EGR temperature sensor circuit
42	Fuel temperature sensor circuit (2WD M/T models for California)
43	Throttle position sensor circuit
45	Injector leak

On-board Diagnostic System — Diagnostic Test Mode III (Self-diagnostic Results)

The ECM constantly monitors the function of these sensors and actuators, regardless of ignition key position. If a malfunction occurs, the information is stored in the ECM and can be retrieved from the memory by turning on the diagnostic test mode selector, located on the side of the ECM. When activated, the malfunction is indicated by flashing a red and a green LED (Light Emitting Diode), also located on the ECM. Since all the self-diagnostic results are stored in the ECM's memory even intermittent malfunctions can be diagnosed.

A malfunction is indicated by the number of both red and green flashing LEDs. First, the red LED flashes and the green flashes follow. The red LED corresponds to units of ten and the green LED corresponds to units of one. For example, when the red LED flashes once and the green LED flashes twice, this signifies the number "12", showing that the mass air flow sensor signal is malfunctioning. All problems are classified by diagnostic trouble code numbers in this way.

- When the engine fails to start, crank it two or more seconds before beginning on-board diagnostic system.
- Read out self-diagnostic results first and then erase the malfunction records which are stored in the ECM memory. If it is erased, the on-board diagnostic system function for intermittent malfunctions will be lost.

DISPLAY DIAGNOSTIC TROUBLE CODE TABLE

Diagnostic trouble code No.	Detected items
11	Camshaft position sensor circuit
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
21	Ignition signal missing in primary coil
31	Engine control module (ECM)
32	EGR function
33	Oxygen sensor circuit
35	EGR temperature sensor circuit
41	Intake air temperature sensor circuit
42	Fuel temperature sensor circuit (2WD M/T models for California)
43	Throttle position sensor circuit
45	Injector leak
55	No malfunction in the above circuit

On-board Diagnostic System — Diagnostic Test Mode III (Self-diagnostic Results) (Cont'd)

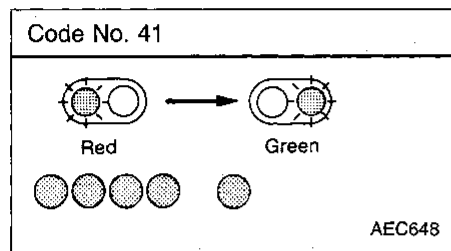
DECODING CHART

DISPLAY DIAGNOSTIC TROUBLE CODE

MALFUNCTIONING CIRCUIT OR PARTS

ECM SHOWS A MALFUNCTION SIGNAL WHEN THE FOLLOWING CONDITIONS ARE DETECTED.

INTAKE AIR TEMPERATURE SENSOR



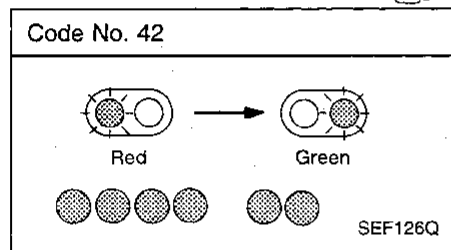
Intake air temperature sensor circuit

- Signal circuit is open or shorted. (Output voltage is too high or too low.)

SYSTEM INSPECTION

Refer to Diagnostic Procedure 32.

FUEL TEMPERATURE SENSOR



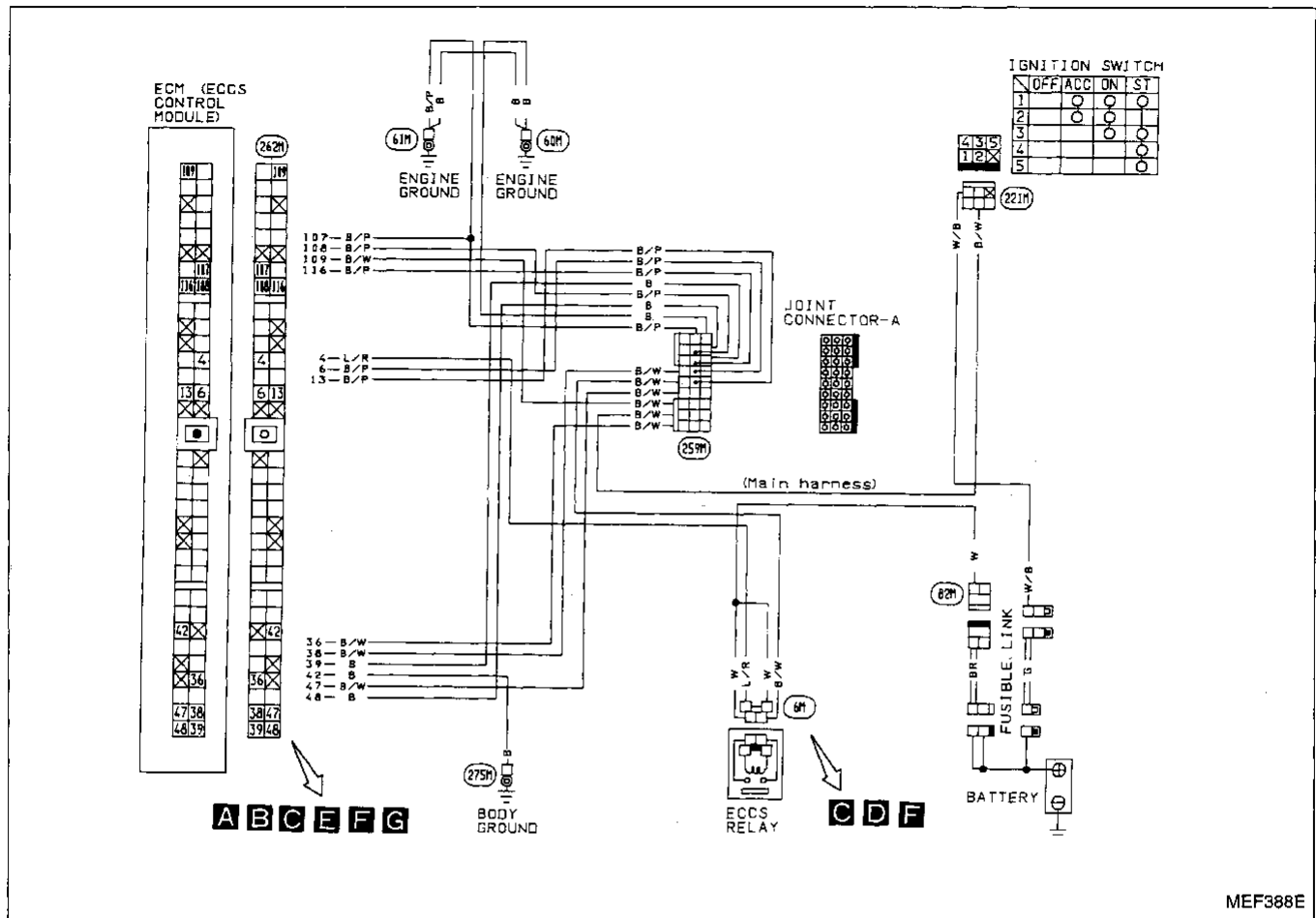
- Fuel temperature sensor circuit is open or shorted. (Output voltage is too high or too low.)

SYSTEM INSPECTION

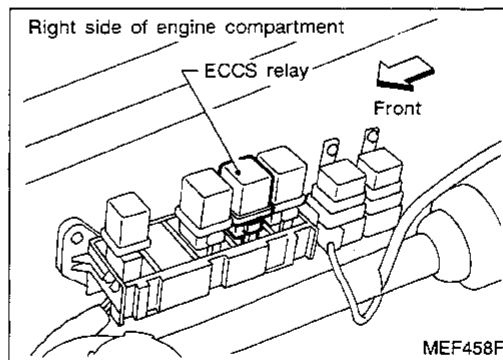
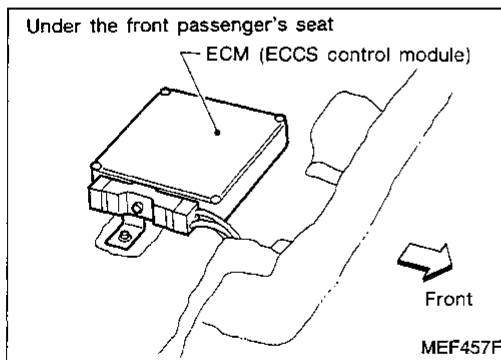
Refer to Diagnostic Procedure 44.

Diagnostic Procedure 22

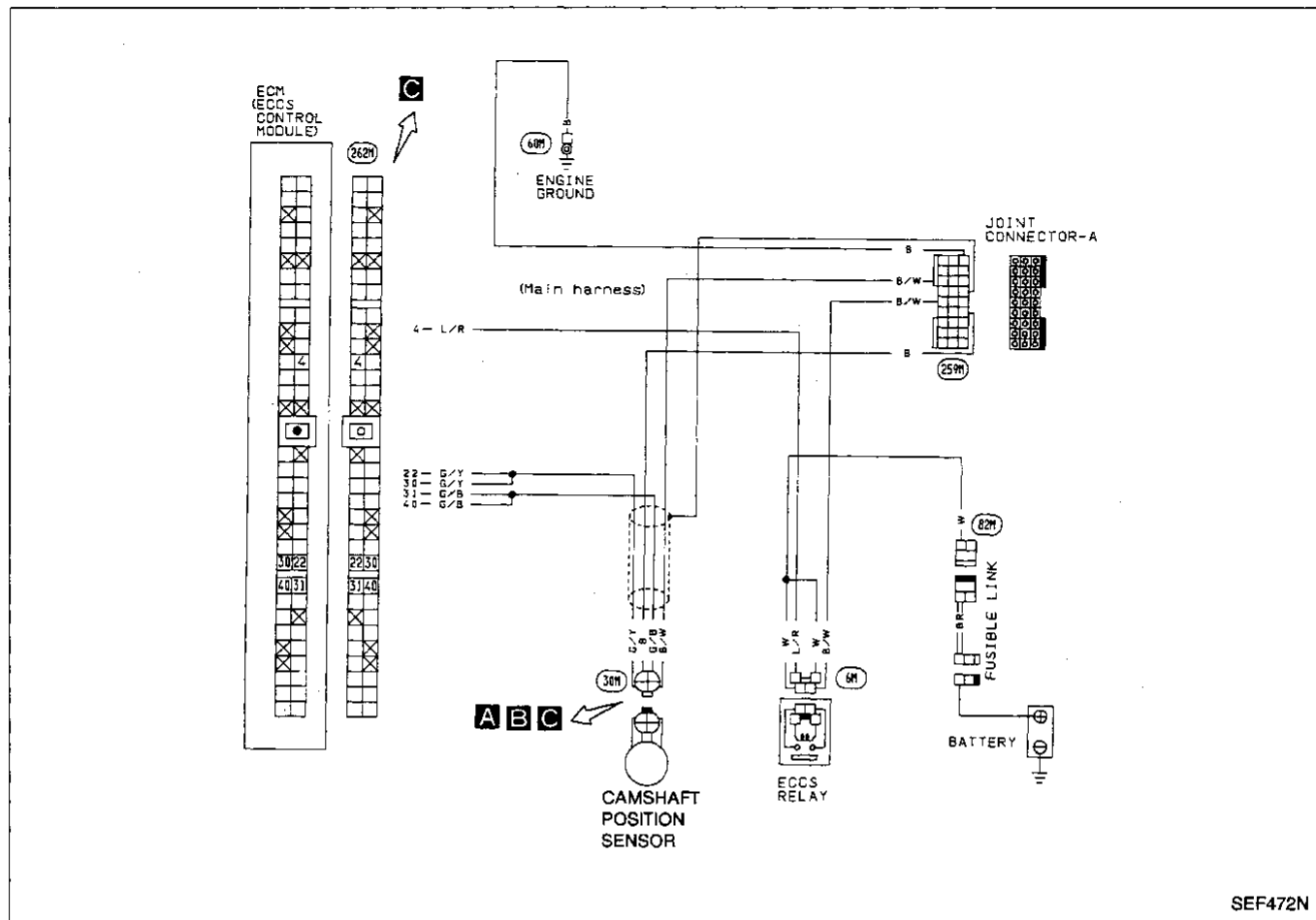
MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



Harness layout



CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

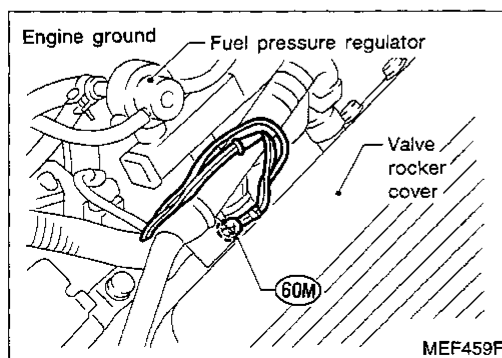
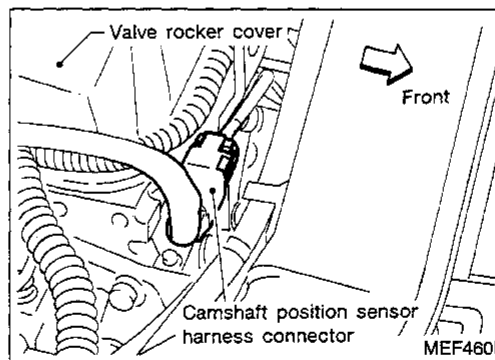


Under the front passenger's seat

ECM (ECCS control module)

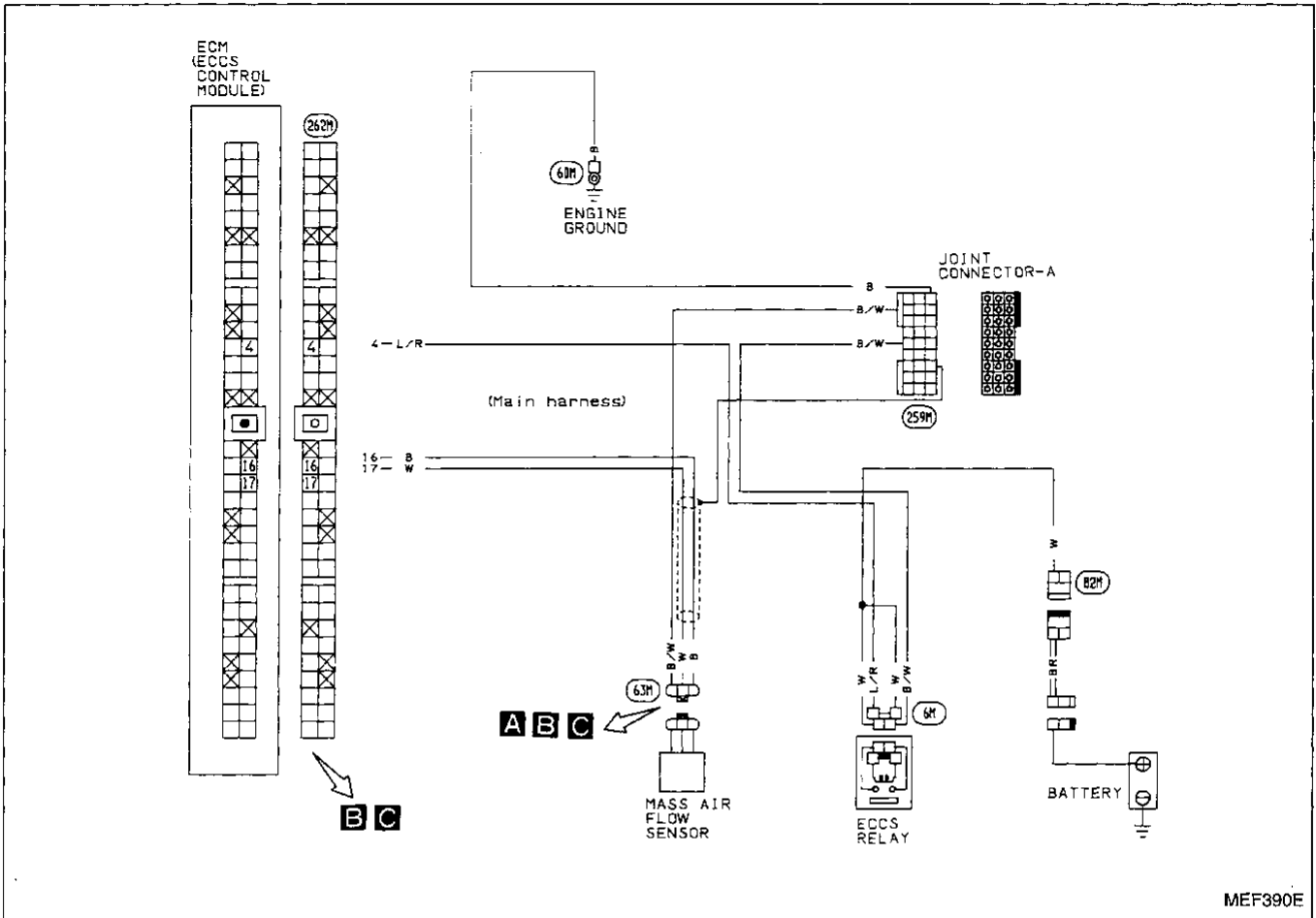
Front

MEF457F

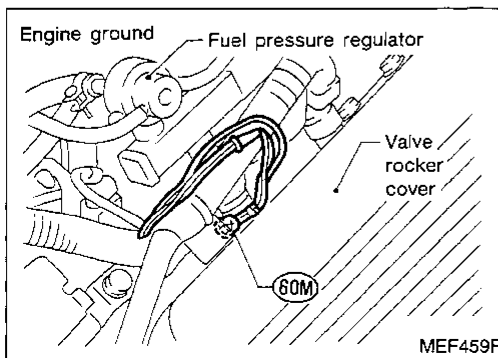
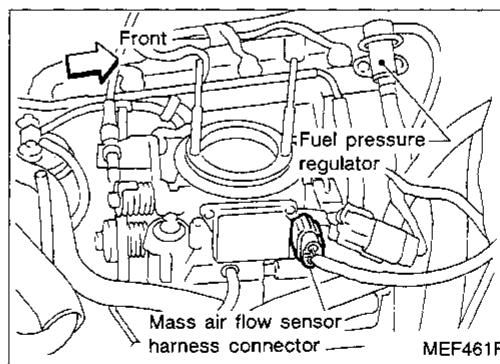
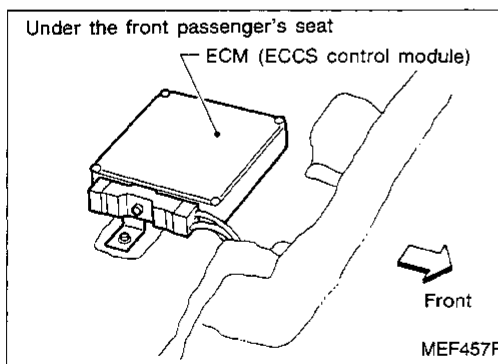


Diagnostic Procedure 24

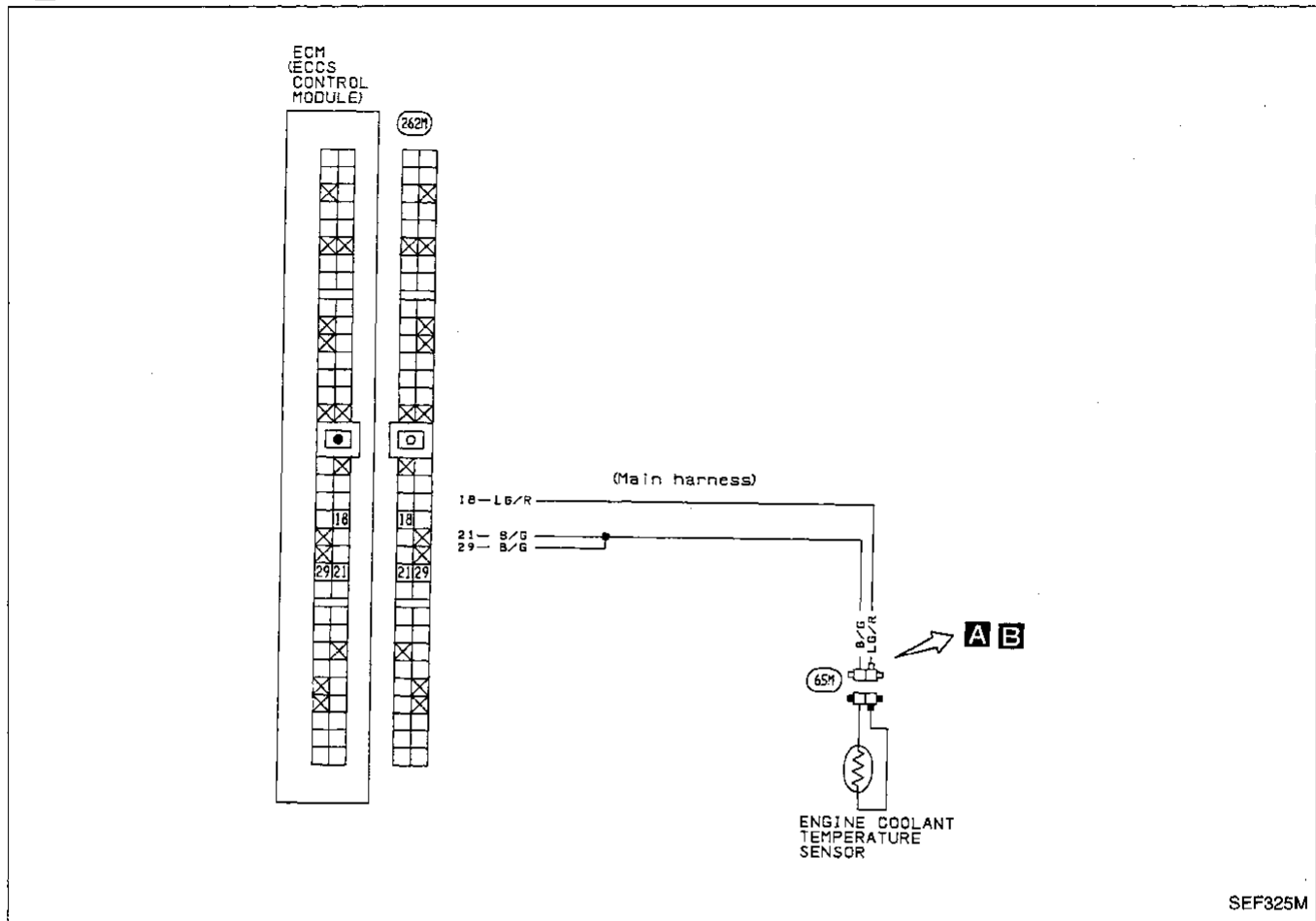
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12)  (MALFUNCTION INDICATOR LAMP ITEM)



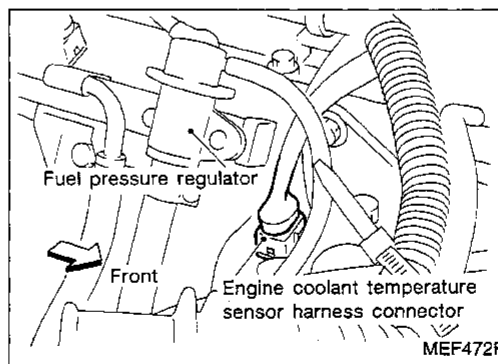
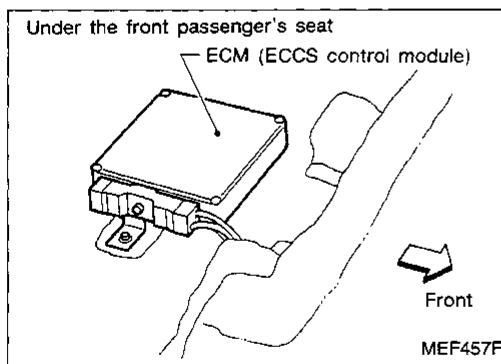
Harness layout



Diagnostic Procedure 25

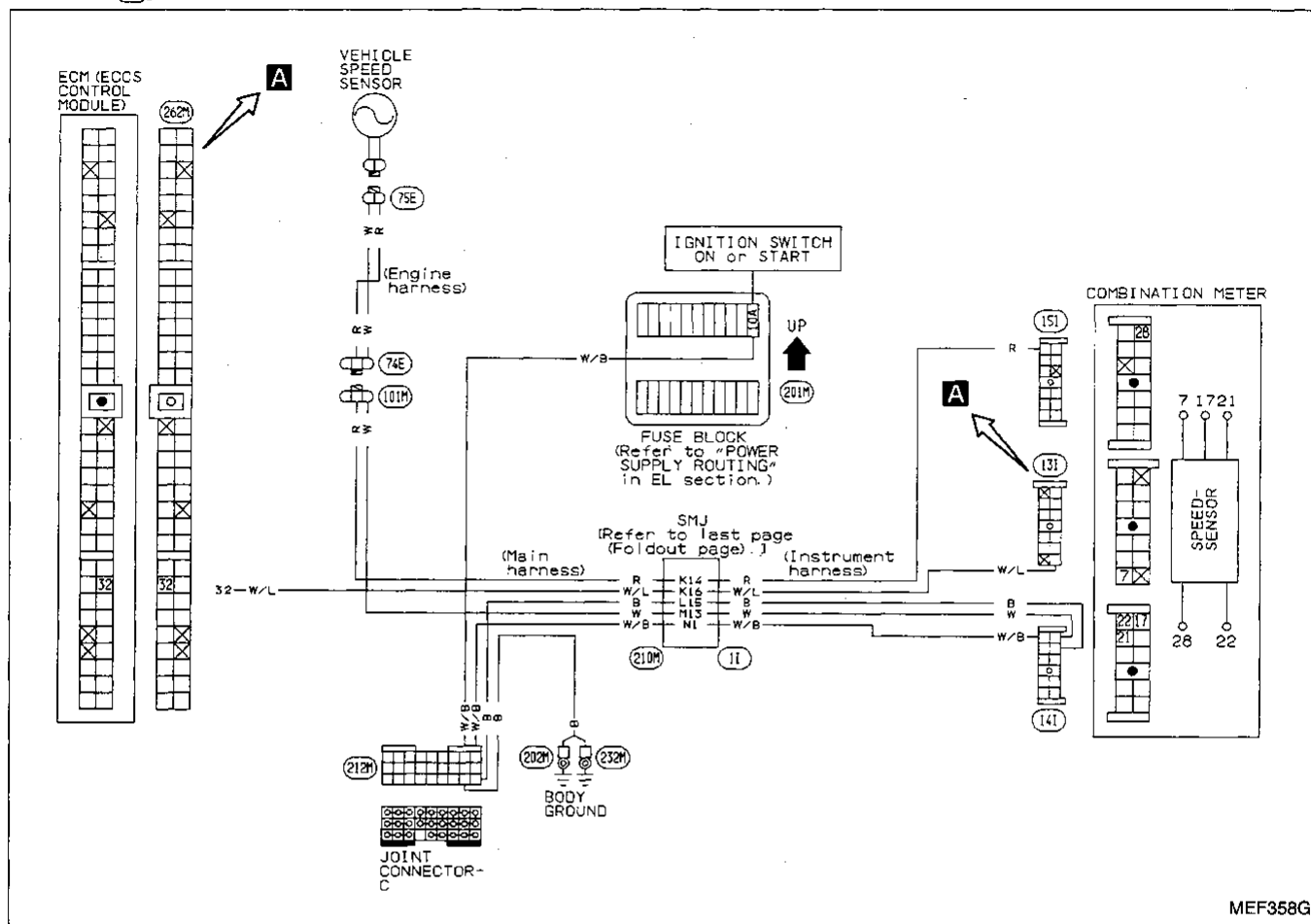
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(MALFUNCTION INDICATOR LAMP ITEM)

Harness layout

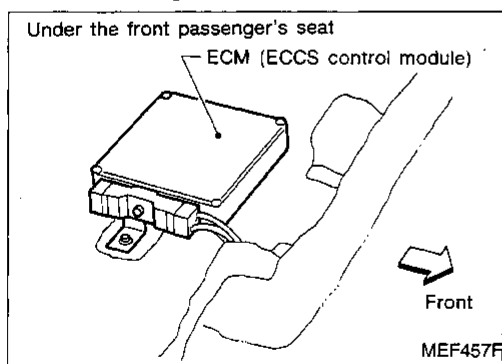


Diagnostic Procedure 26

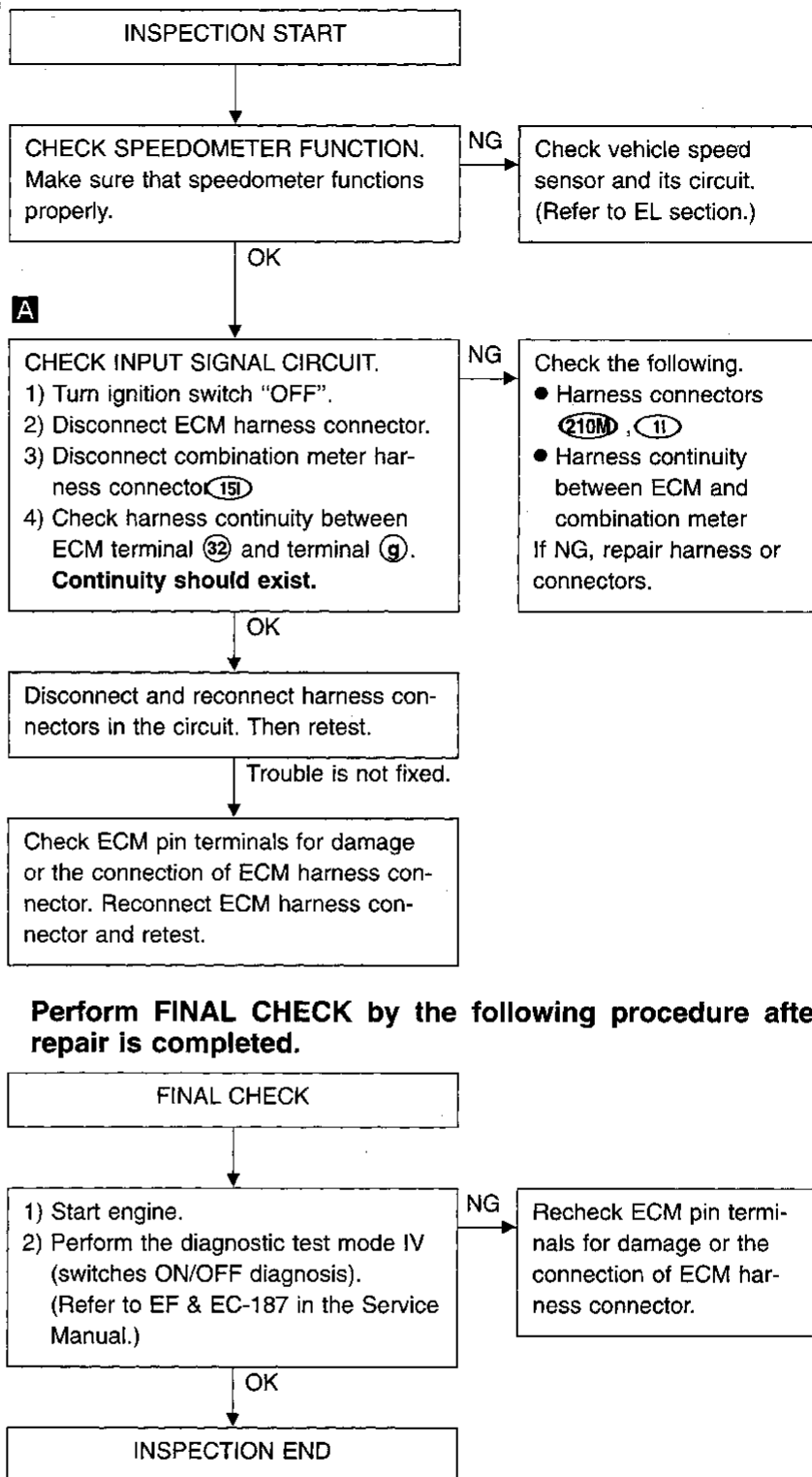
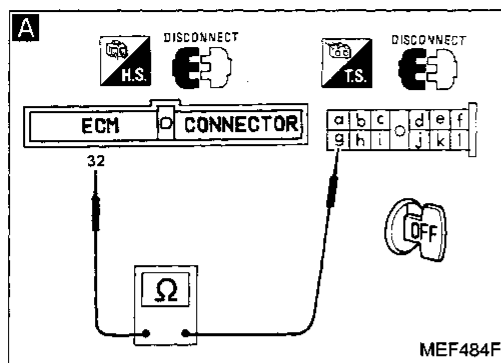
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Switch ON/OFF diagnostic item)  **(MALFUNCTION INDICATOR LAMP ITEM)**



Harness layout



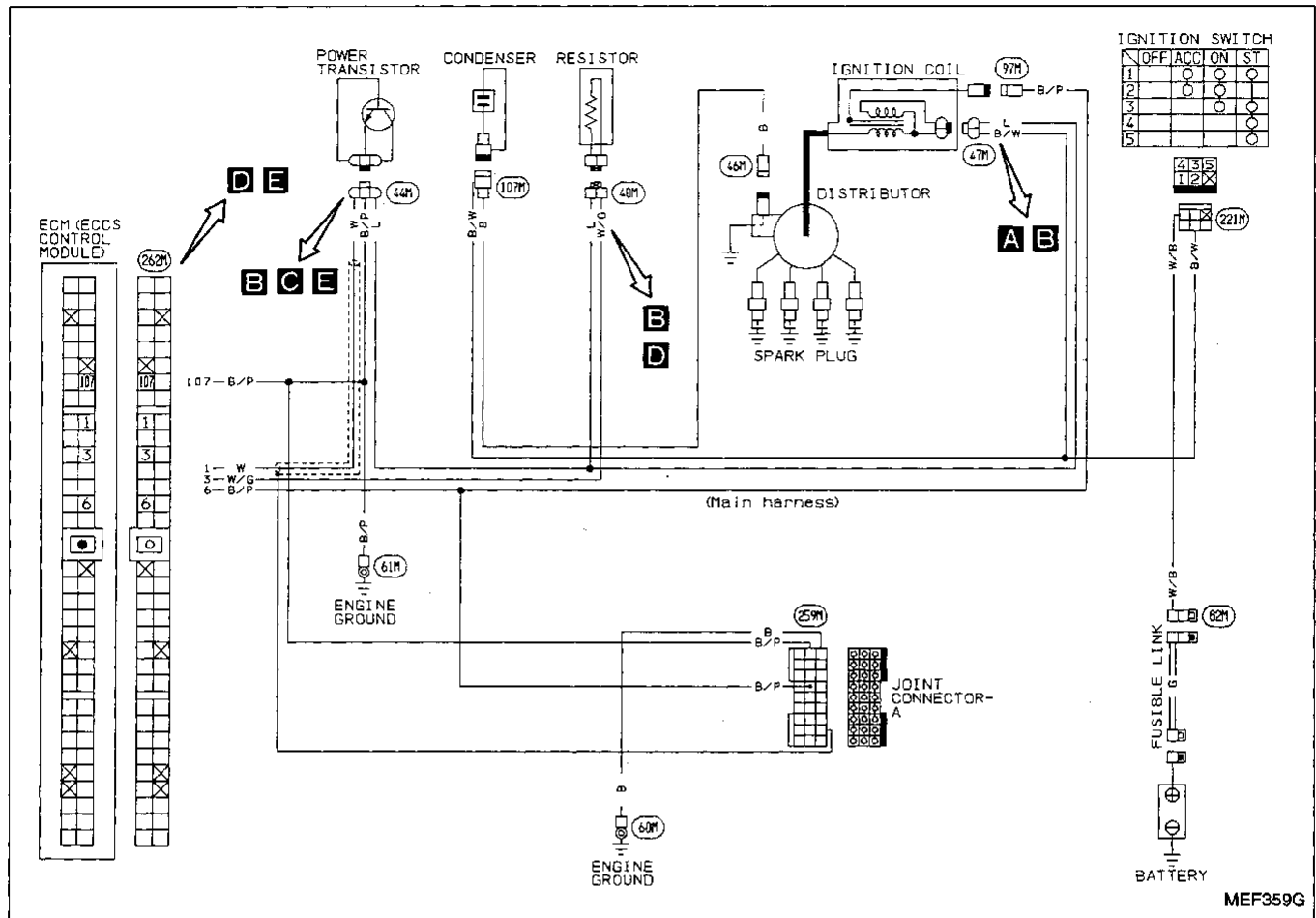
Diagnostic Procedure 26 (Cont'd)



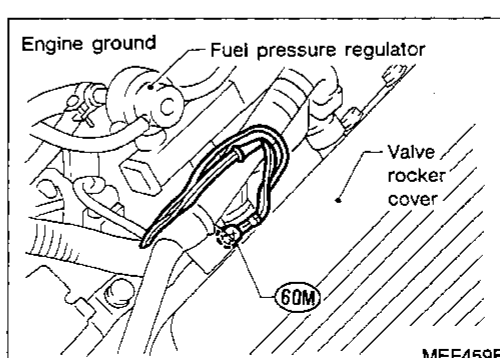
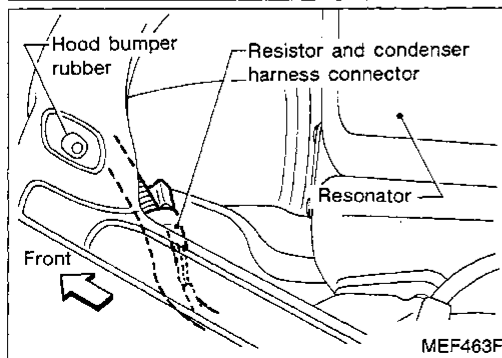
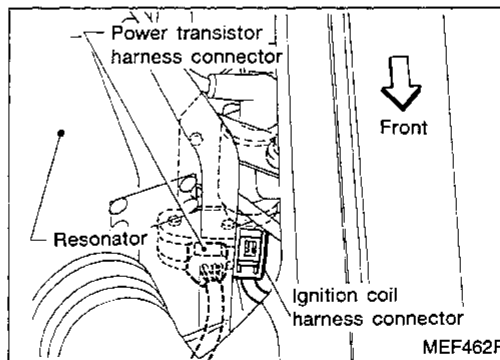
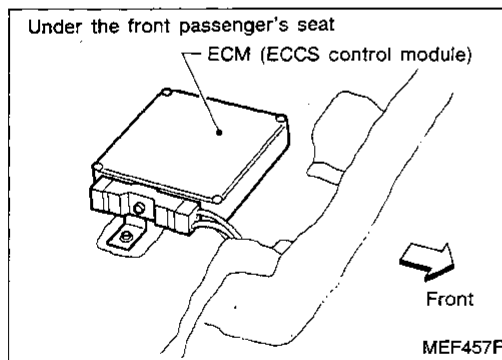
Perform FINAL CHECK by the following procedure after repair is completed.

Diagnostic Procedure 27

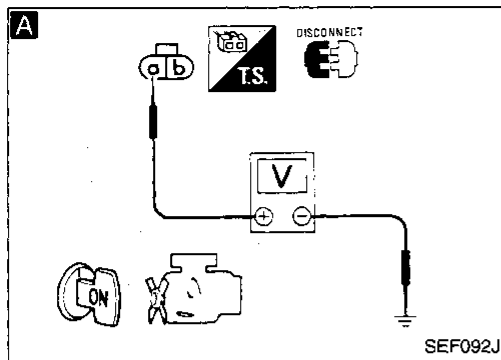
IGNITION SIGNAL (Diagnostic trouble code No. 21)



Harness layout



Diagnostic Procedure 27 (Cont'd)



INSPECTION START

- A**
- CHECK POWER SUPPLY.**
- 1) Disconnect ignition coil harness connector.
 - 2) Turn ignition switch "ON".
 - 3) Check voltage between terminal (a) and ground.

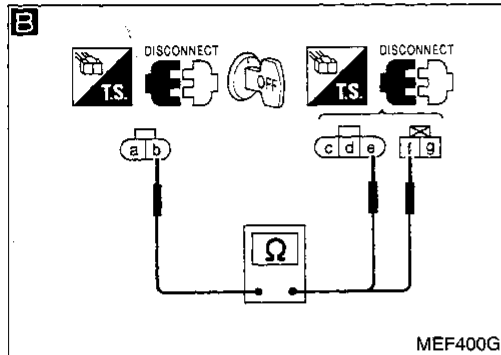
NG

Repair harness or connectors.

Voltage: Battery voltage

OK

Loosen and retighten ground screw.



- CHECK GROUND CIRCUIT.**
- 1) Turn ignition switch "OFF".
 - 2) Disconnect resistor harness connector.
 - 3) Disconnect power transistor harness connector.

NG

Repair harness or connectors.

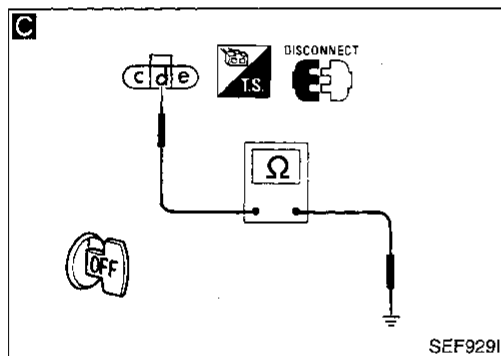
- B** 4) Check harness continuity between terminal (b) and terminals (e), (f).

Continuity should exist.

- C** 5) Check harness continuity between terminal (d) and engine ground.

Continuity should exist.

OK



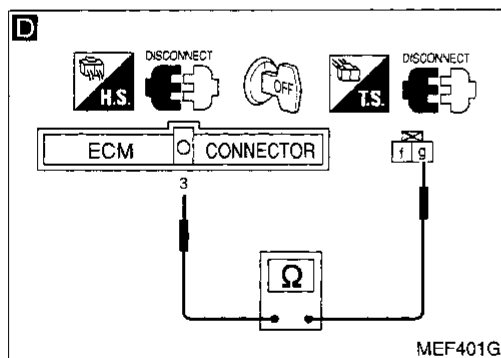
- D**
- CHECK INPUT SIGNAL CIRCUIT.**
- 1) Disconnect ECM harness connector.
 - 2) Check harness continuity between terminal (g) and ECM terminal (3).

NG

Repair harness or connectors.

Continuity should exist.

OK



- E**
- CHECK OUTPUT SIGNAL CIRCUIT.**
- 1) Check harness continuity between terminal (c) and ECM terminal (1).

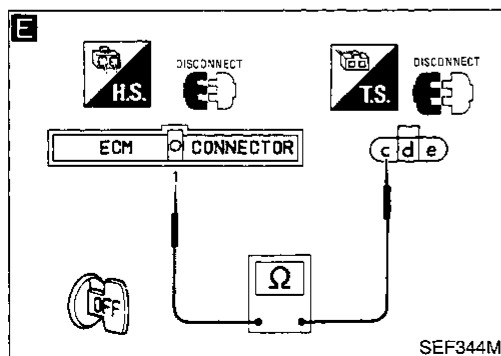
NG

Repair harness or connectors.

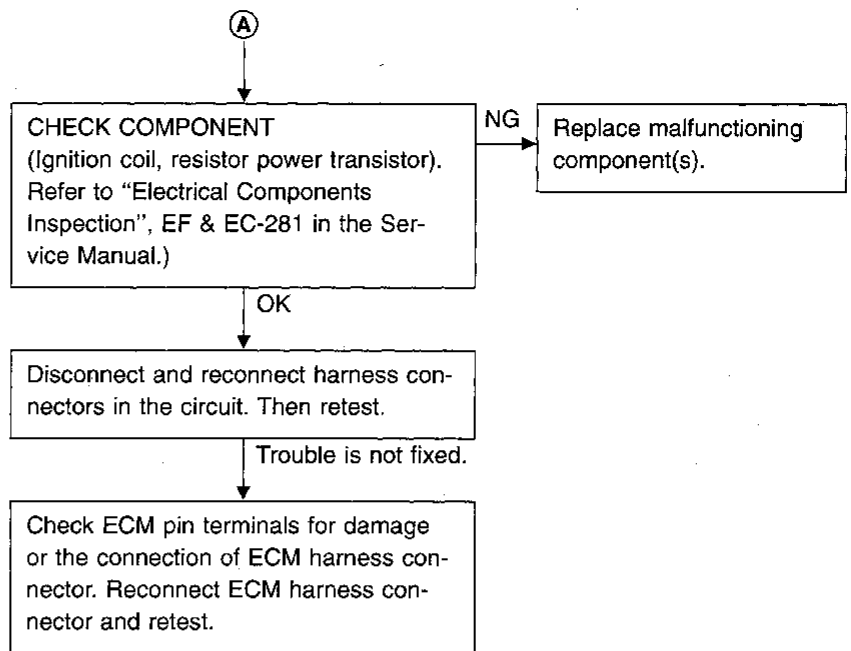
Continuity should exist.

OK

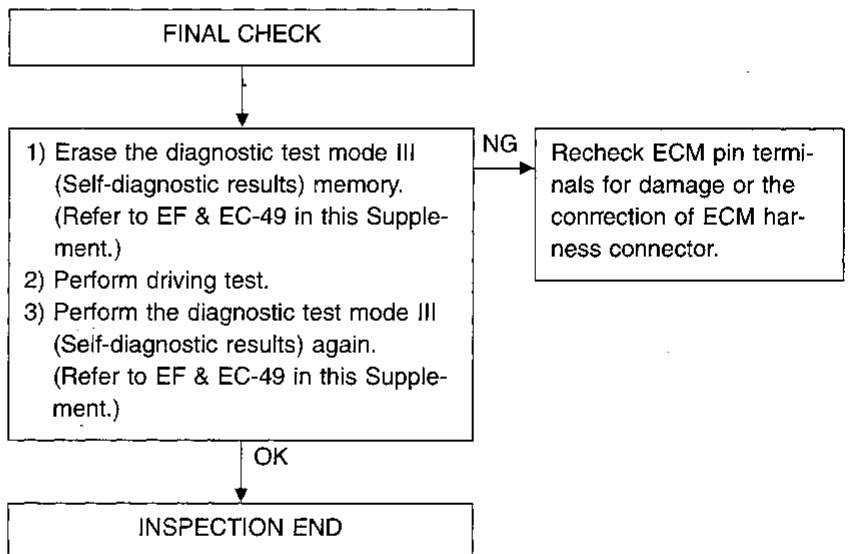
A



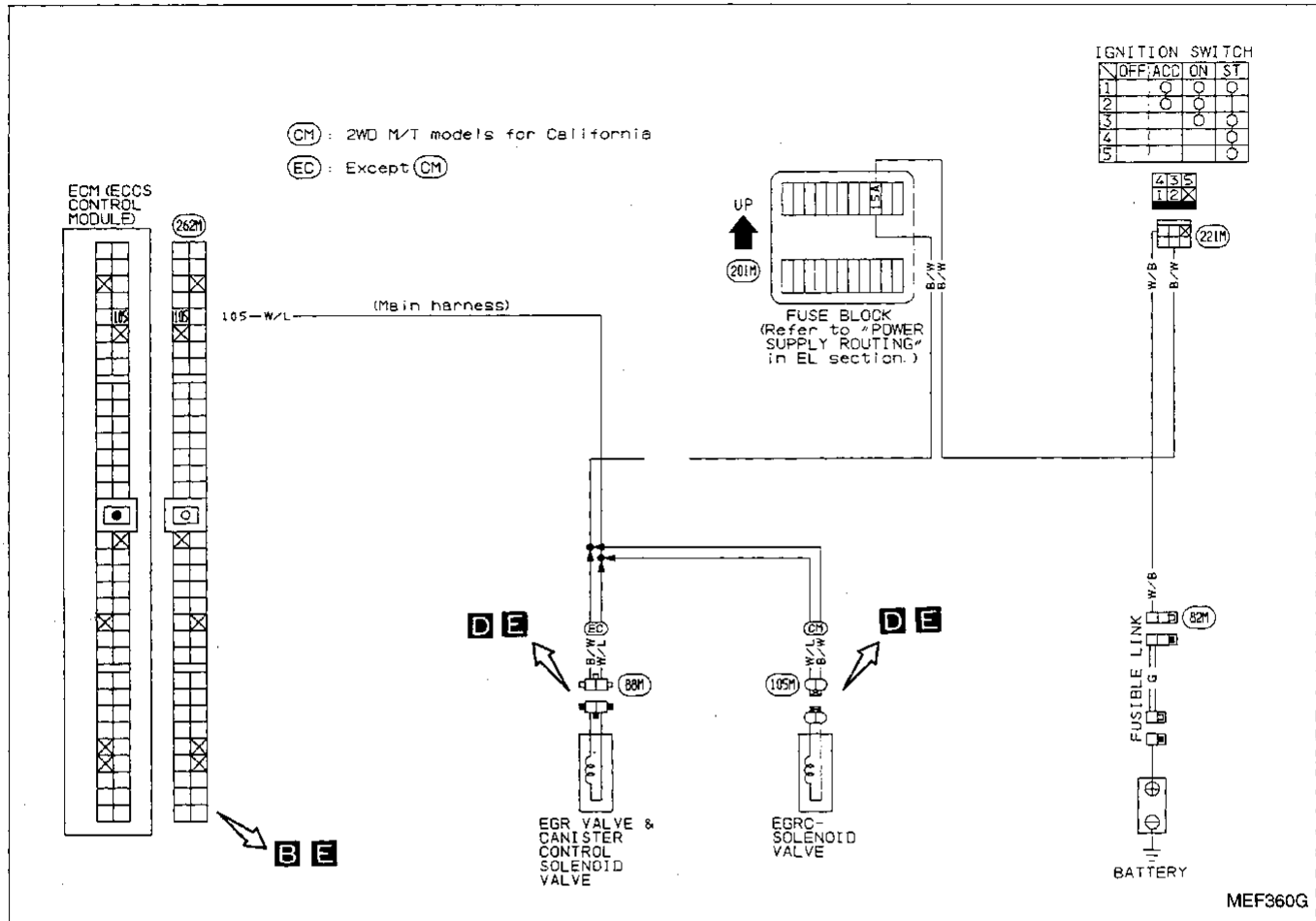
Diagnostic Procedure 27 (Cont'd)



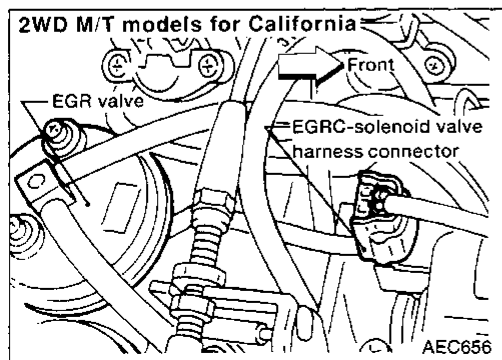
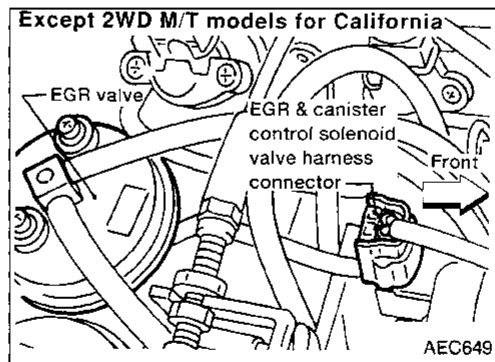
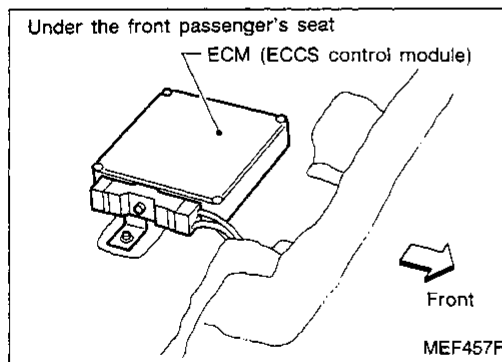
Perform FINAL CHECK by the following procedure after repair is completed.



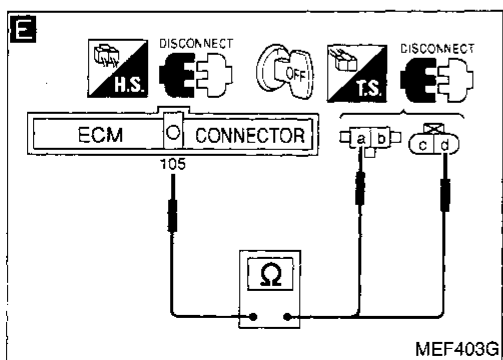
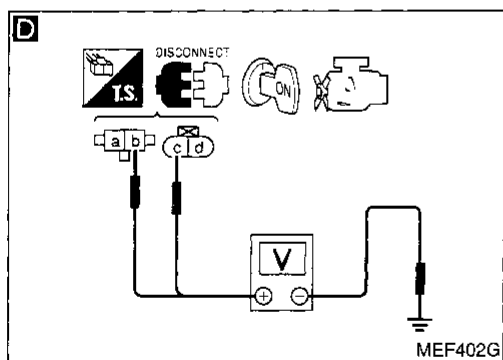
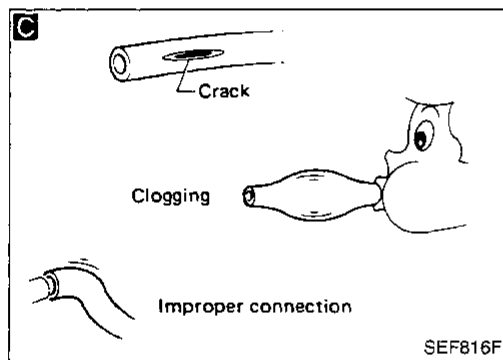
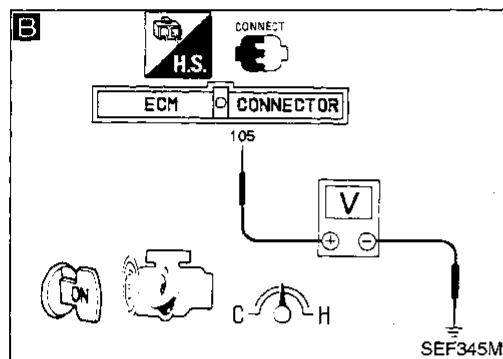
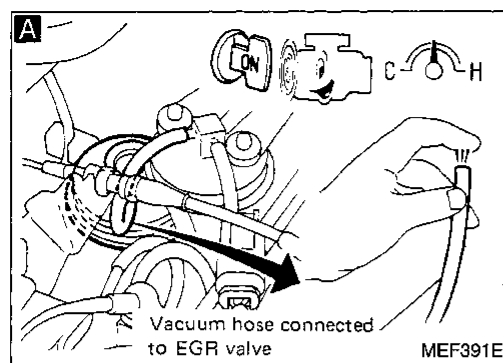
Diagnostic Procedure 29

EGR FUNCTION (Diagnostic trouble code No. 32) (MALFUNCTION INDICATOR LAMP ITEM)

Harness layout



Diagnostic Procedure 29 (Cont'd)



INSPECTION START

- A**
- CHECK VACUUM SOURCE TO EGR VALVE.**
- 1) Start engine and warm it up sufficiently.
 - 2) Perform diagnostic test mode III (self diagnostic results). Make sure that diagnostic trouble code No. 12 is not displayed.
 - 3) Keep engine speed at about 2,000 rpm.
 - 4) Disconnect vacuum hose to EGR valve.
 - 5) Make sure that vacuum exists. **Vacuum should exist.**

OK → **CHECK COMPONENTS** (EGR valve, EGRC-BPT VALVE and EGR temperature sensor). Refer to "Electrical Components Inspection".

NG

Replace malfunctioning component(s).

- B**
- CHECK CONTROL FUNCTION.**
- 1) Check voltage between ECM terminal (105) and ground under the following conditions.
- Voltage:**
- At idle
 - Approximately 0V
 - Engine speed is about 2,000 rpm
 - Battery voltage

OK → **C**

CHECK VACUUM HOSE.

- 1) Check vacuum hose for clogging, cracks and proper connection.

NG

- D**
- CHECK POWER SUPPLY.**
- 1) Stop engine.
 - 2) Disconnect EGRC-solenoid valve harness connector.
 - 3) Turn ignition switch "ON".
 - 4) Check voltage between terminal (b) and ground (Models except 2WD M/T models for California), terminal (c) and ground (2WD M/T models for California).
- Voltage: Battery voltage**

NG → Repair harness or connectors.

OK

- E**
- CHECK OUTPUT SIGNAL CIRCUIT.**
- 1) Turn ignition switch "OFF".
 - 2) Disconnect ECM harness connector.
 - 3) Check harness continuity between ECM terminal (105) and terminal (a) (Models except 2WD M/T models for California), terminal (d) (2WD M/T models for California).
- Continuity should exist.**

NG → Repair harness or connectors.

OK

A

G1

MA

EM

LC

EF & EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

BF

HA

EL

IDX

Diagnostic Procedure 29 (Cont'd)

F ROAD TEST**Test conditions**

Drive vehicle under the following conditions with suitable gear position.

(1) Engine speed:

A/T models: $2,200 \pm 200$ rpm
M/T models: $2,500 \pm 500$ rpm

(2) Intake manifold vacuum:

2WD models with A/T:

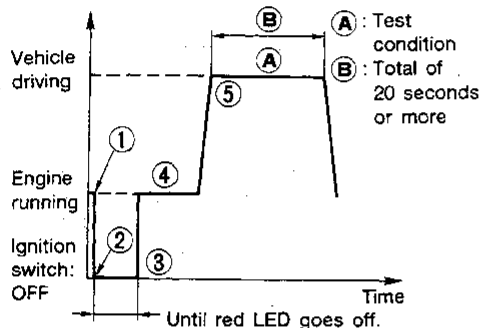
-40.0 ± 4.0 kPa
(-300 ± 30 mmHg, -11.81 ± 1.18 inHg)

2WD models with M/T:

-46.7 ± 6.7 kPa
(-350 ± 50 mmHg, -13.78 ± 1.97 inHg)

4WD models:

-48.32 ± 5.00 kPa
(-362.5 ± 37.5 mmHg, -14.272 ± 1.476 inHg)

Driving mode

① Start engine and warm it up sufficiently.

② Turn off ignition switch and keep it off until red LED goes off.

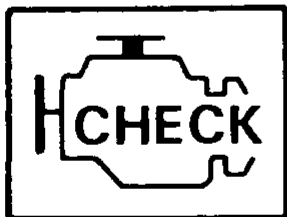
③ Start engine and make sure that air conditioning switch and rear defogger are turned "OFF" during test drive.

④ Keep engine running for at least 4 minutes.

⑤ Shift to suitable gear position and drive in "Test condition" for a total 20 seconds or more.

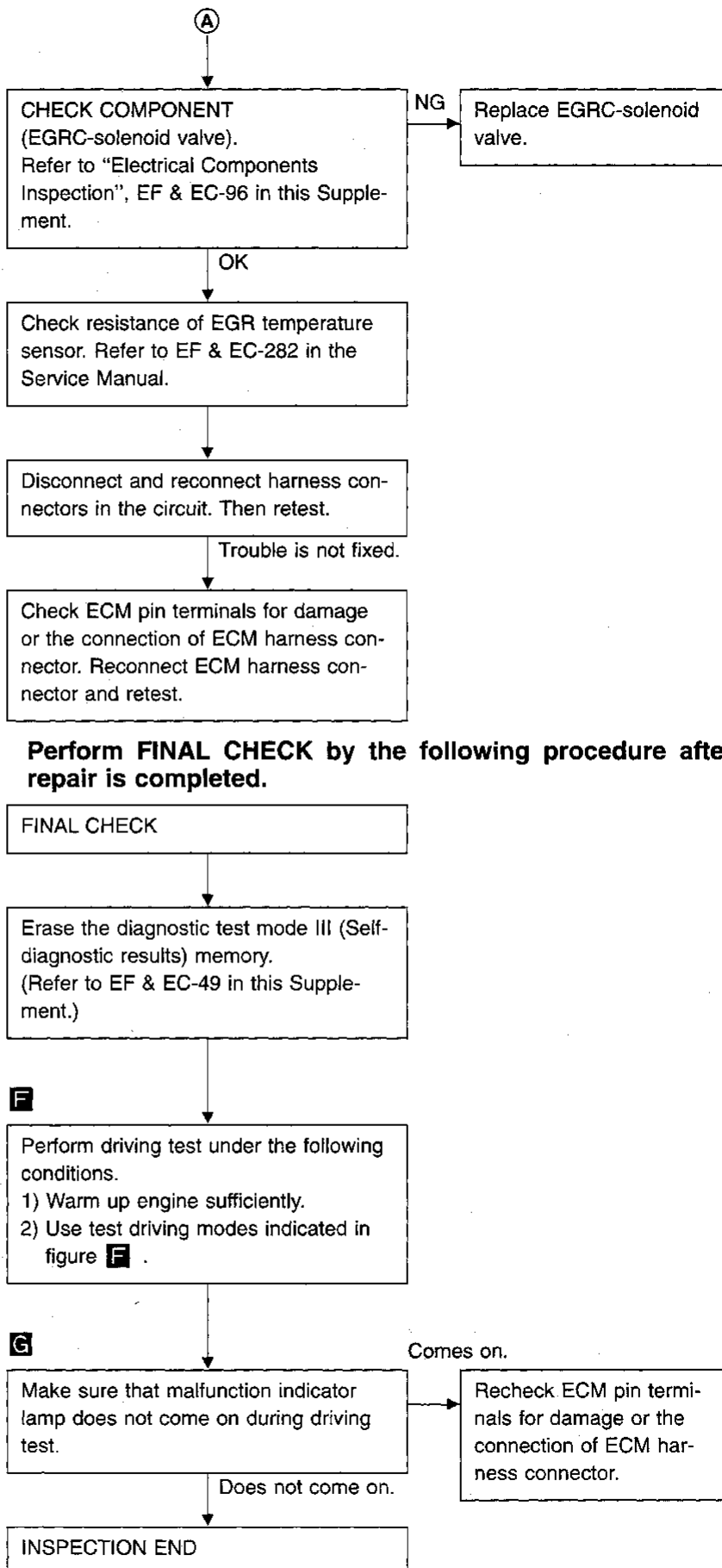
Note: If engine stalls or ignition switch is turned off within step ⑤, return to step ②.

SEF560NA

G

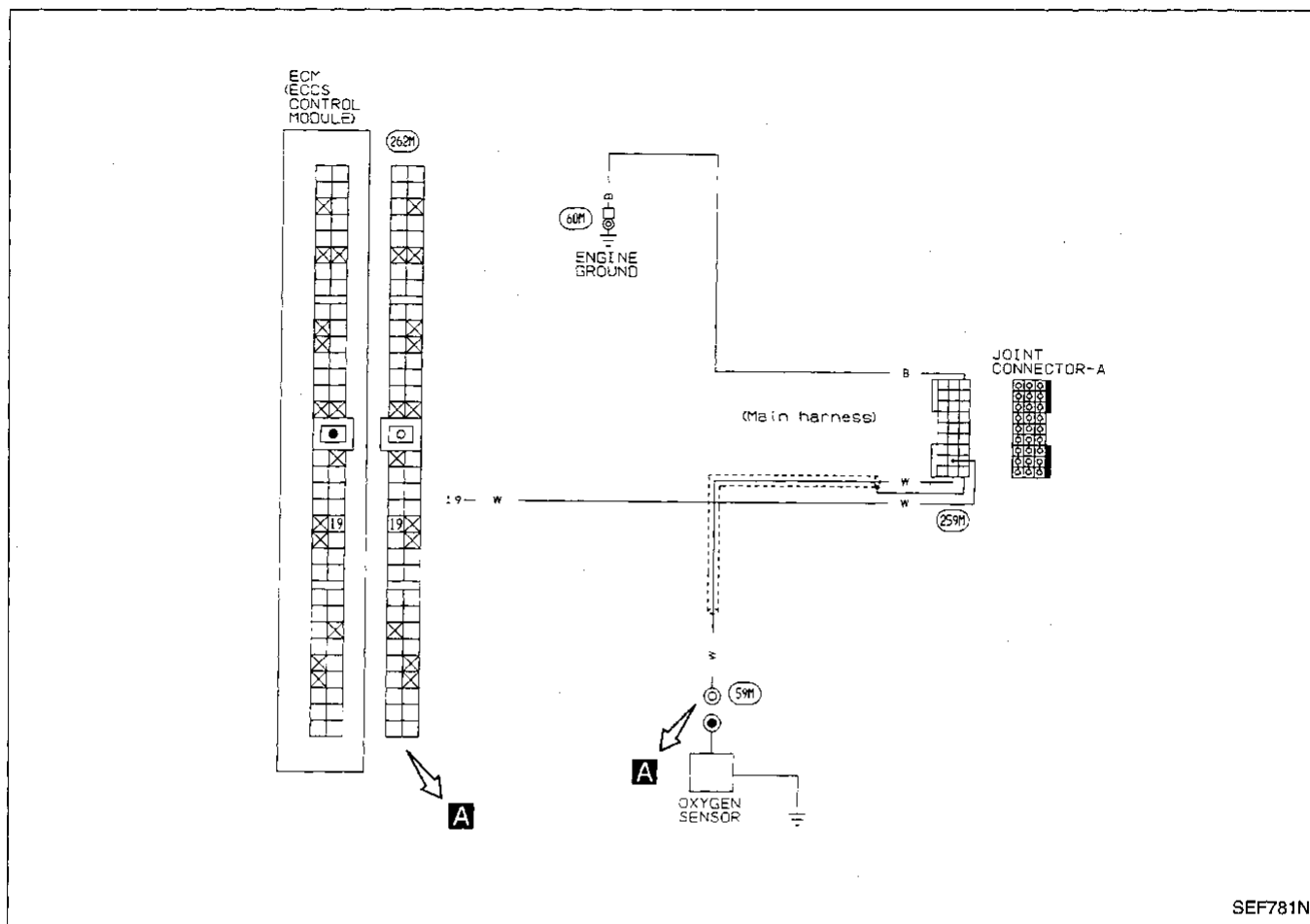
MALFUNCTION INDICATOR LAMP

SEF177M

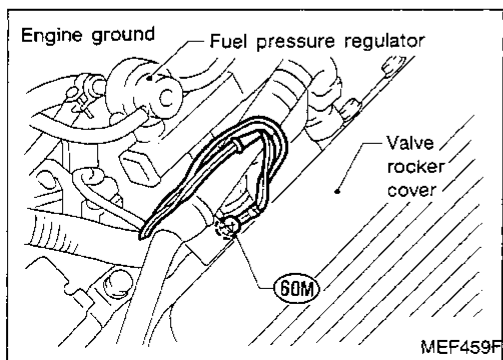
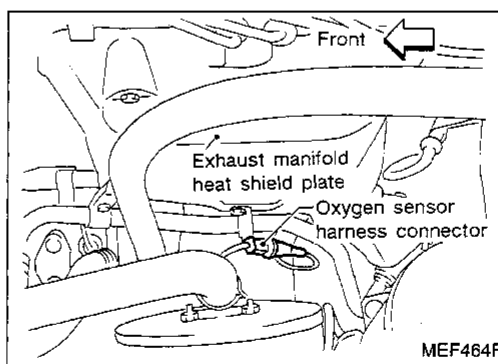
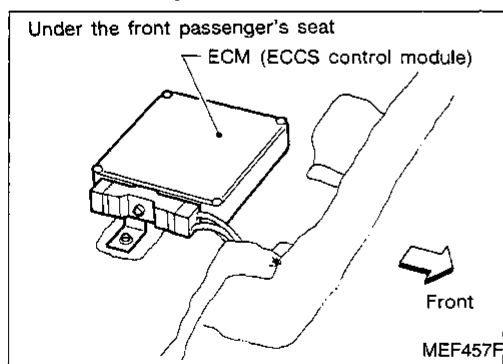


Diagnostic Procedure 30

OXYGEN SENSOR (Diagnostic trouble code No. 33)  (MALFUNCTION INDICATOR LAMP ITEM)

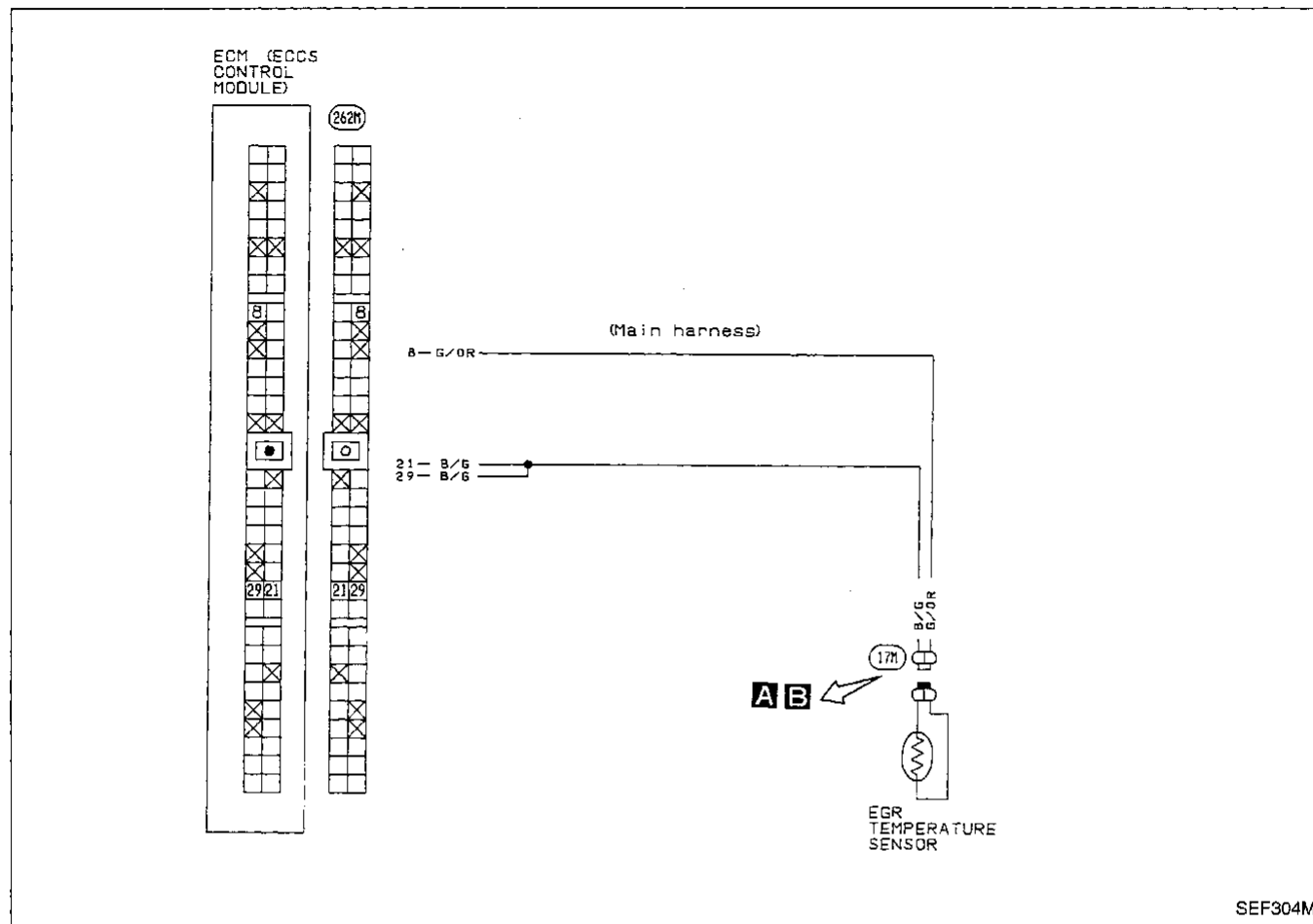


Harness layout

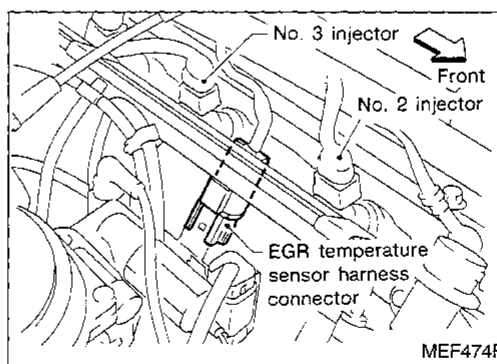
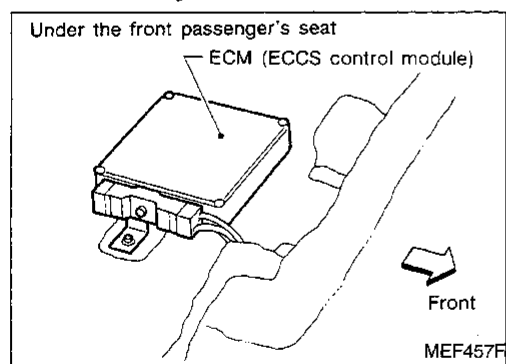


Diagnostic Procedure 31

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35)  (MALFUNCTION INDICATOR LAMP ITEM)

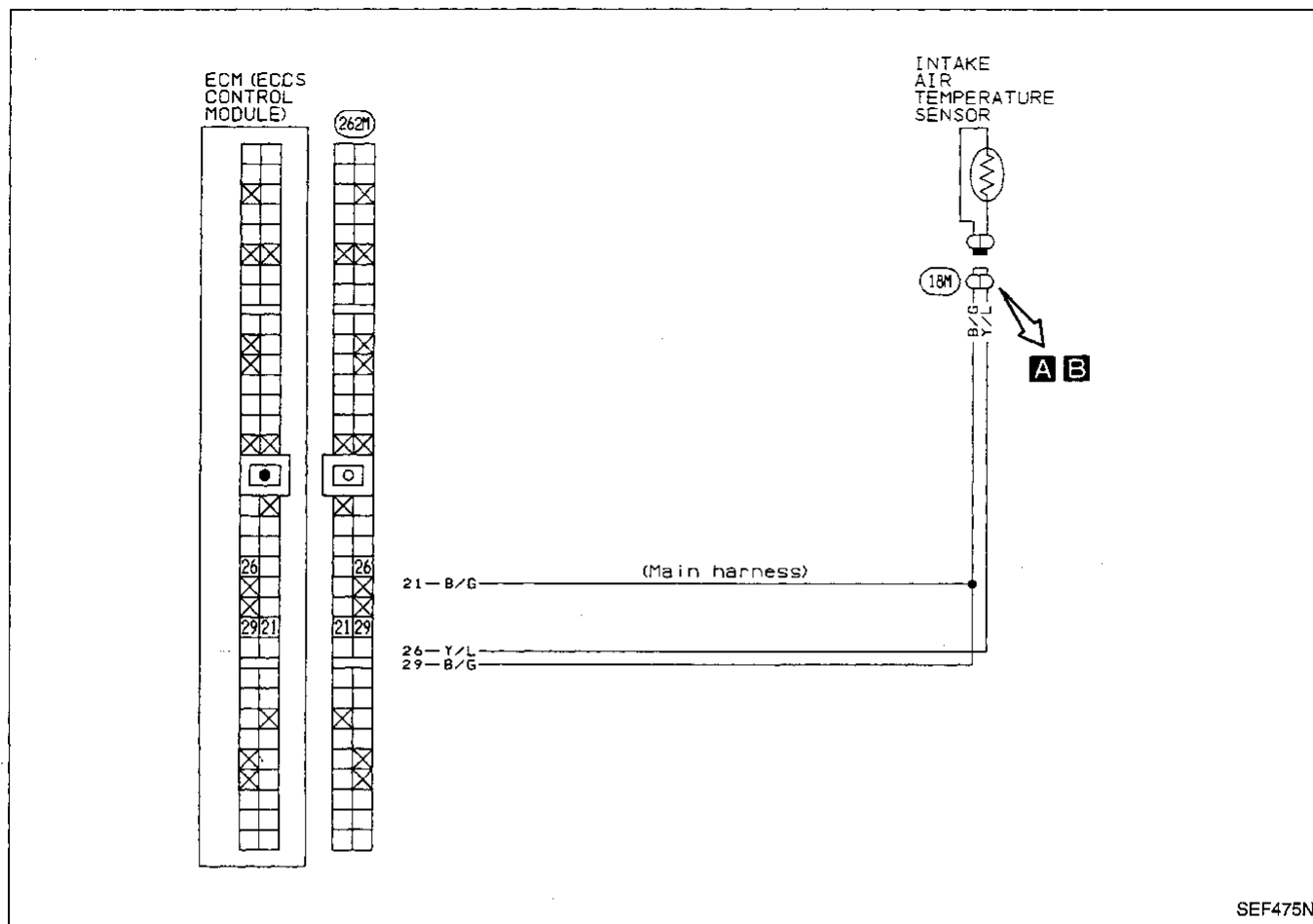


Harness layout

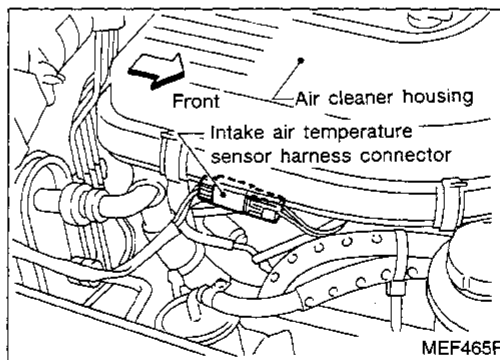
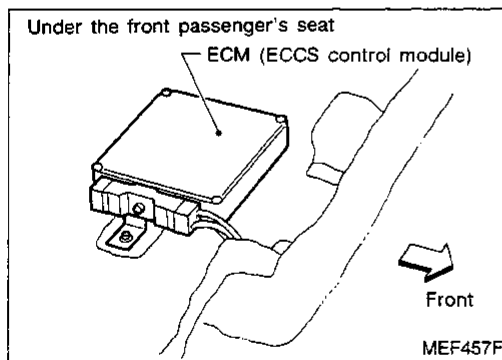


Diagnostic Procedure 32

INTAKE AIR TEMPERATURE SENSOR (Diagnostic trouble code No. 41)

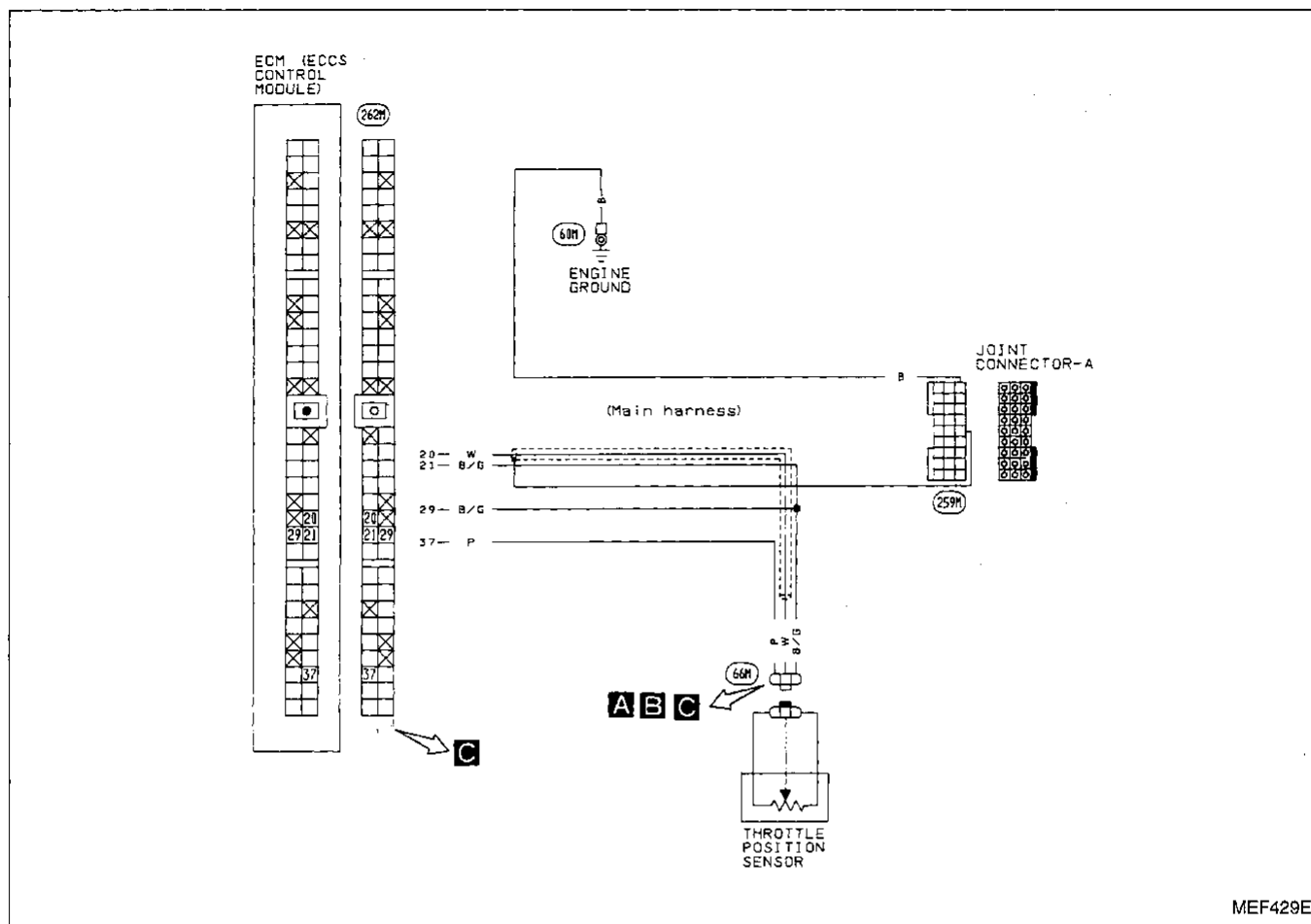


Harness layout

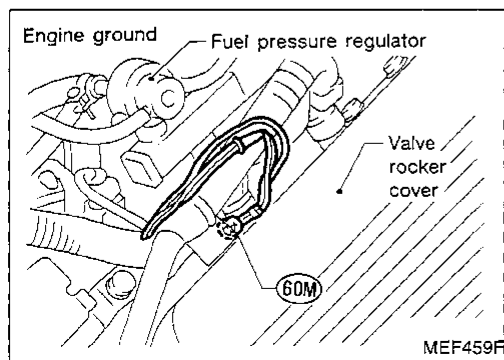
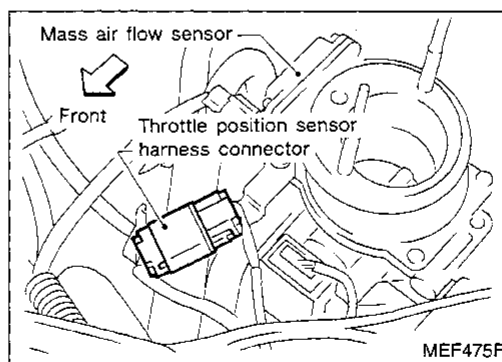
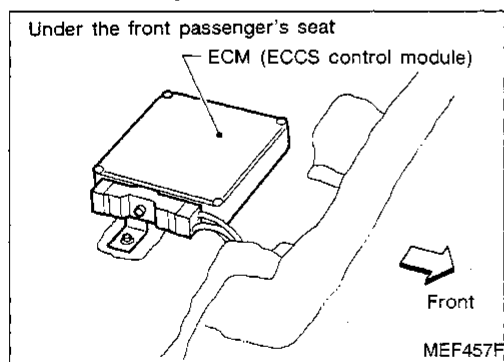


Diagnostic Procedure 33

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)  (MALFUNCTION INDICATOR LAMP ITEM)

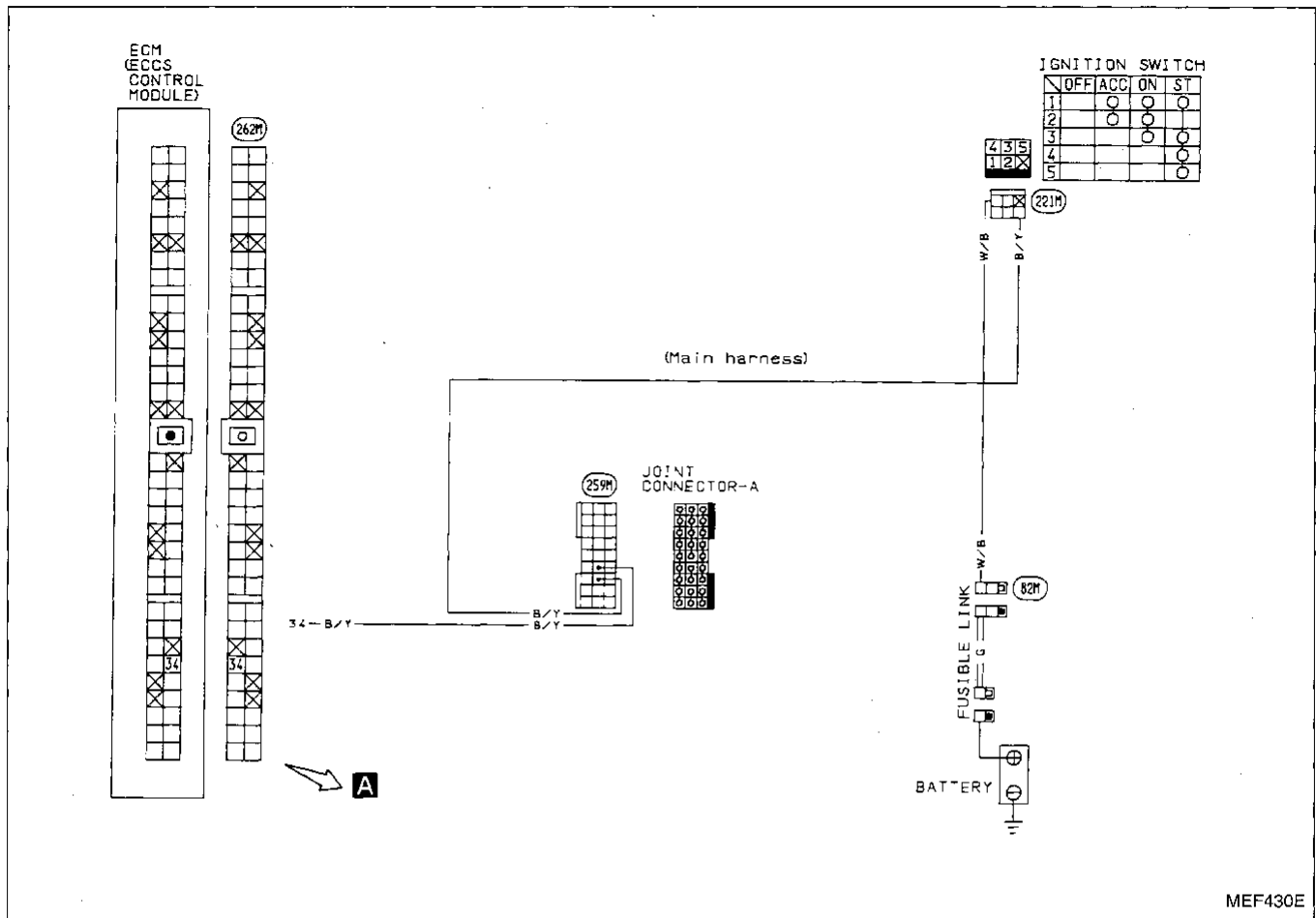


Harness layout

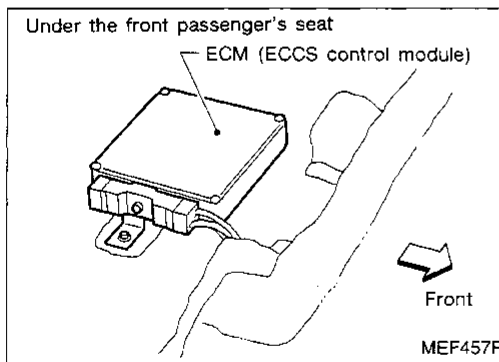


Diagnostic Procedure 35

START SIGNAL (Switch ON/OFF diagnostic item)

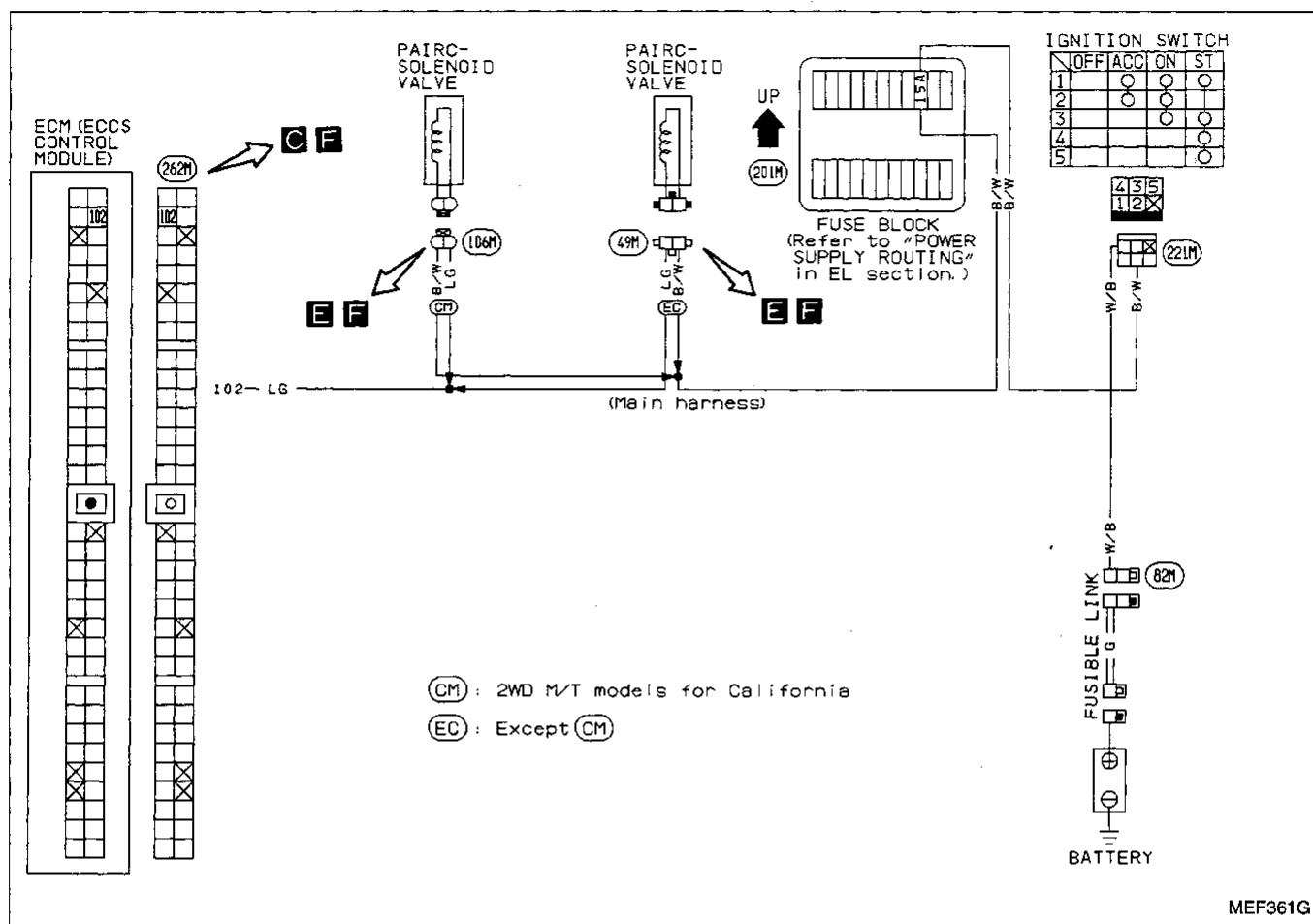


Harness layout

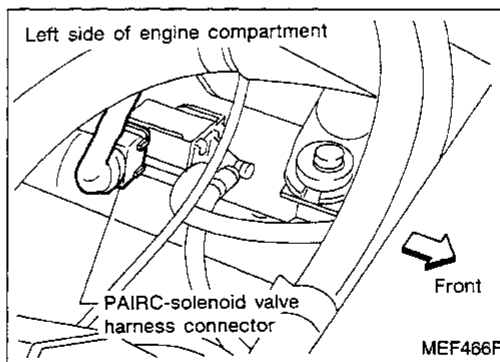
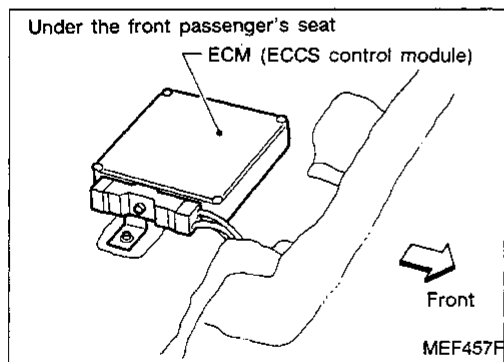


Diagnostic Procedure 36

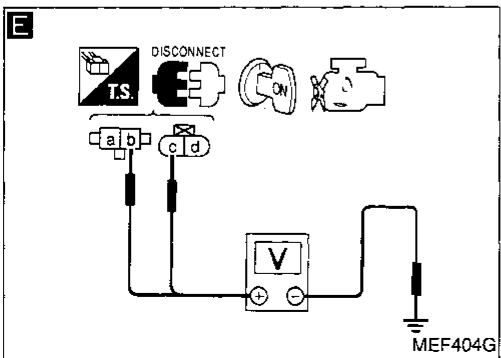
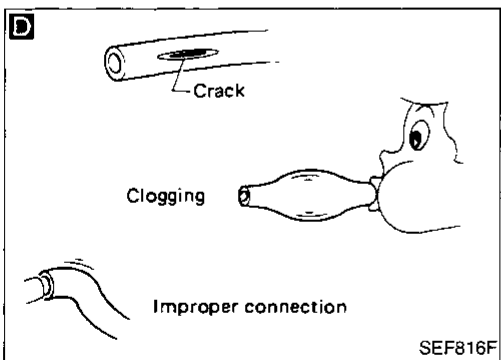
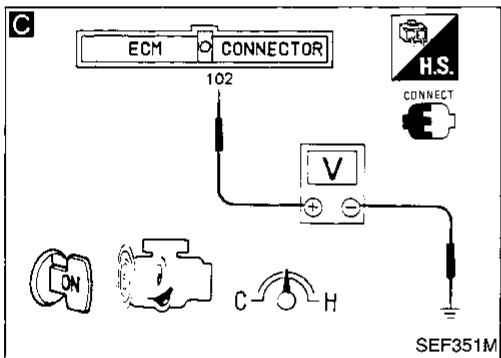
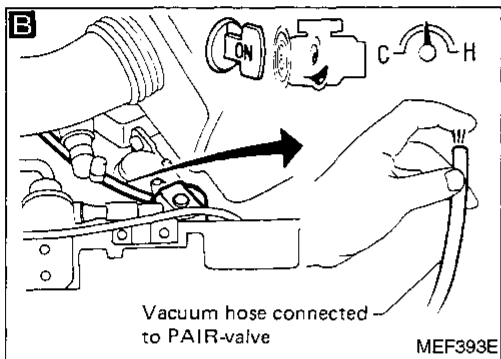
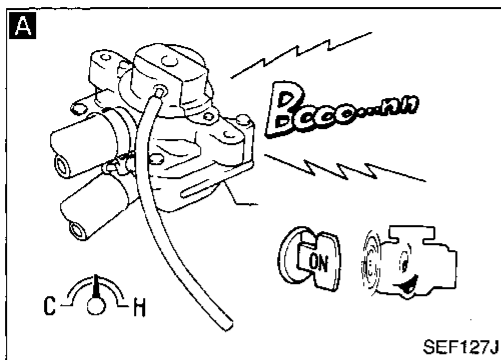
PAIR VALVE SYSTEM (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 36 (Cont'd)



INSPECTION START

A

CHECK OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
- 3) Make sure that inspection lamp (Green) on ECM goes on and off periodically more than 5 times during 10 seconds at 2,000 rpm under no-load.
- 4) Release accelerator pedal fully, and run engine at idle.
- 5) Listen to PAIR valve operating sound.

At idle:

PAIR valve should operate.

Except at idle:

PAIR valve should not operate.

OK

INSPECTION END

NG

B

CHECK VACUUM SOURCE TO PAIR VALVE.

- 1) Disconnect vacuum hose to PAIR valve.
- 2) Make sure that vacuum exists under the following conditions.

At idle:

Vacuum should exist.

Except at idle:

Vacuum should not exist.

OK

CHECK COMPONENTS (PAIR valve)
Refer to "Electrical Components Inspection" EF & EC-284 in the Service Manual.

NG

C

CHECK CONTROL FUNCTION.

- 1) Check voltage between ECM terminal 102 and ground.

Voltage:

At idle

Approximately 0V

Except at idle

Battery voltage

OK

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks and proper connections.

NG

A

GI

MA

EM

LC

EF & EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

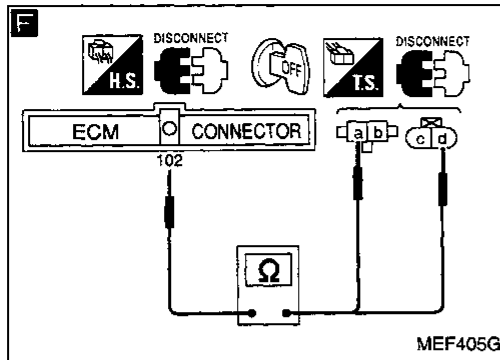
BF

HA

EL

IDX

Diagnostic Procedure 36 (Cont'd)

**E**

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect PAIRC-solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal **(b)** and ground (Models except 2WD M/T models for California), terminal **(c)** and ground (2WD M/T models for California).

Voltage: Battery voltage

NG

Repair harness or connectors.

OK

F

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal **(102)** and terminal **(a)** (Models except 2WD M/T models for California), terminal **(d)** (2WD M/T models for California).

Continuity should exist.

NG

Repair harness or connectors.

OK

CHECK COMPONENTS
(PAIRC-solenoid valve).

Refer to "Electrical Components Inspection", EF & EC-96 in this Supplement.

NG

Replace PAIRC-solenoid valve.

OK

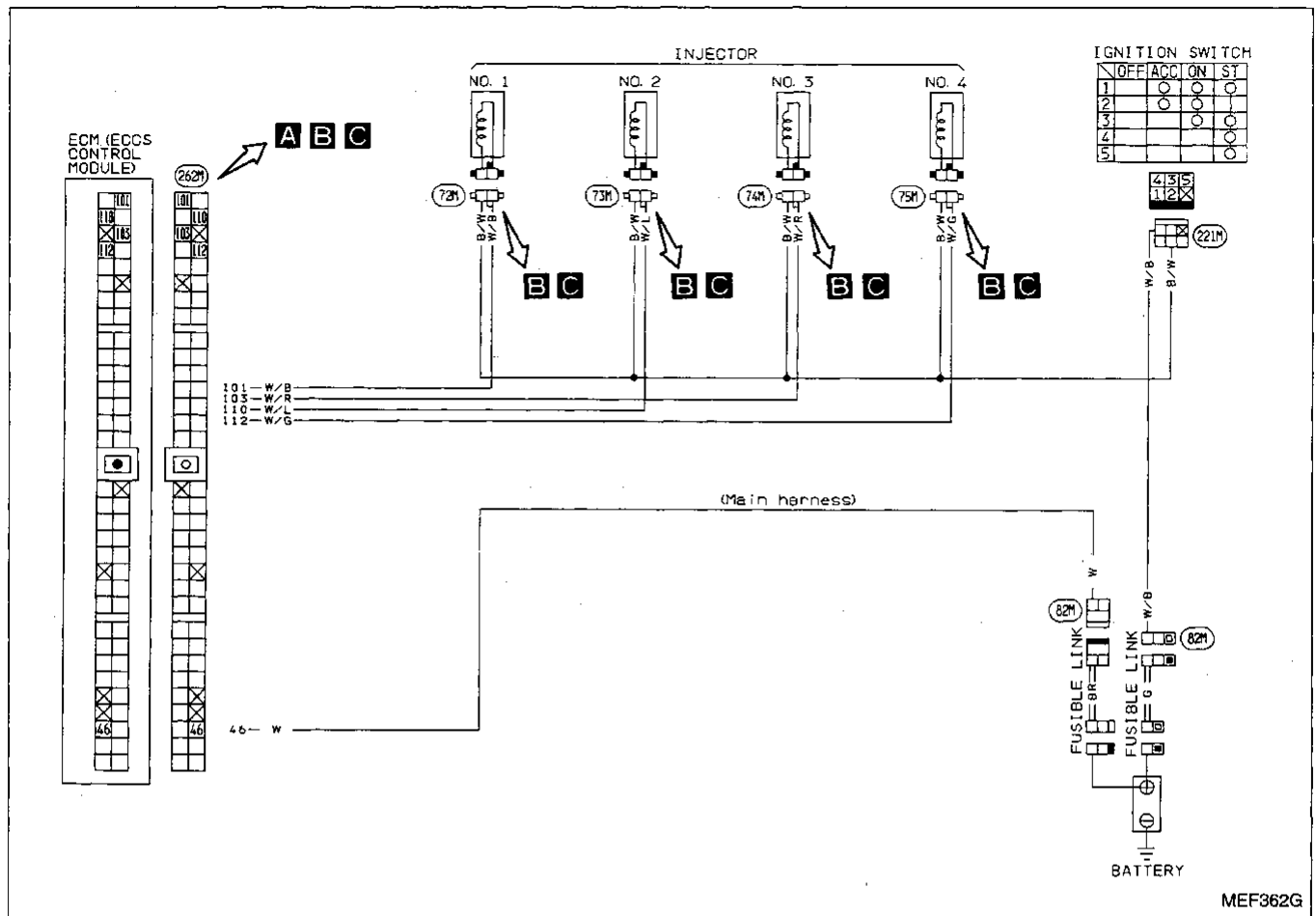
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

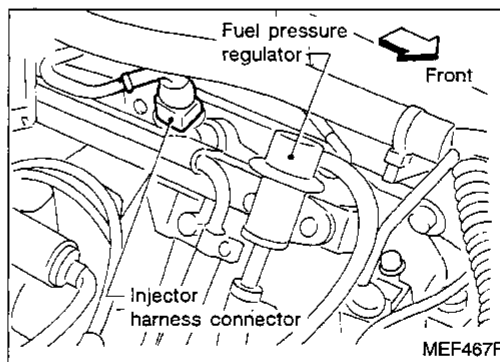
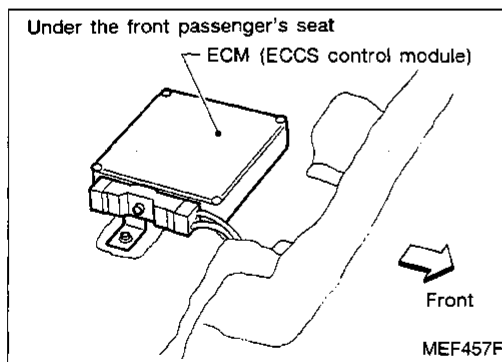
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 37

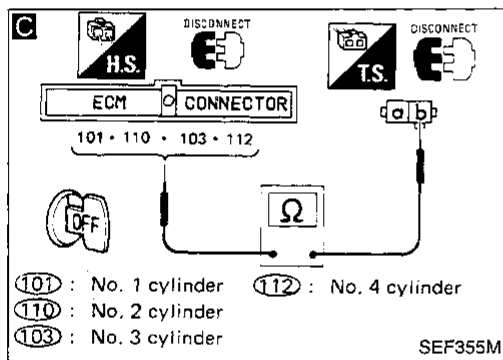
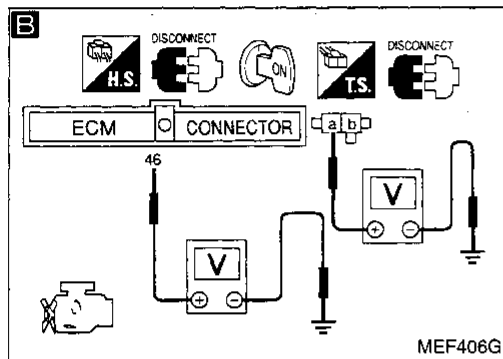
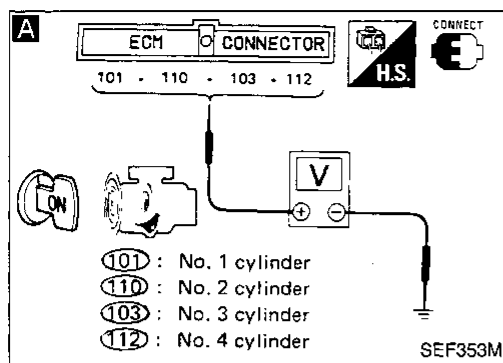
INJECTOR (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 37 (Cont'd)



INSPECTION START

A

CHECK CONTROL FUNCTION.

- 1) Start engine.
- 2) Check voltage between ECM terminals 101, 110, 103, 112 and ground.

Voltage: Battery voltage

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect injector harness connector and ECM harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (a) and ground, ECM terminal 46 and ground.

Voltage: Battery voltage

NG → Repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal (b) and ECM terminals 101 (No. 1 cylinder), 110 (No. 2 cylinder), 103 (No. 3 cylinder), 112 (No. 4 cylinder).

Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Injector).

Refer to "Electrical Components Inspection", EF & EC-283 in the Service Manual.

NG → Replace injector.

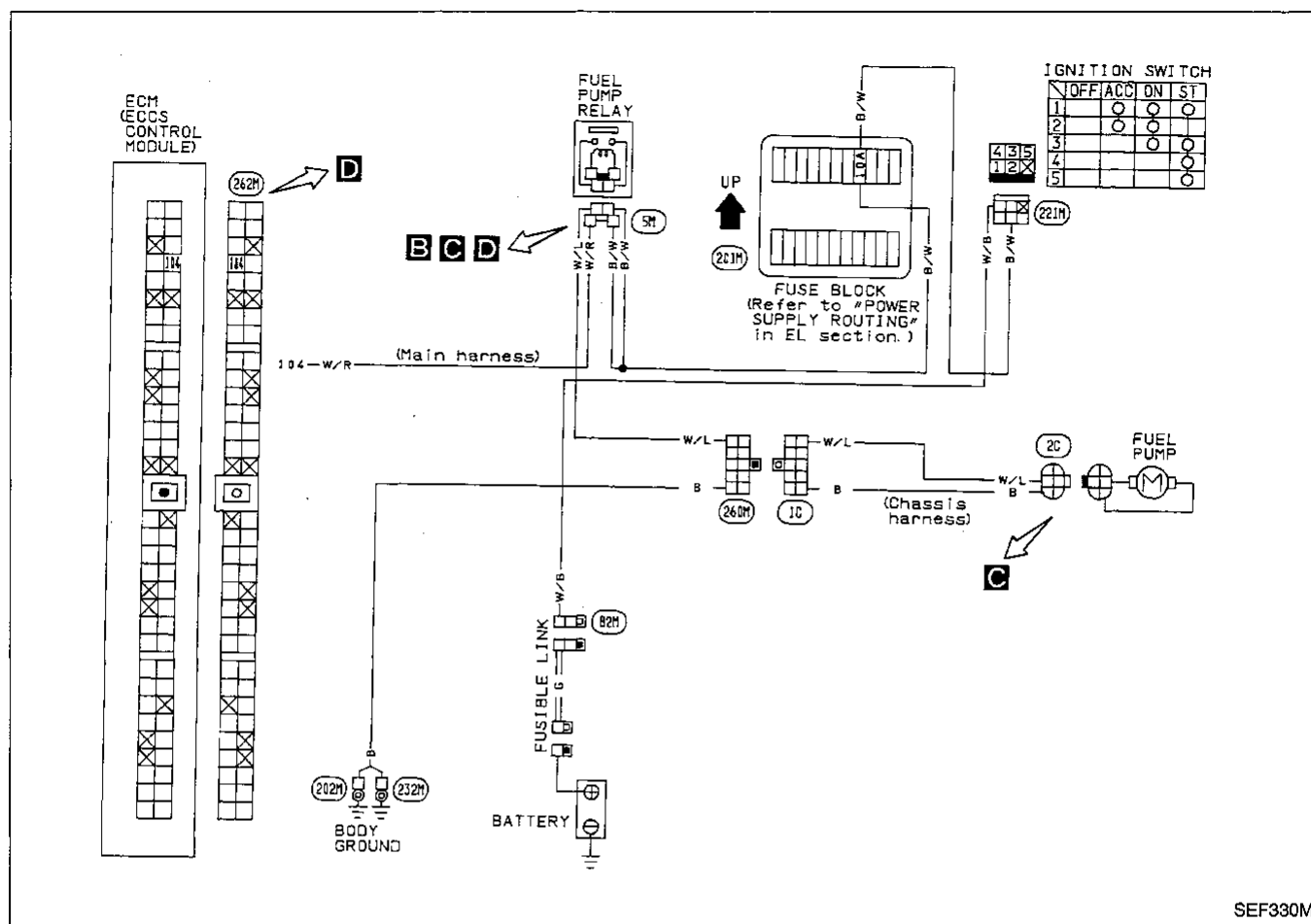
OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

FUEL PUMP (Not self-diagnostic item)

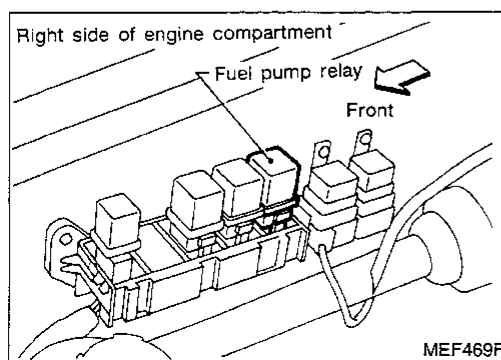
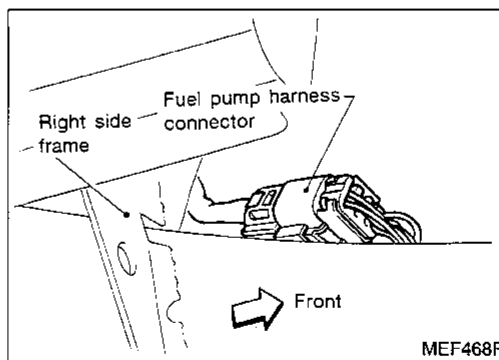


Under the front passenger's seat

ECM (ECCS control module)

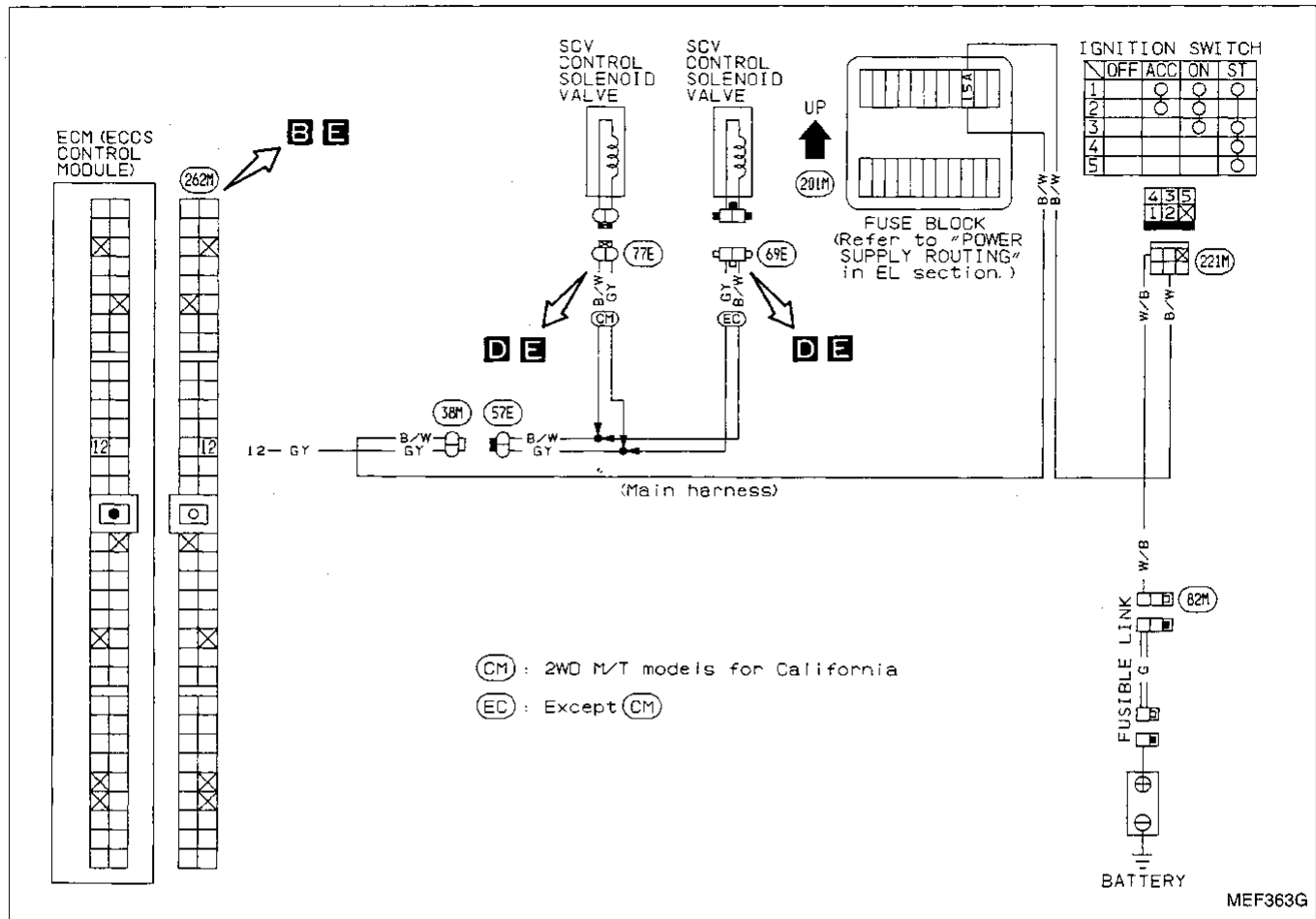
Front

MEF457P

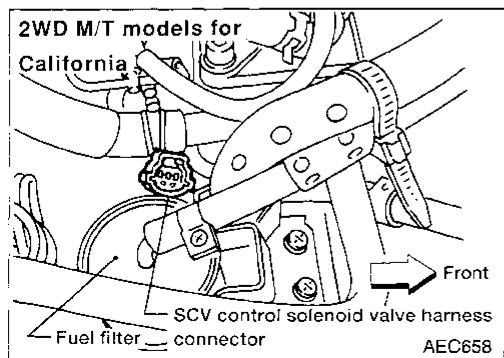
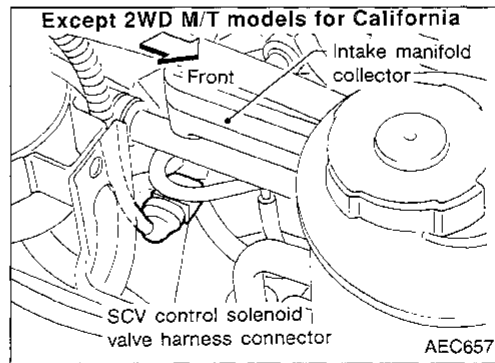
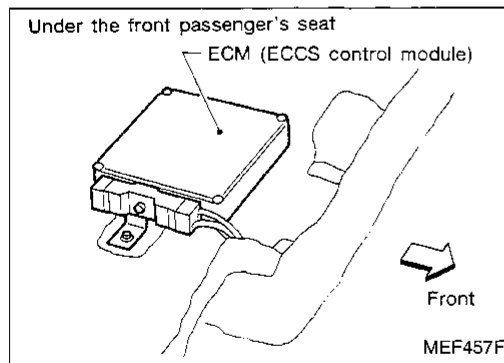


Diagnostic Procedure 39

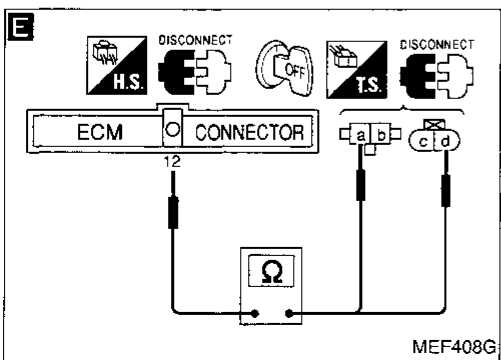
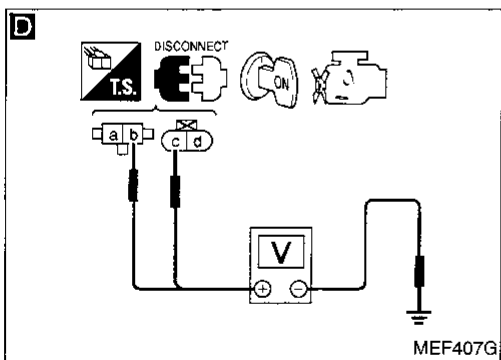
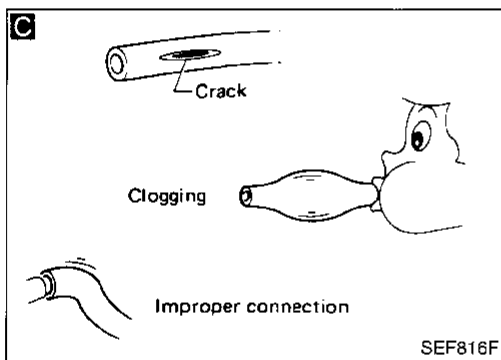
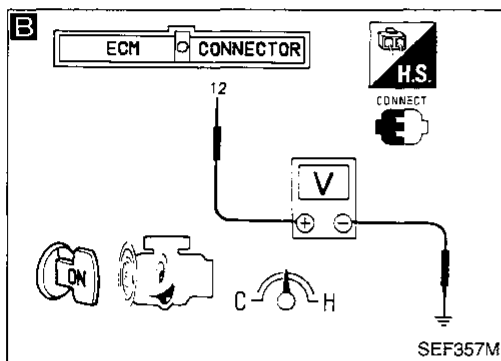
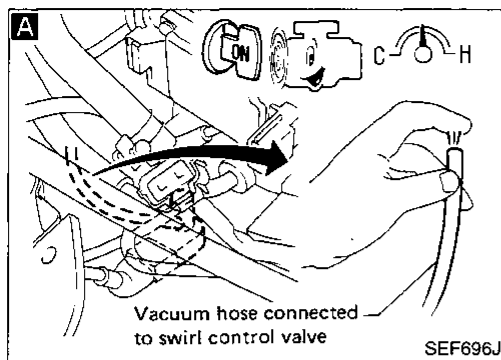
SCV CONTROL (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 39 (Cont'd)



INSPECTION START

A CHECK VACUUM SOURCE TO SWIRL CONTROL VALVE.

- 1) Start engine and warm it up sufficiently.
- 2) Stop engine.
- 3) After a few seconds, disconnect vacuum hose to swirl control valve and restart engine.
- 4) Make sure that vacuum exists under the following conditions.
Engine speed is less than 3,600 rpm:
 Vacuum should exist.
Engine speed is more than 3,600 rpm:
 Vacuum should not exist.

OK → INSPECTION END

NG

B CHECK CONTROL FUNCTION.

- 1) Check voltage between ECM terminal 12 and ground.

Voltage:

Engine speed is less than 3,600 rpm
 Approximately 0V

Engine speed is more than 3,600 rpm
 Battery voltage

C CHECK VACUUM HOSE AND SWIRL CONTROL VALVE.

- 1) Check vacuum hose and swirl control valve for clogging, cracks and proper connection.

OK

D CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect SCV control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (b) and ground (Models except 2WD M/T models for California), terminal (c) and ground (2WD M/T models for California).

Voltage: Battery voltage

NG → Check the following.

- Harness connectors (38M), (57E)
- 15A Fuse
- Harness continuity between SCV control solenoid valve and fuse

If NG, repair harness or connectors.

OK

E CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal 12 and terminal (a) (Models except 2WD M/T models for California), terminal (d) (2WD M/T models for California).

Continuity should exist.

NG → Check the following:

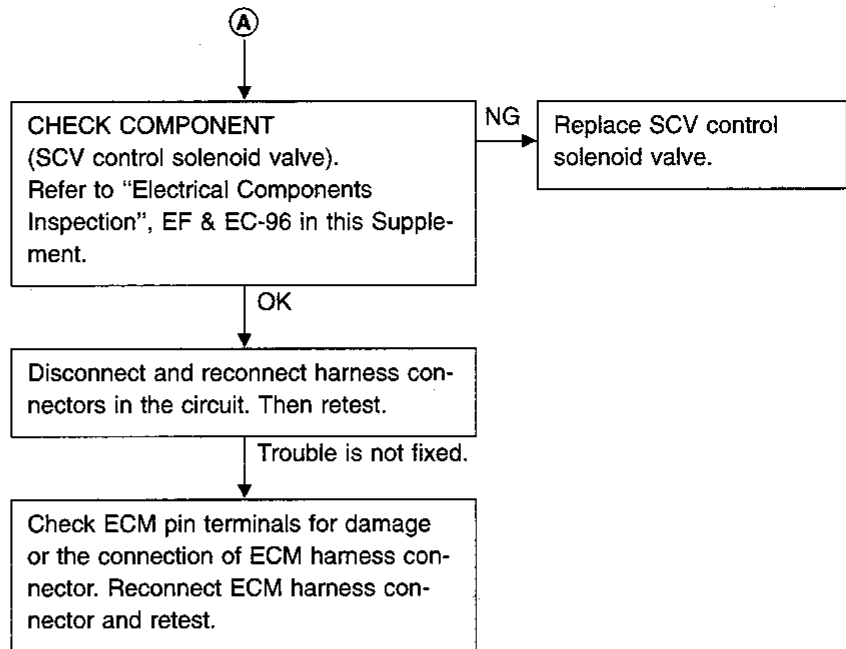
- Harness connectors (38M), (57E)
- Harness continuity between ECM and SCV control solenoid valve

If NG, repair harness or connectors.

OK

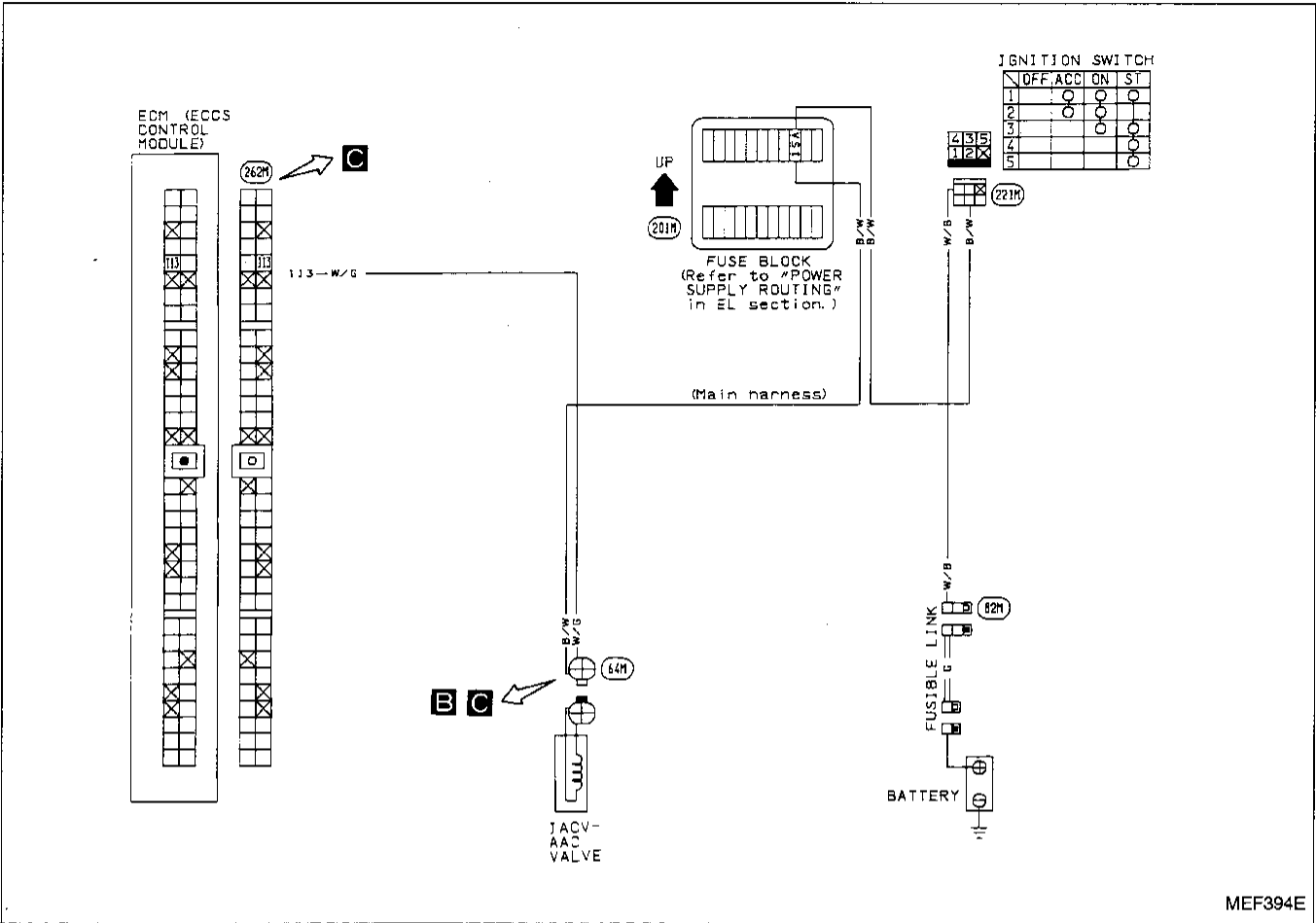
A

Diagnostic Procedure 39 (Cont'd)

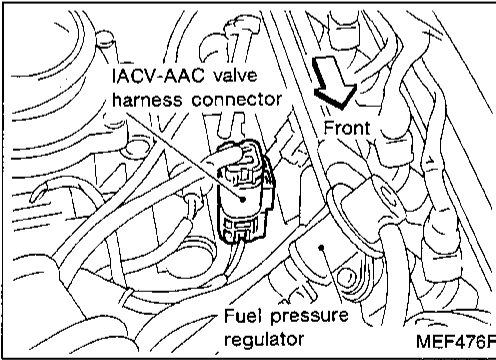
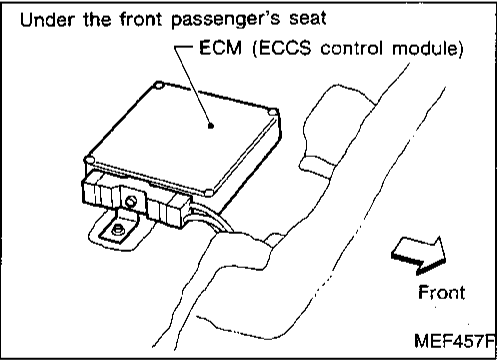


Diagnostic Procedure 40

IACV-AAC VALVE (Not self-diagnostic item)

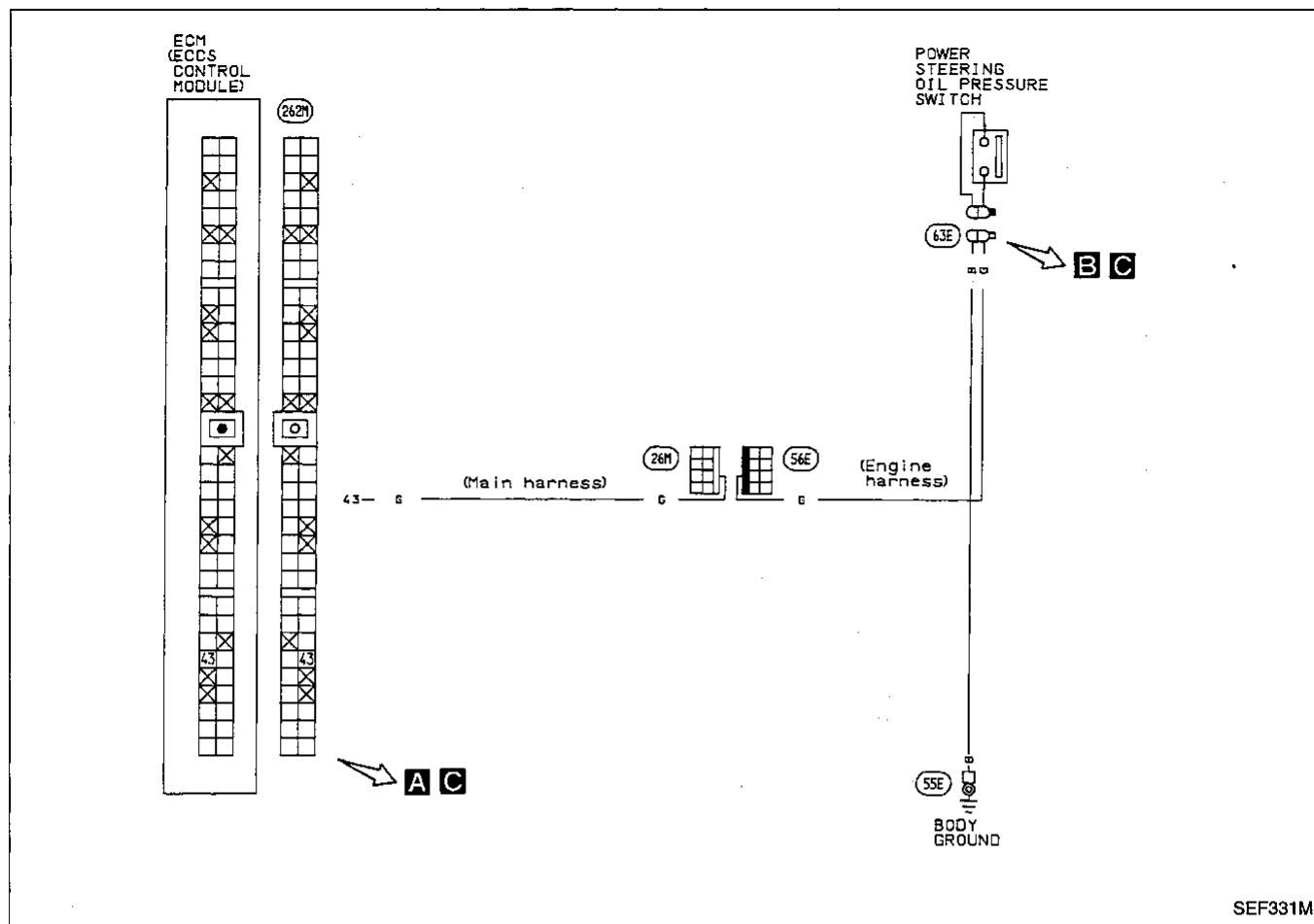


Harness layout

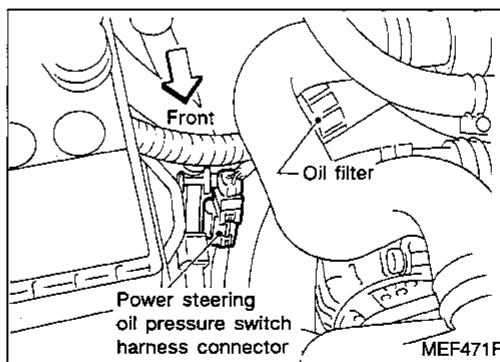
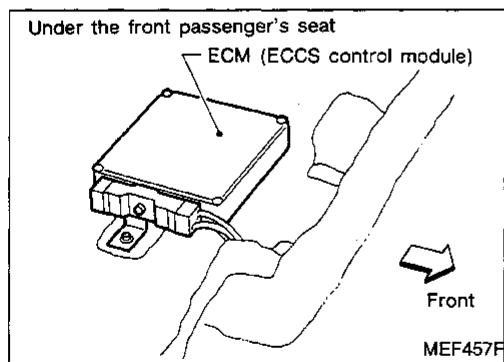


Diagnostic Procedure 41

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

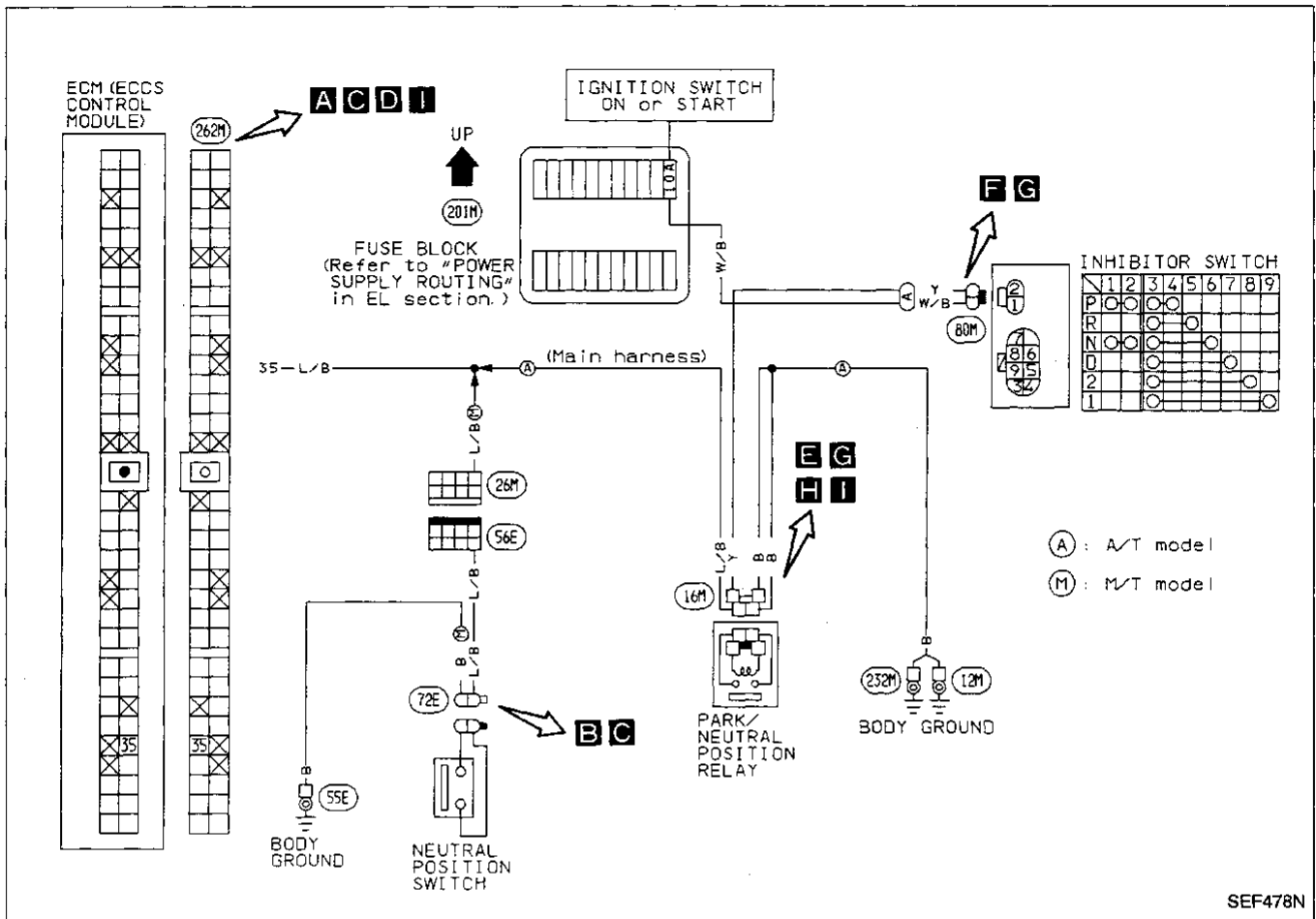


Harness layout

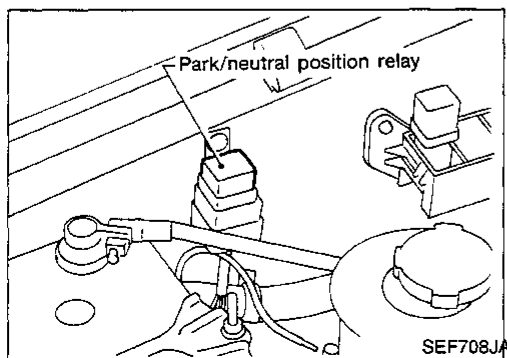
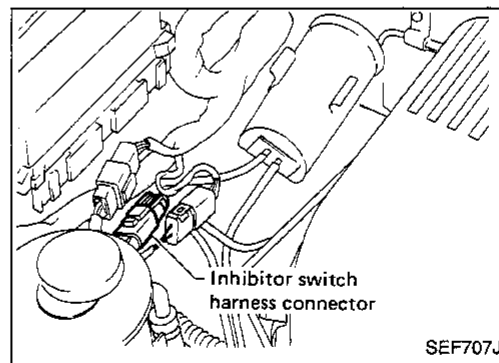
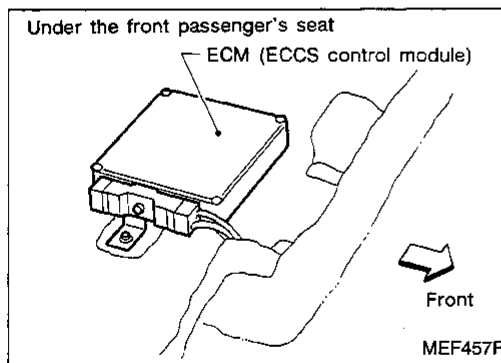


Diagnostic Procedure 42

NEUTRAL POSITION/INHIBITOR SWITCH (Not self-diagnostic item)

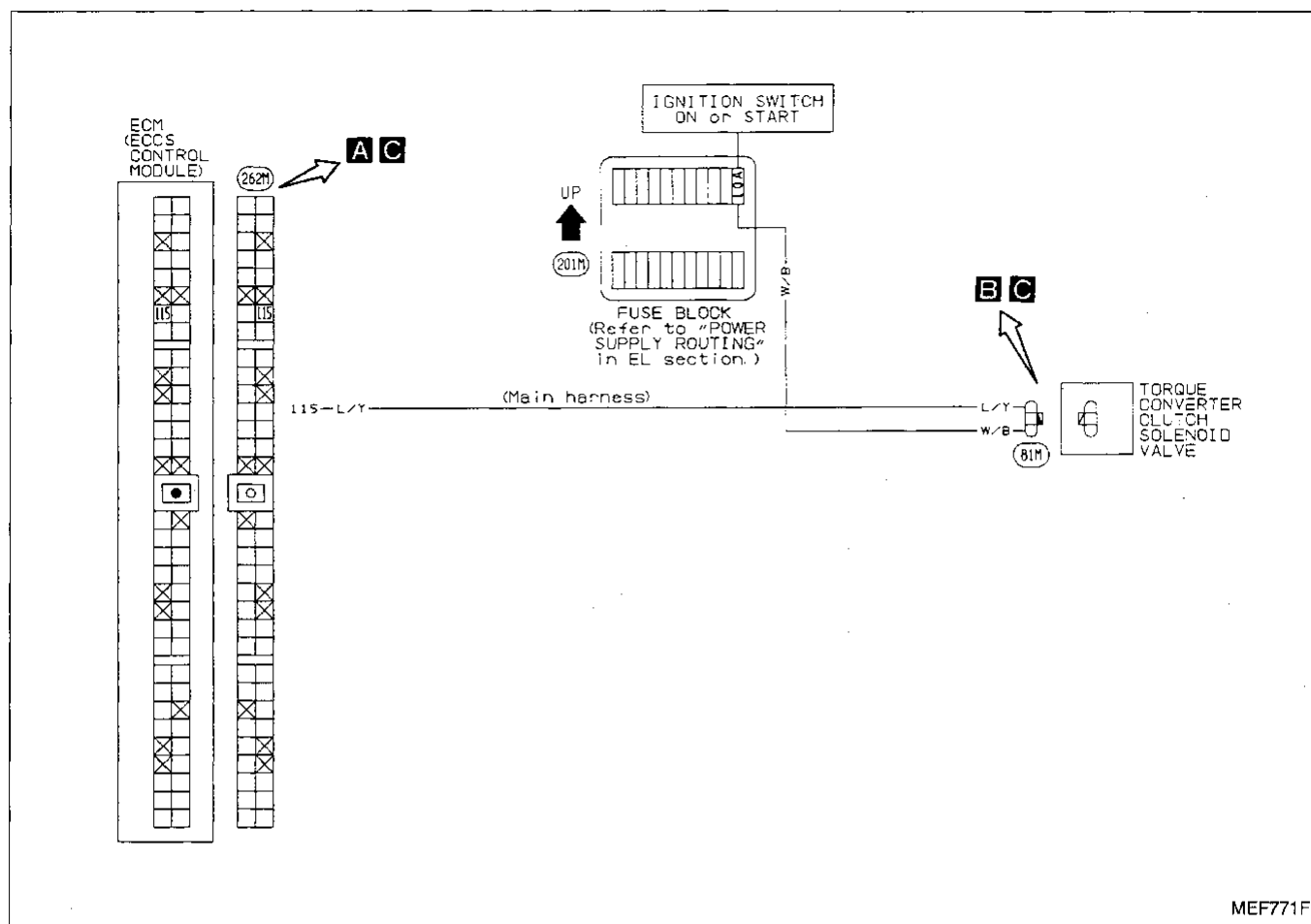


Harness layout

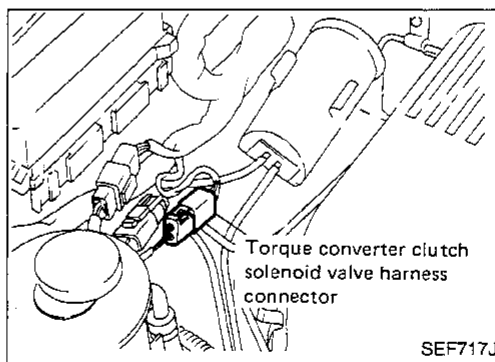
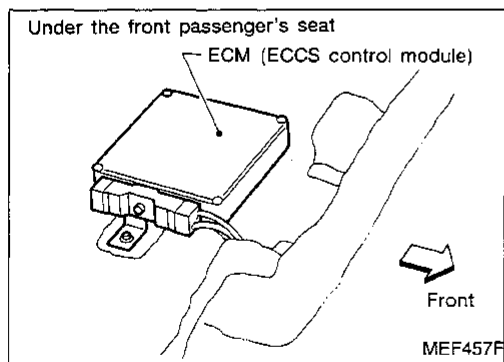


Diagnostic Procedure 43

TORQUE CONVERTER CLUTCH SOLENOID VALVE (Not self-diagnostic item)

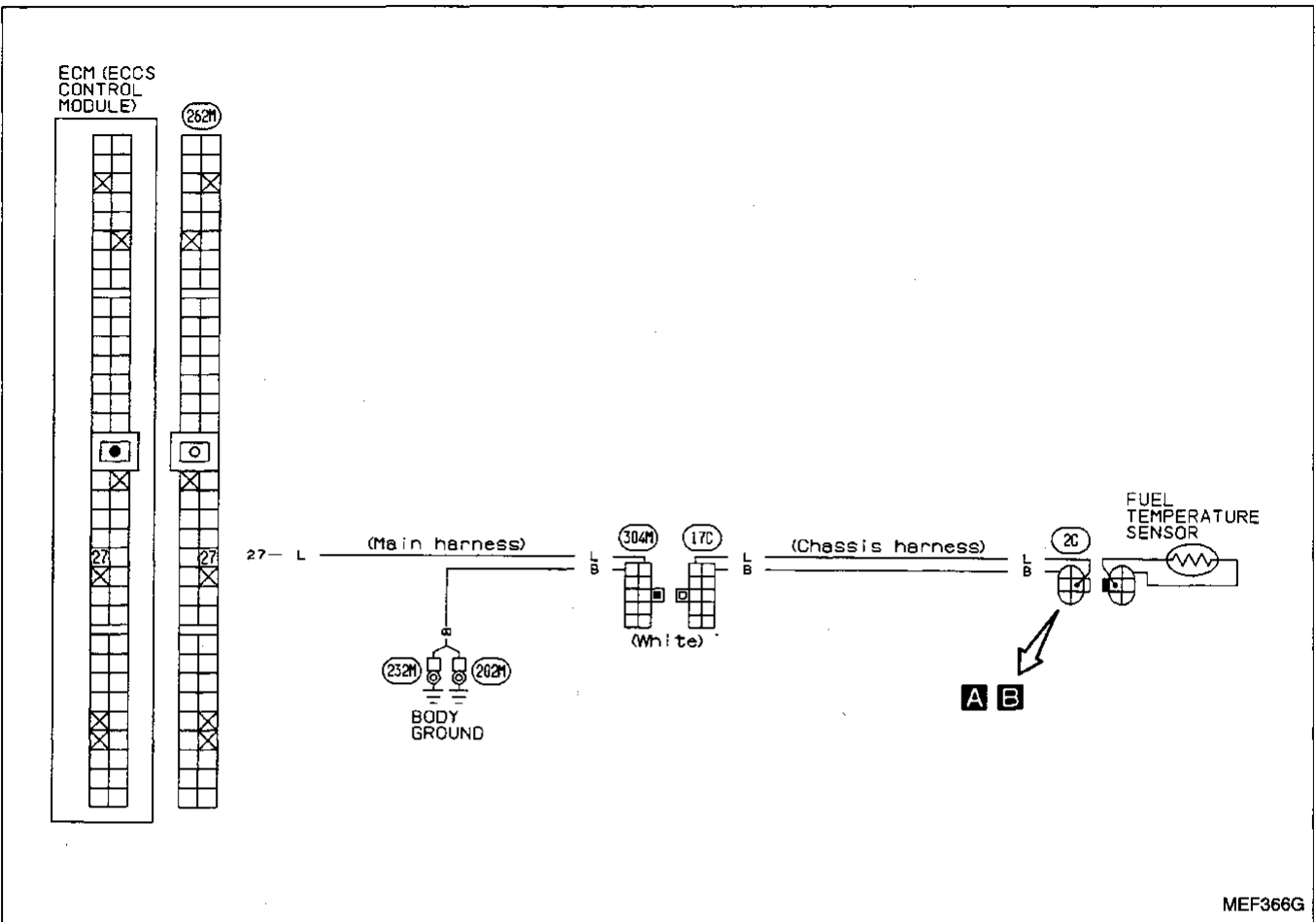


Harness layout

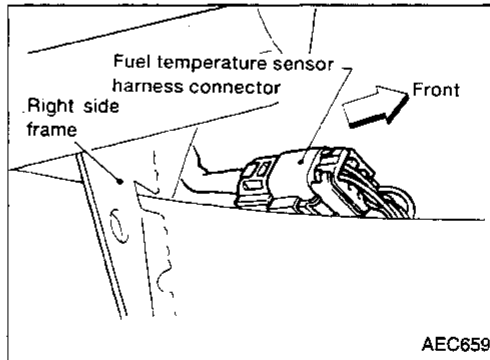
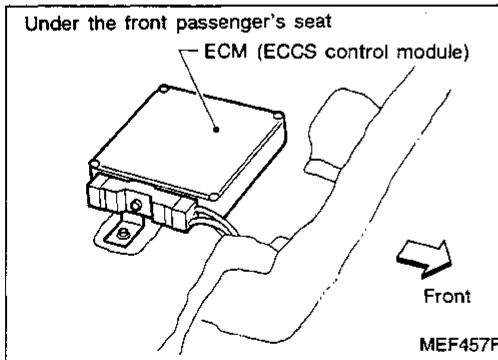


Diagnostic Procedure 44

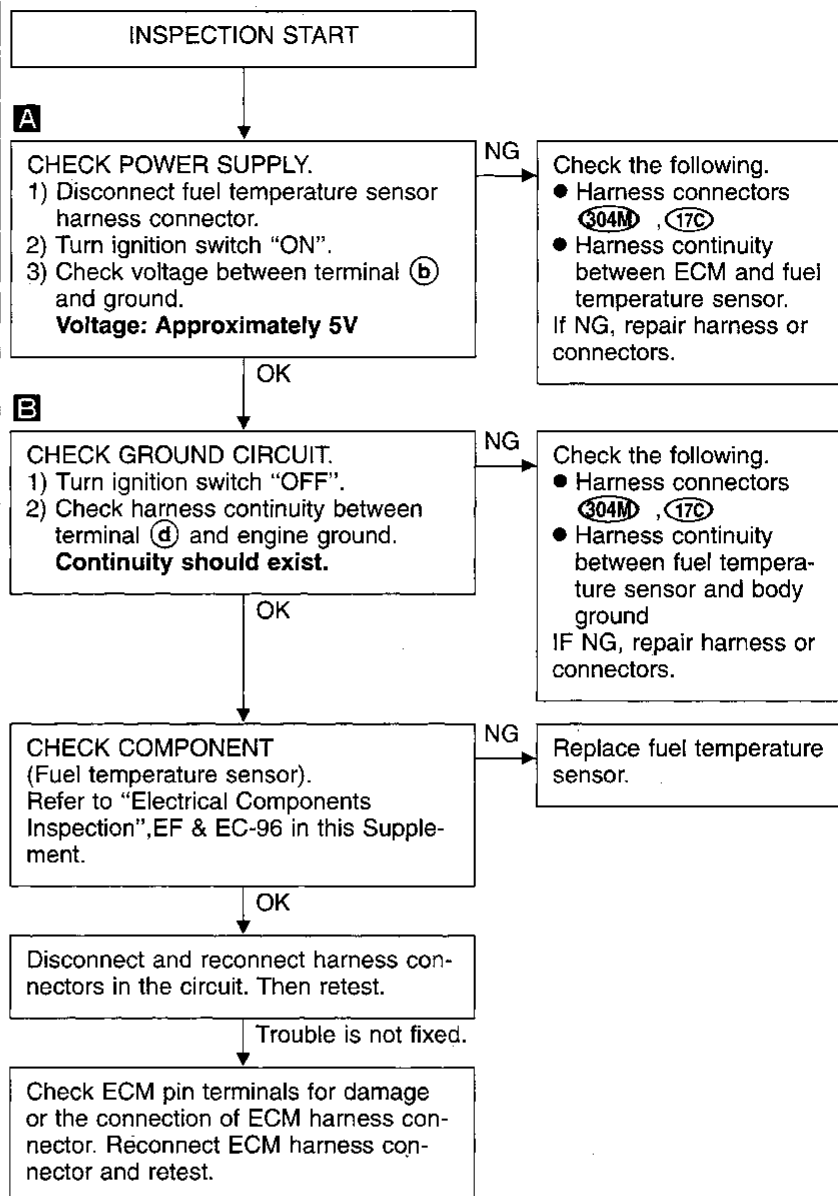
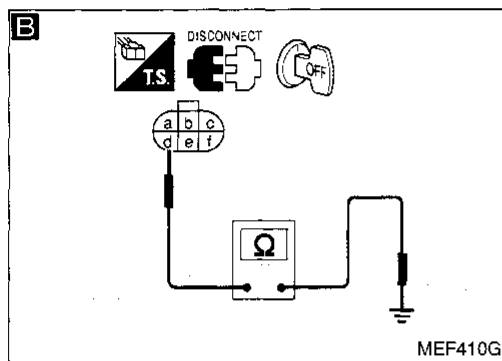
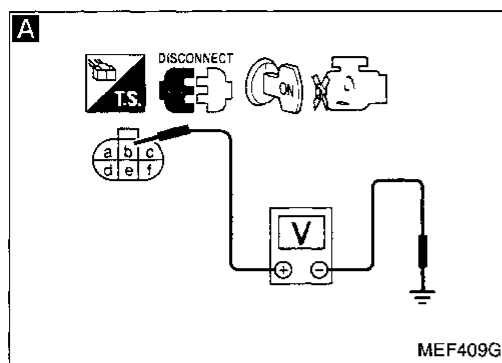
FUEL TEMPERATURE SENSOR (Diagnostic trouble code No. 42)



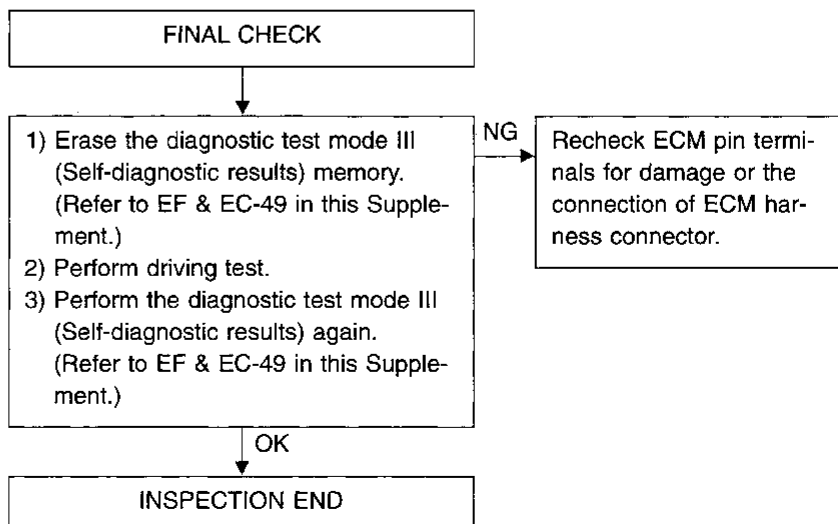
Harness layout



Diagnostic Procedure 44 (Cont'd)

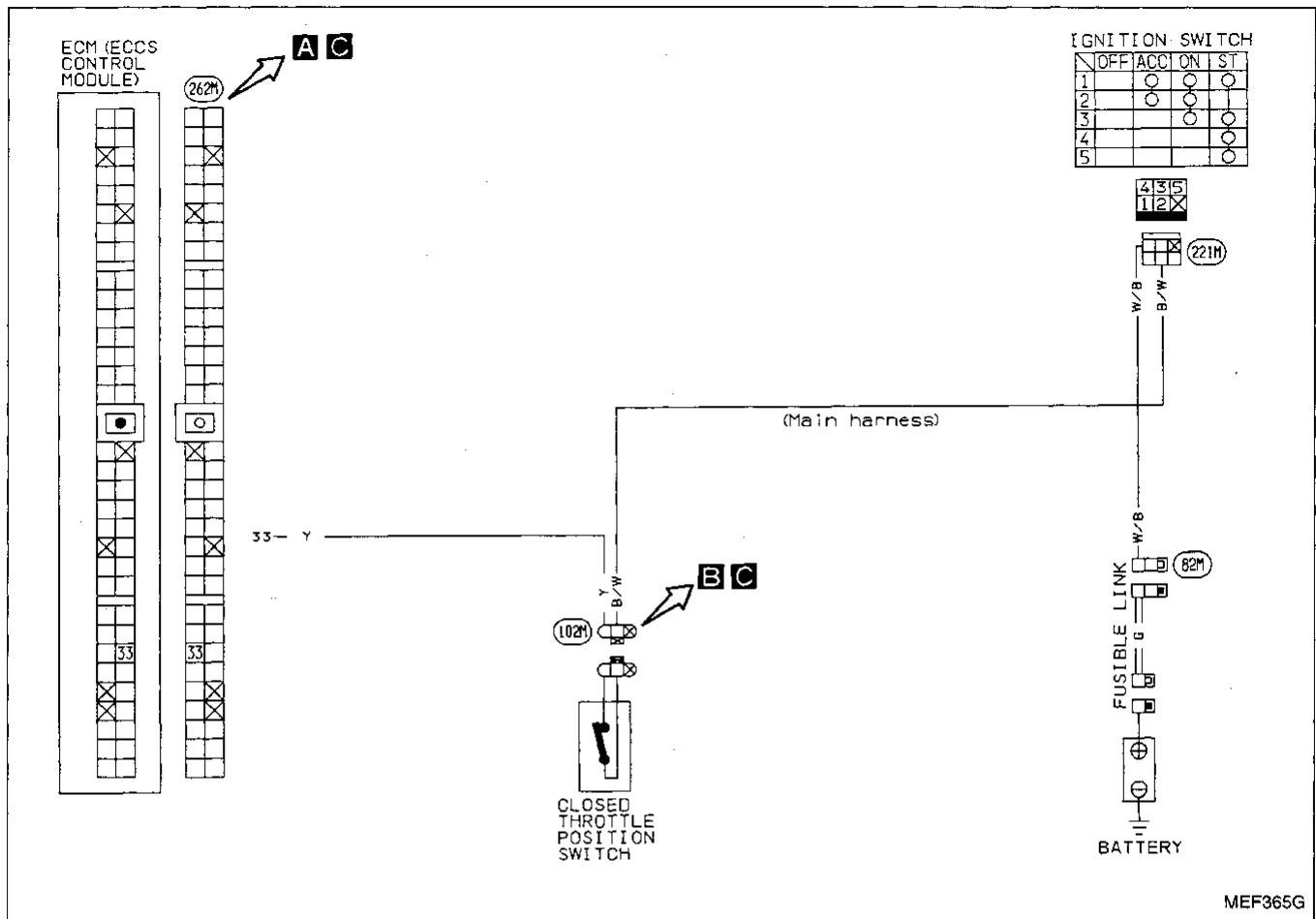


Perform FINAL CHECK by the following procedure after repair is completed.

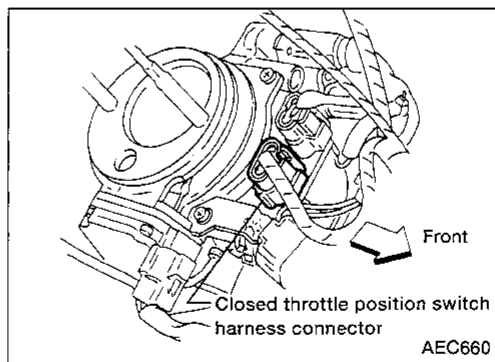
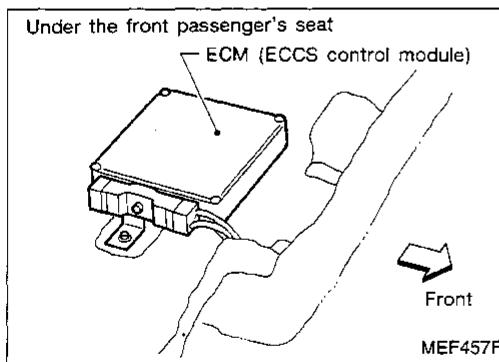


Diagnostic Procedure 45

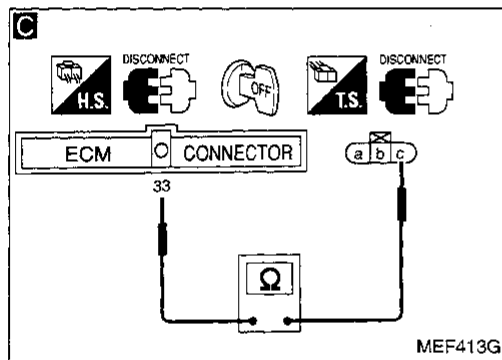
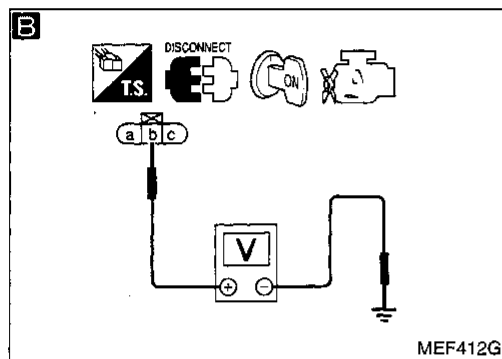
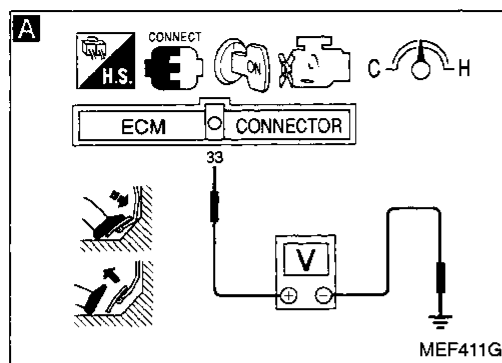
CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 45 (Cont'd)



INSPECTION START

A

CHECK OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Stop engine.
- 3) Turn ignition switch "ON".
- 4) Check voltage between ECM terminal ③③ and ground under the following conditions.

Voltage:**Accelerator pedal is released****Battery voltage****Accelerator pedal is depressed****Approximately 0V**

OK

INSPECTION END

NG

B

CHECK POWER SUPPLY.

- 1) Turn ignition switch "OFF".
- 2) Disconnect closed throttle position switch harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal ② and ground.

Voltage: Battery voltage.

NG

Check the following.

- Harness continuity between closed throttle position switch and ignition switch.
- If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
 - 2) Disconnect ECM harness connector.
 - 3) Check harness continuity between ECM terminal ③③ and terminal ②.
- Continuity should exist.**

NG

Repair harness or connectors.

OK

CHECK COMPONENT

(Closed throttle position switch).
Refer to "Electrical Components Inspection", EF & EC-97 in this Supplement.)

NG

Replace closed throttle position switch.

OK

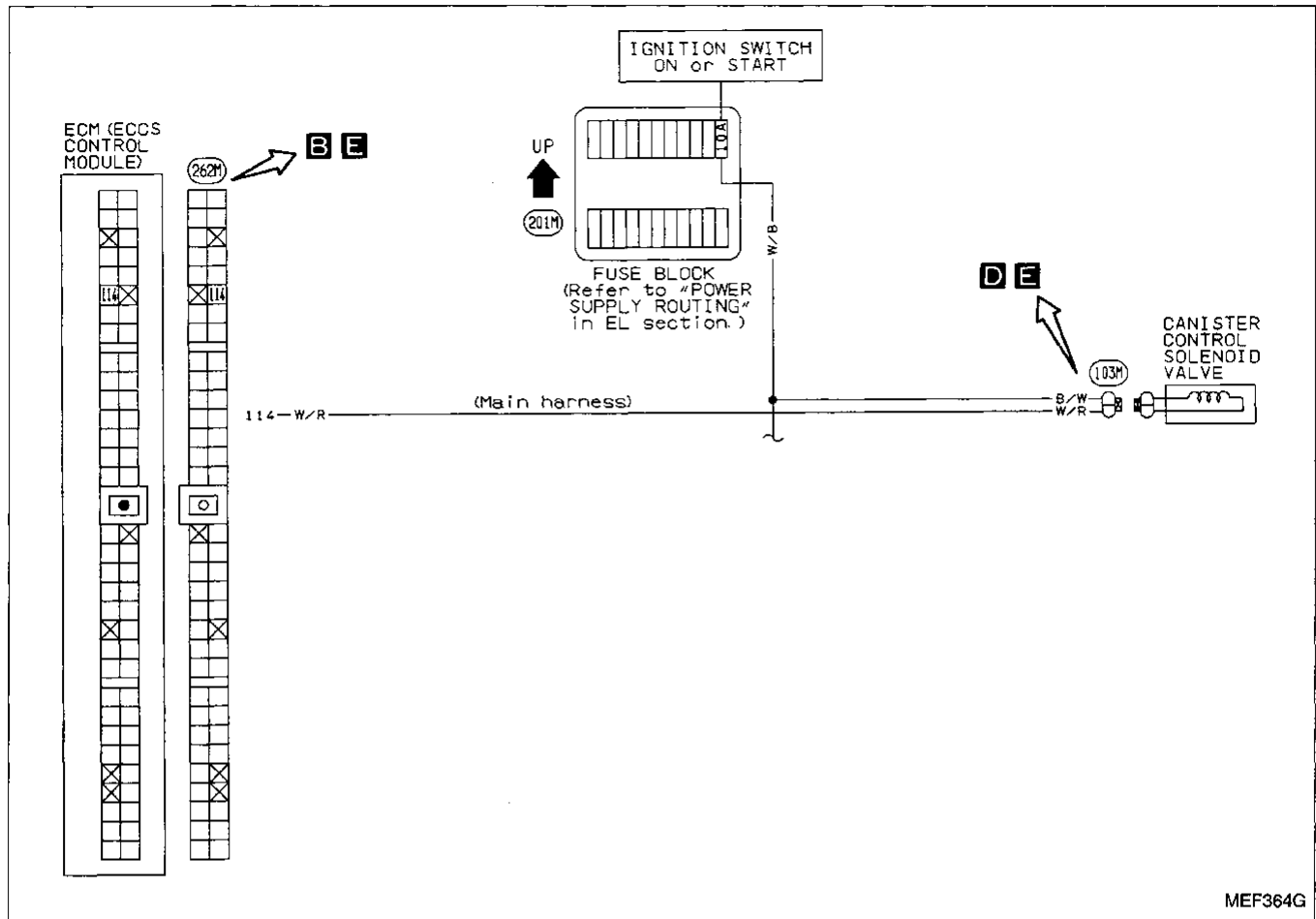
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

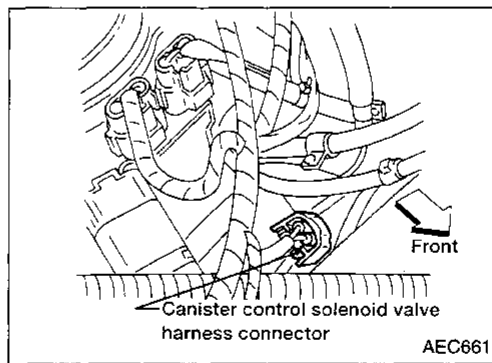
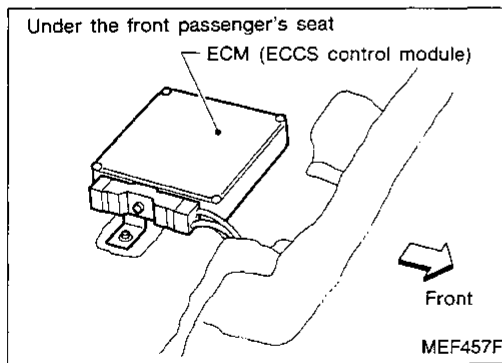
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 46

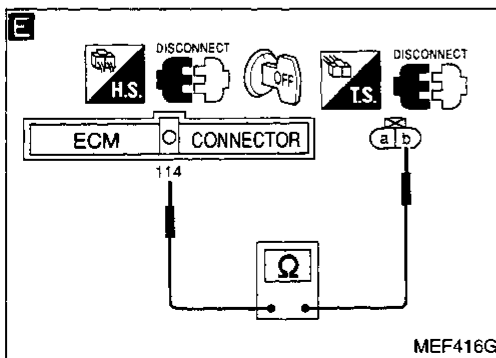
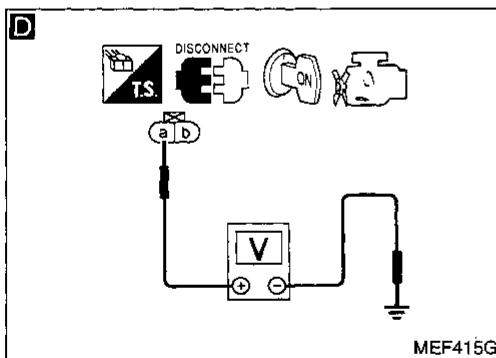
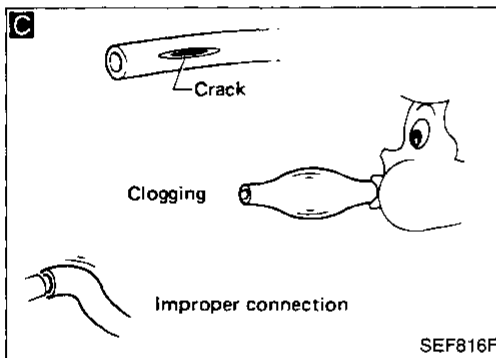
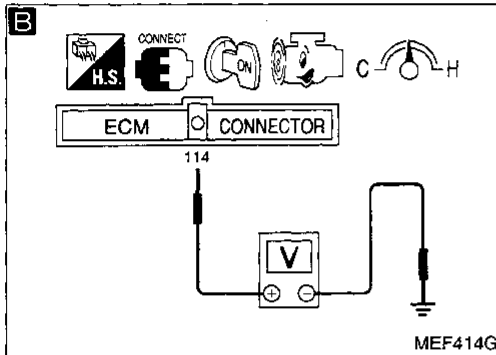
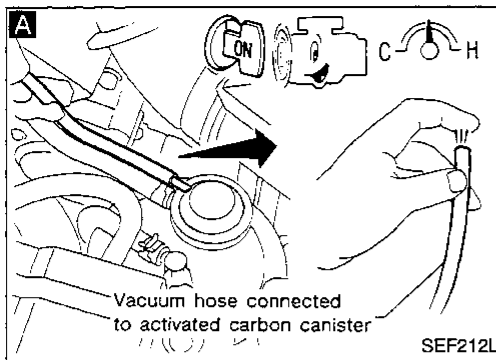
CANISTER CONTROL SOLENOID VALVE (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 46 (Cont'd)



INSPECTION START

A
CHECK VACUUM SOURCE TO ACTIVATE CARBON CANISTER.

- 1) Start engine and warm it up sufficiently.
- 2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 12 is not displayed.
- 3) Stop engine and jack up drive wheels.
- 4) Disconnect vacuum hose to activated carbon canister and restart engine.
- 5) Make sure that vacuum exists under the following conditions.

At idle:

Vacuum should not exist.

Engine speed is about 2,000 rpm (in "1" position)

Vacuum should exist.

OK → CHECK COMPONENTS.
(Canister)
Refer to EF & EC-99 in this Supplement.
If NG, replace canister.

OK

INSPECTION END.

NG

B
CHECK CONTROL FUNCTION.

- 1) Check voltage between ECM terminal (114) and ground under the following conditions.

Voltage:

At idle

Approximately 0V

Engine speed is about 2,000 rpm (in "1" position)

Battery voltage

OK → Check vacuum hose for clogging, cracks and proper connection.

NG

D
CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect canister control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (a) and ground.

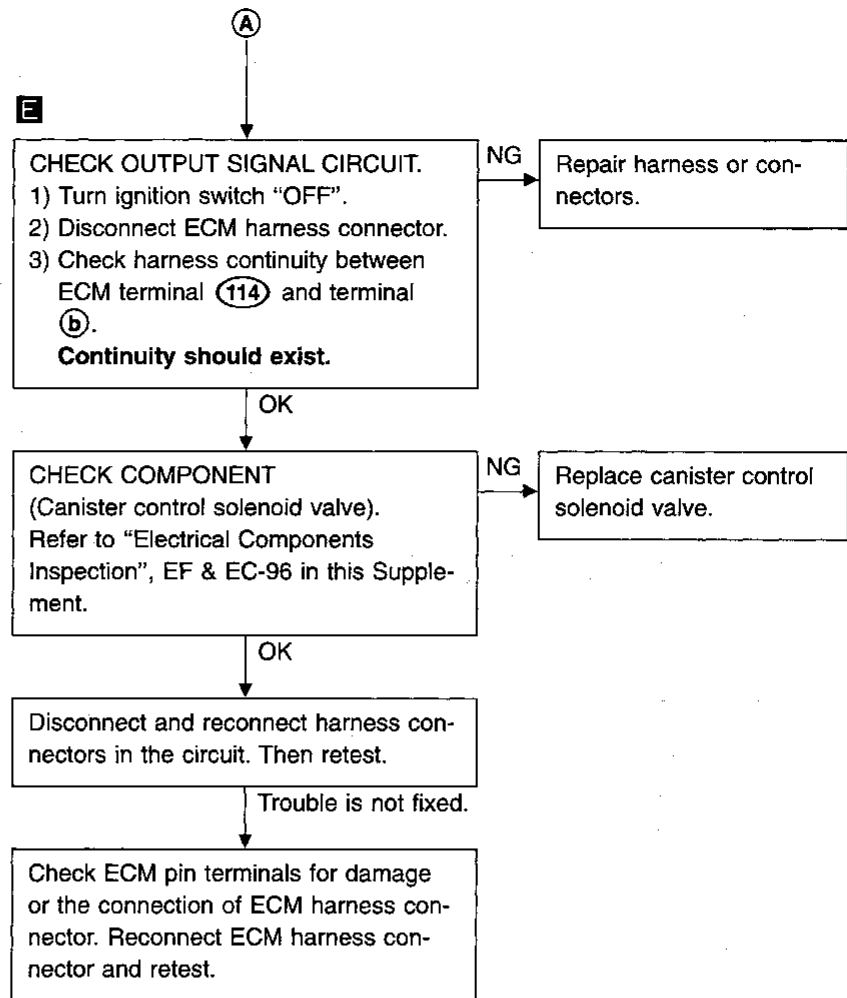
Voltage: Battery voltage

NG → Check the following.
 • 10A fuse
 • Harness continuity between canister control solenoid valve and fuse
 If NG, repair harness or connectors.

OK

A

Diagnostic Procedure 46 (Cont'd)



GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

TF

PD

FA

RA

BR

ST

BF

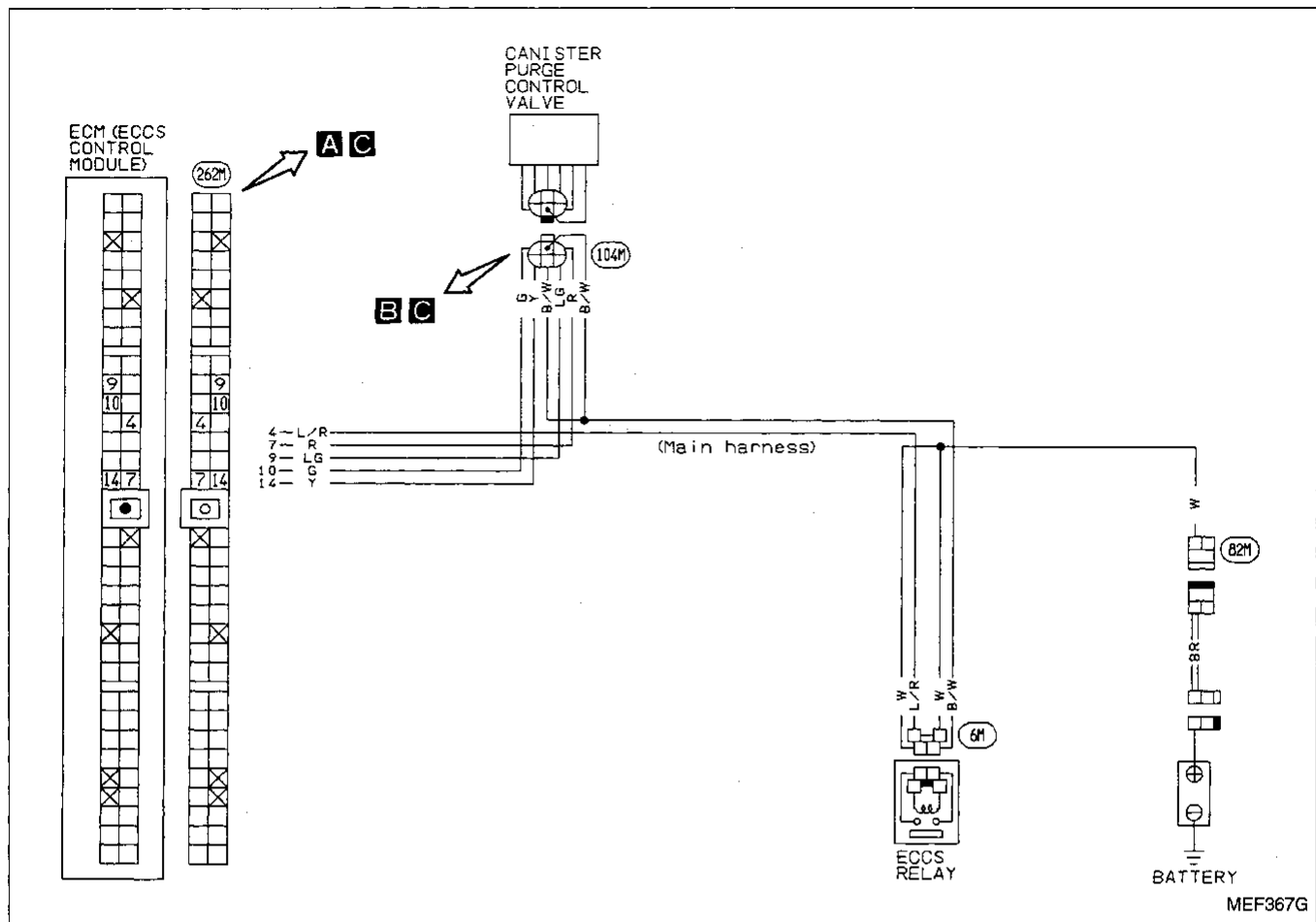
HA

EL

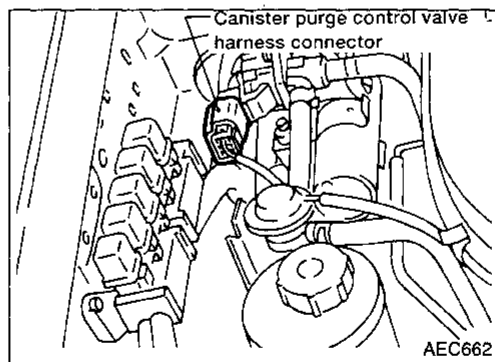
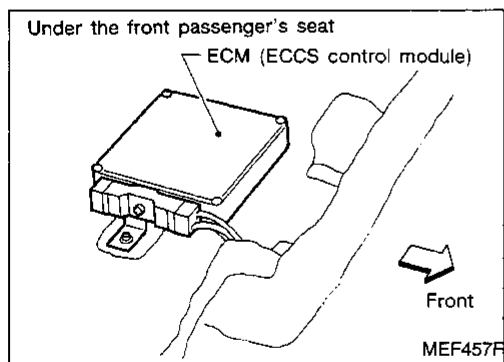
IDX

Diagnostic Procedure 47

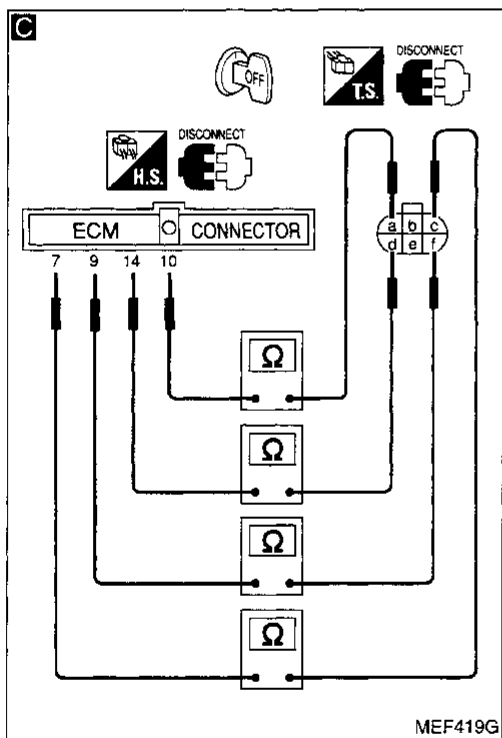
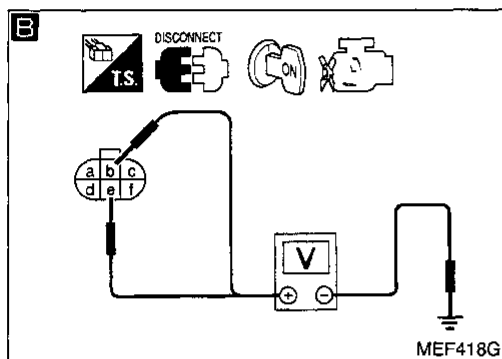
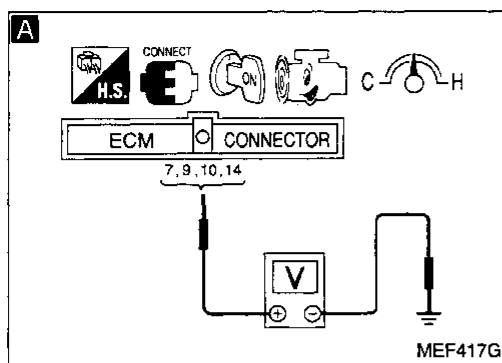
CANISTER PURGE CONTROL VALVE (Not self-diagnostic item)



Harness layout



Diagnostic Procedure 47 (Cont'd)



INSPECTION START

A

CHECK CONTROL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 55 is displayed.
- 3) Keep engine at idle and check voltage between ECM terminals ⑦, ⑨, ⑩, ⑭ and ground.

Voltage:

ECM terminals ⑦, ⑨

Approximately 0 - 0.4V

ECM terminals ⑩, ⑭

Battery voltage

OK

CHECK COMPONENT
(Canister purge control valve).

Refer to "Electrical Components Inspection".
(See page EF & EC-96 in this Supplement.)

If NG, replace canister purge control valve.

OK

INSPECTION END.

NG

B

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect canister purge control valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminals ②, ⑤ and ground.

Voltage: Battery voltage

NG

Check the following.

- Harness continuity between canister purge control valve and ECCS relay
- If NG, repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal ⑦ and terminal ③, ECM terminal ⑨ and terminal ⑥, ECM terminal ⑩ and terminal ①, ECM terminal ⑭ and terminal ④.

Continuity should exist.

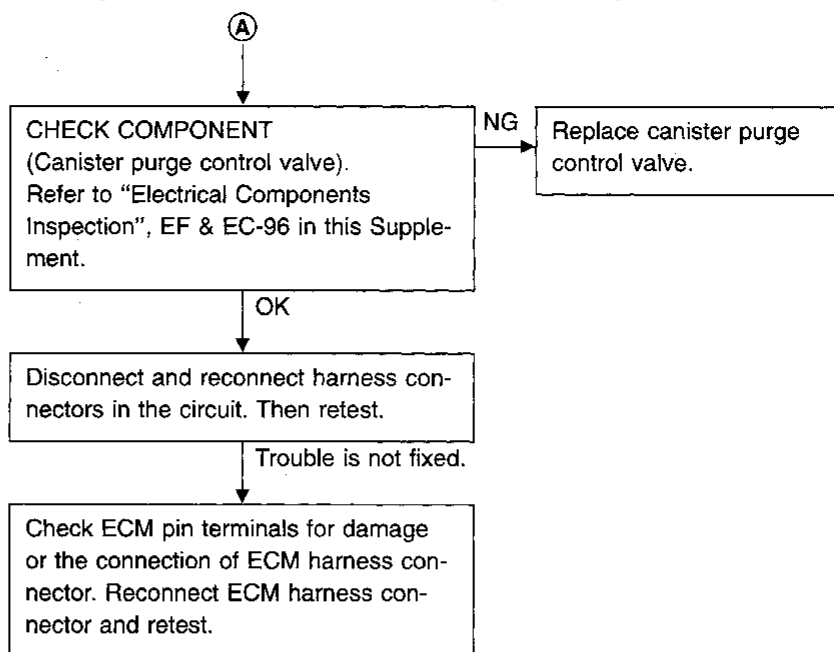
NG

Repair harness or connectors.

OK

A

Diagnostic Procedure 47 (Cont'd)



Electrical Components Inspection
ECM HARNESS CONNECTOR TERMINAL LAYOUT

101	102	103	104	105	X	107	108		1	2	3	4	5	6	7	○	X	16	17	18	19	20	21	22		31	32	33	34	35	36	37	38	39
109	110	X	112	113	114	115	116		8	9	10	11	12	13	14		23	24	25	26	27	X	29	30		40	41	42	43	X	X	46	47	48



CONNECT



MEF420G

GI

MA

EM

LC

EF &
EC

FE

CL

MT

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TF

PD

FA

RA

BR

ST

BF

HA

EL

IDX

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V
		Engine is running. └ Engine speed is 2,000 rpm.	1.2 - 1.5V
2	Tachometer	Engine is running. └ Idle speed	Approximately 1.0V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 2.7V
3	Ignition check	Engine is running. └ Idle speed	9 - 12V
4	ECCS relay (Main relay)	Engine is running. Ignition switch "OFF" └ Within a few seconds after turning ignition switch "OFF"	0 - 1V
		Ignition switch "OFF" └ A few seconds after turning ignition switch "OFF" and thereafter.	BATTERY VOLTAGE (11 - 14V)
7 9	Canister purge control valve	Engine is running. └ Idle speed	Approximately 0 - 0.4V
10 14		Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ Idle speed	3.0 - 4.0V
		Engine is running. (Racing) └ After warming up	0 - 3.0V
11	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0 - 1.0V
		Engine is running. └ A/C switch is "OFF".	0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA	
12	SCV control solenoid valve	Engine is running. └ Idle speed	0 - 1.0V	GI
		Engine is running. └ Engine speed is 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)	MA EM
16	Mass air flow sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine speed.	LC
18	Engine coolant temperature sensor	Engine is running.	1.0 - 3.0V Output voltage varies with engine coolant temperature.	EF & EC
19	Oxygen sensor	Engine is running. └ After warming up sufficiently.	0 - Approximately 1.0V	FE
20	Throttle position sensor	Ignition switch "ON" └ After warming up sufficiently.	0.5 - Approximately 4V Output voltage varies with the throttle valve opening angle.	CL
22 30	Camshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	0.3 - 0.4V	MT AT
26	Intake air temperature sensor	Ignition switch "ON" └ Intake air temperature is 20°C (68°F).	Approximately 2.4V	TF
		Ignition switch "ON" └ Intake air temperature is 80°C (176°F).	Approximately 0.3V	PD
27	Fuel temperature sensor	Ignition switch "ON"	0 - 5V Output voltage varies with fuel temperature.	FA RA
31 40	Camshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 3.0V	BR
33	Closed throttle position switch	Ignition switch "ON" └ Accelerator pedal is fully released after warming-up.	BATTERY VOLTAGE (11 - 14V)	ST
		Ignition switch "ON" └ Accelerator pedal is depressed.	Approximately 0V	BF
34	Start signal	Cranking	8 - 12V	HA
35	Neutral position switch & Inhibitor switch	Ignition switch "ON" └ Neutral position/Parking	0V	EL
		Ignition switch "ON" └ Except the above gear position	6 - 7V	IDX

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON".	0V
		Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
43	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0.1 - 0.3V
		Engine is running. └ Steering wheel is not being turned.	Approximately 5V
46	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
105	EGRC-solenoid valve	Engine is running. └ Engine is cold. Engine coolant temperature is below 60°C (140°F).	0.7 - 0.9V
		Engine is running. (Racing) └ After warming up Engine coolant temperature is between 60°C (140°F) and 105°C (221°F).	BATTERY VOLTAGE (11 - 14V)
102	PAIRC-solenoid valve	Engine is running. └ Idle speed	Approximately 0V
		Engine is running. └ Except at idle Do not run engine at high speed under no-load.	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMI- NAL NO.	ITEM	CONDITION	*DATA
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	0.7 - 0.9V
		Engine is running.	
		Ignition switch "ON" └ Within 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
113	IACV-AAC valve	Engine is running. └ Idle speed	7 - 10V
		Engine is running. └ Steering wheel is being turned. └ Air conditioner is operating. └ Rear defogger is "ON". └ Headlamps are in high position.	4 - 7V
		Engine is running. └ Idle speed	BATTERY VOLTAGE (11-14V)
114	Canister control solenoid valve	Engine is running. └ Engine speed is about 2,000 rpm in "1" position after warm- ing up.	Approximately 0V
		Engine is running. └ Idle speed └ Engine coolant temperature is below 40°C (104°F).	Approximately 0V
		Engine is running. └ After warming up └ Engine coolant temperature is above 40°C (104°F). └ Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)
115	Torque converter clutch solenoid valve	Engine is running. └ Idle speed └ Engine coolant temperature is below 40°C (104°F).	Approximately 0V
		Engine is running. └ After warming up └ Engine coolant temperature is above 40°C (104°F). └ Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

GI

MA

EM

LC

EF &
EC

FE

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MT

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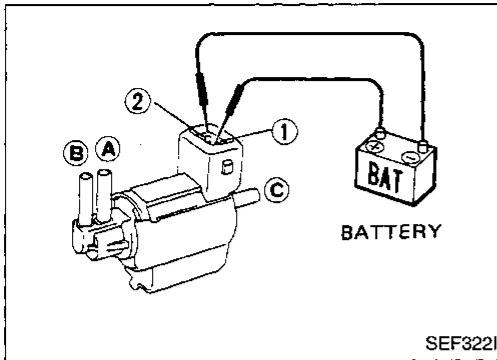
ST

BF

HA

EL

IDX

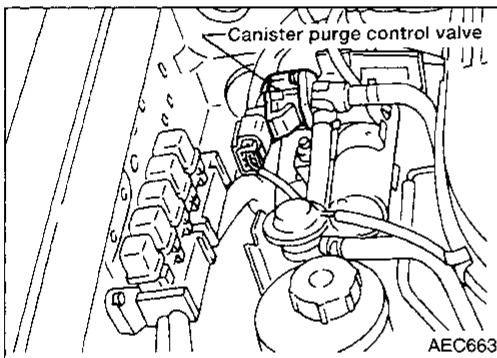


Electrical Components Inspection (Cont'd)

EGRC-SOLENOID VALVE, PAIRC-SOLENOID VALVE AND SCV CONTROL SOLENOID VALVE, CANISTER CONTROL SOLENOID VALVE

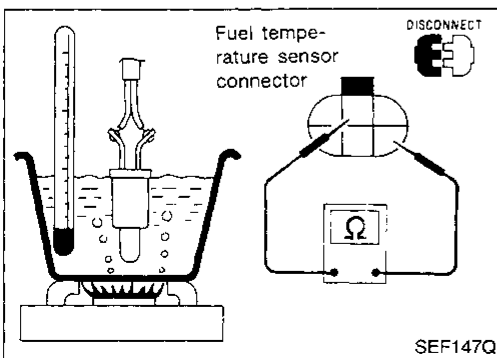
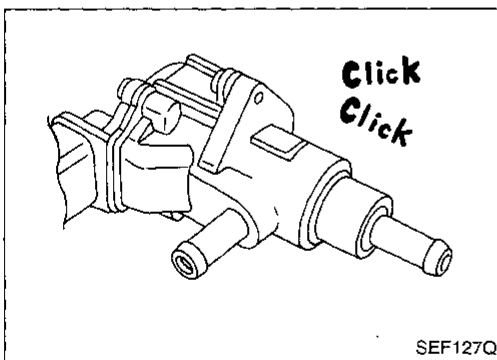
Check air passages continuity.

Condition	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



CANISTER PURGE CONTROL VALVE (2WD M/T models for California)

Turn switch "ON" and "OFF" and ensure the canister purge control valve makes an operating sound. If NG, replace the canister purge control valve.

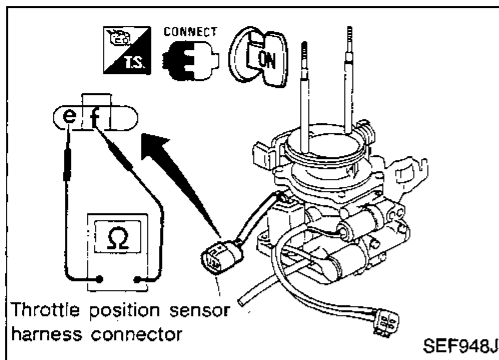


FUEL TEMPERATURE SENSOR (2WD M/T models for California)

Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel temperature sensor.



Electrical Components Inspection (Cont'd)

THROTTLE POSITION SENSOR

Make sure that resistance between terminals ⑤ and ⑥ changes when opening throttle valve manually.

Resistance should change.

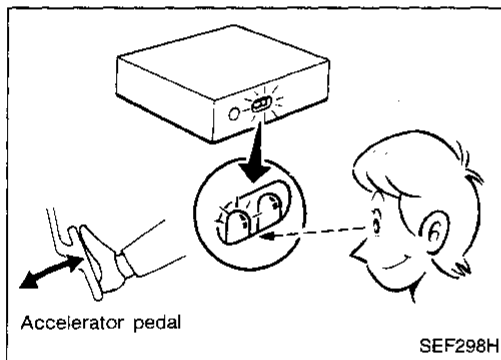
If NG, replace throttle position sensor.

Adjustment

If throttle position sensor is replaced or removed, it is necessary to install it in the proper position.

Except 2WD M/T models for California.

1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect throttle position sensor harness connector.
3. Start engine and warm it up sufficiently.
4. Measure output voltage of throttle position sensor using voltmeter.
5. Adjust by rotating throttle position sensor body so that output voltage is 0.4 to 0.6V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.

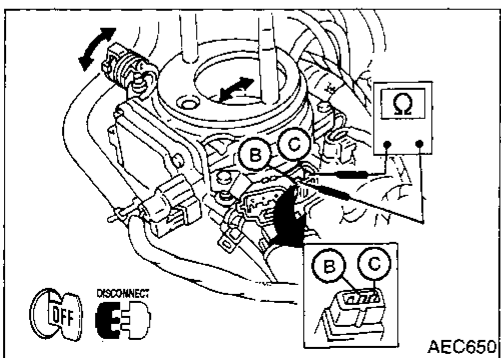


2WD M/T models for California

1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect closed throttle position switch harness connector. Do not connect throttle position sensor connector.
3. Start engine and warm it up sufficiently.
4. Turn diagnostic test mode to mode IV.
5. Depress accelerator pedal and release slowly.
6. Check engine rpm when red LED on ECM is turned on.

Closed throttle position switch ON-OFF: 1,000±150 rpm

7. If it is out of specification, adjust switch by turning throttle position sensor body.
8. Turn engine off and remove air duct.
9. Tighten securing bolts, install air duct and connect throttle position sensor connector.
10. Recheck engine ON-OFF rpm.



CLOSED THROTTLE POSITION (2WD M/T models for California)

- Check continuity between terminals ⑦ and ⑧ while moving throttle valve.

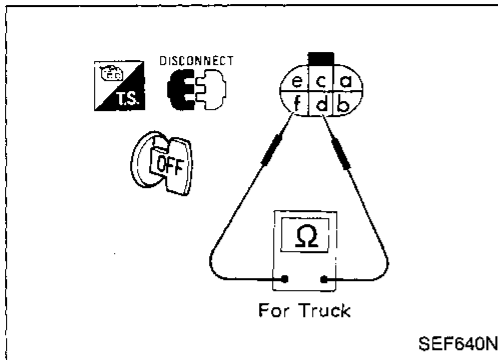
Throttle valve condition	Continuity
Fully closed	Yes
Open	No

Electrical Components Inspection (Cont'd)

FUEL PUMP

Check resistance between terminals ④ and ①.

Resistance: 0.2 - 5.0Ω



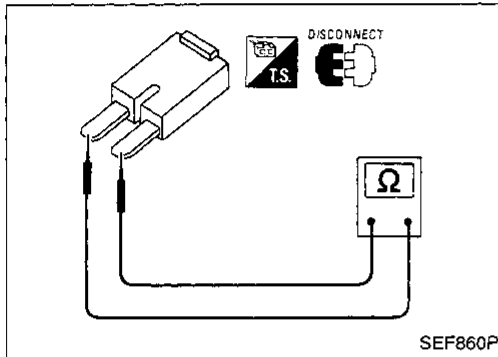
RESISTOR

1. Disconnect resistor harness connector.

2. Check resistance between terminals.

Resistance: Approximately 2.2kΩ

If NG, replace resistor.



Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove or disconnect the following:
 - EGRC-BPT valve
 - Fuel tube securing bolts
3. Remove injectors with fuel tube assembly.
4. Remove injector from fuel tube.

Push out injector from fuel tube assembly. Do not extract injector by pinching electric connector.

5. Install injector to fuel tube after cleaning exterior of injector.

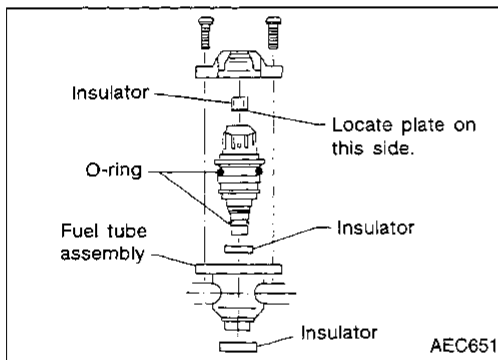
Use new O-rings and insulators.

Lubricate O-rings with a smear of silicone oil.

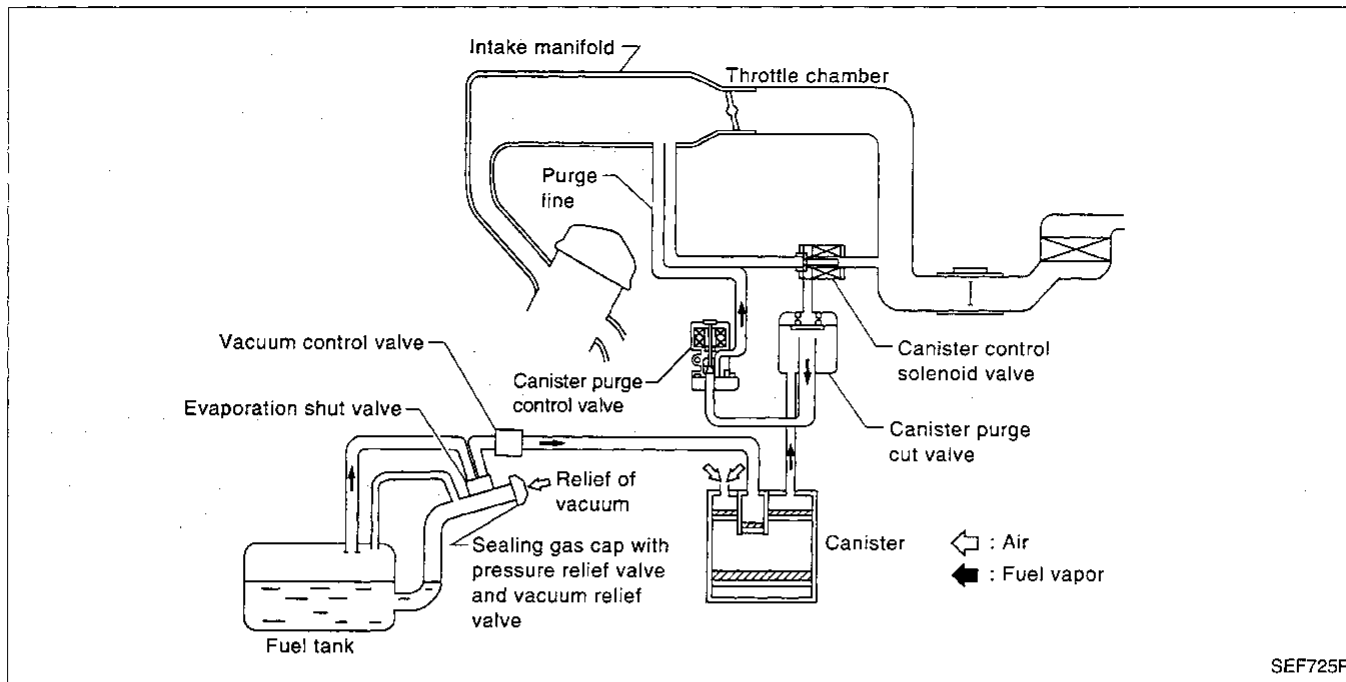
CAUTION:

After properly connecting injectors to fuel tube, check connection for fuel leakage.

6. Assemble injectors with fuel pipe to intake manifold.



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 canister.

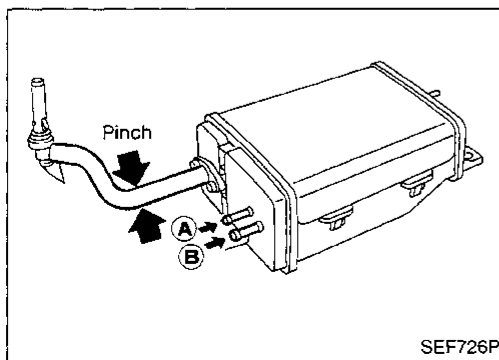
The fuel vapor in the sealed fuel tank is led into the canister which contains activated carbon. The vapor is stored there when the engine is not operating.

The vapor in the canister is purged by the air through the purge line to the intake manifold when the engine is operating.

Canister purge control valve is controlled by engine control module. When the engine operates, the flow rate of vapor is proportionally regulated as the air flow increases.

Canister purge cut valve shuts off the vapor purge line during decelerating and idling. Under normal operating conditions the valve is usually open.

Evaporation shut valve shuts off the vapor charge line when fuel is being supplied to the fuel tank.



Inspection

CANISTER

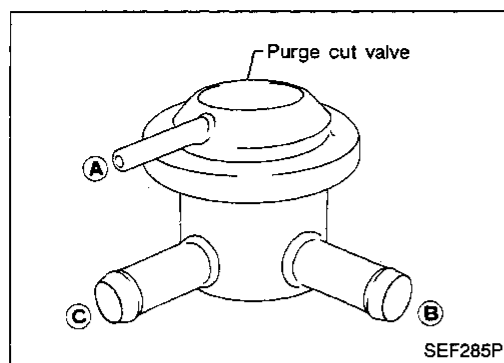
Check canister as follows:

1. Pinch the breezer hose.
2. Blow air in port (A) and ensure free flow out of port (B).

Inspection (Cont'd)
CANISTER PURGE CUT VALVE

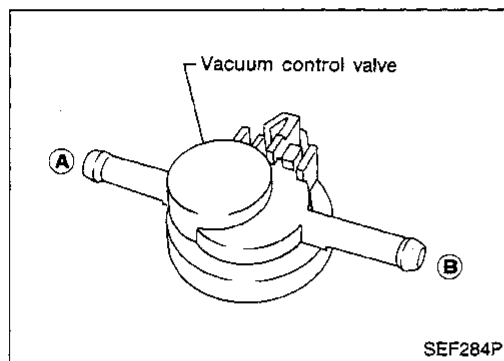
Check canister purge cut valve as follows:

1. Blow air in port (A) and ensure that there is no leakage.
2.
 - Apply vacuum to port (A). [Approximately -13.3 to -20.0 kPa (-100 to -150 mmHg, -3.94 to -5.91 inHg)]
 - Blow air in port (C) and ensure free flow out of port (B).

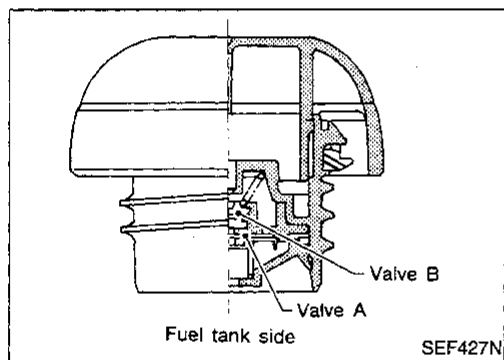

VACUUM CONTROL VALVE

Check vacuum control valve as follows:

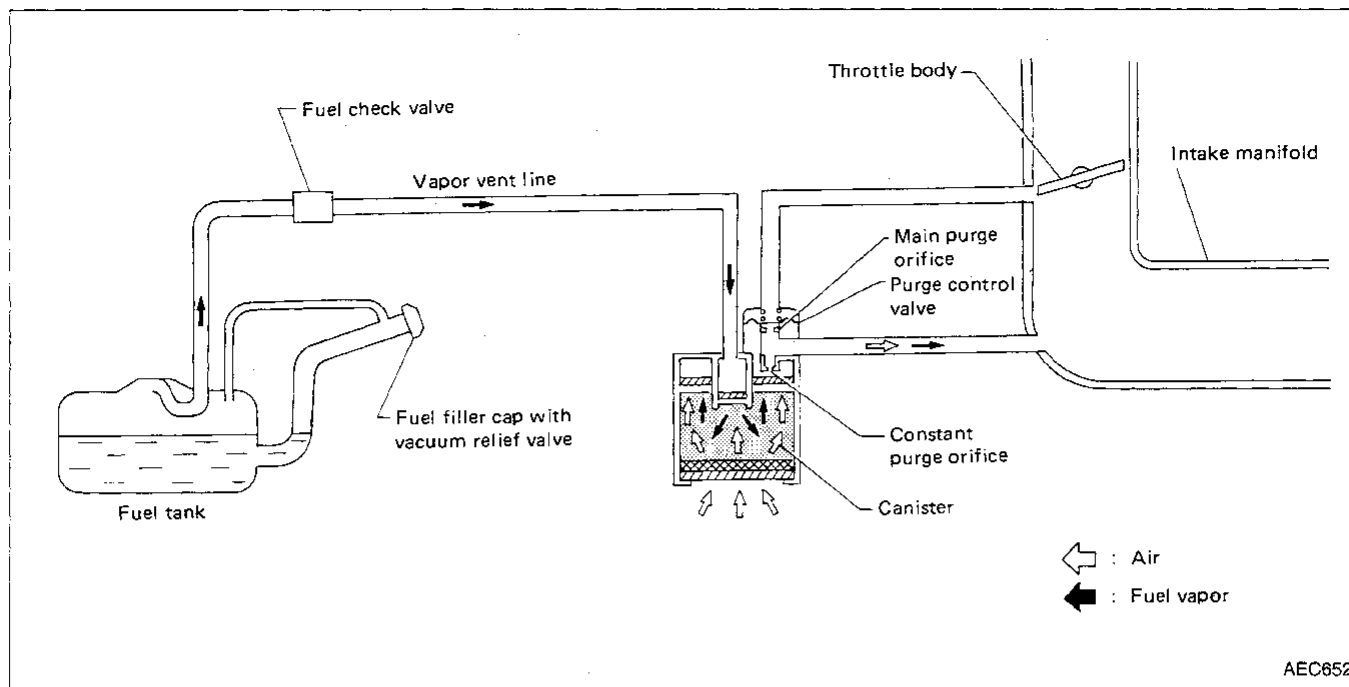
1. Apply vacuum to port (A) and ensure that there is no leakage.
2. Apply vacuum to port (B) and ensure that there is leakage.
3. Blow air in port (B) and ensure free flow out of port (A).


FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity of air passage exists through valve B.
4. If valve is clogged or if no resistance is felt, replace cap as an assembly.



Description

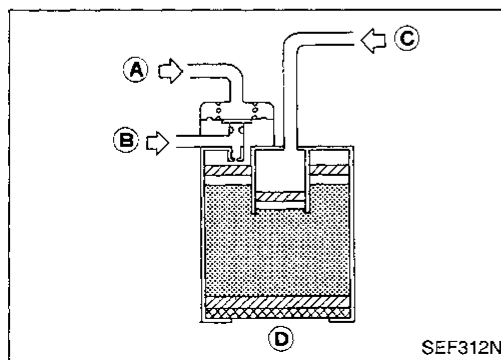


The evaporative emission system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum increases, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.

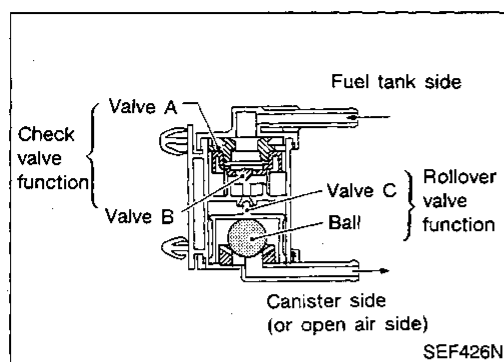


Inspection

CANISTER

Check canister as follows:

1. Blow air in port (A) and ensure that there is no leakage.
2.
 - Apply vacuum to port (A).
 - Cover port (D) with hand.
 - Blow air in port (C) and ensure free flow out of port (B).



Inspection (Cont'd)

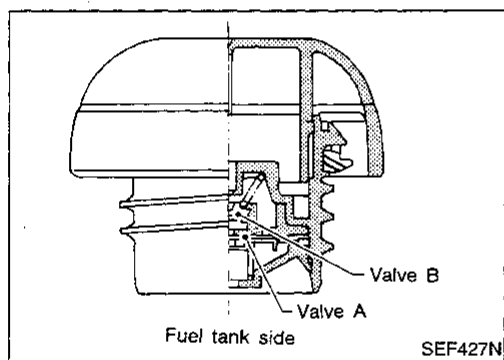
FUEL CHECK VALVE (With rollover valve)

Check valve operation

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 canister side.
2. Blow air through connector on 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.

Rollover valve operation

Ensure that continuity of air passage does not exist when the installed rollover valve is tilted to 90° or 180°.



FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity of air passage exists through valve B.
4. If valve is clogged or if no resistance is felt, replace cap as an assembly.