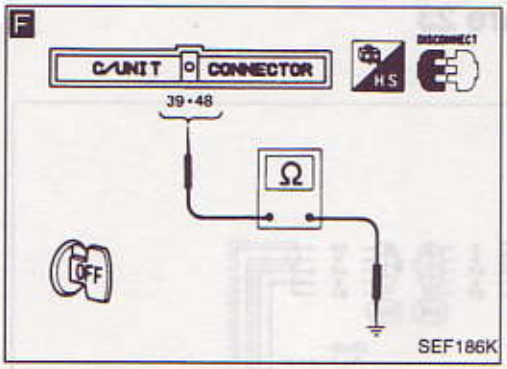
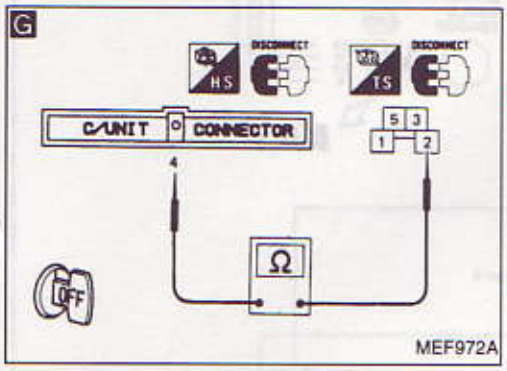
Diagnostic Procedure 22 (Cont'd)

F



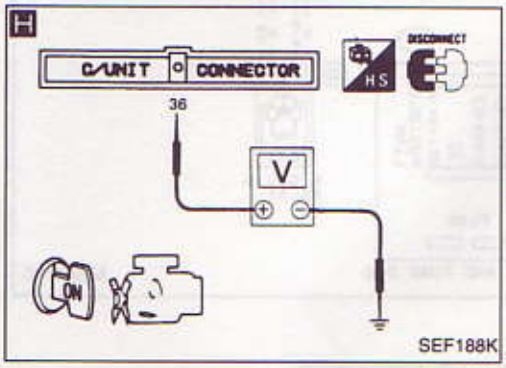
SEF186K

G



MEF972A

H



SEF188K

Ⓐ

E CHECK VOLTAGE BETWEEN E.C.U. AND GROUND.
1) Check voltage between E.C.U. terminal ㊻ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M8), (C103)
- 10A fuse
- Harness continuity between E.C.U. and fusible link

If N.G., repair harness or connectors.

O.K. ↓

F CHECK GROUND CIRCUIT.
1) Check harness continuity between E.C.U. terminals ㊴, ㊽ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M19), (E1)
- Harness continuity between E.C.U. and engine ground

If N.G., repair harness or connectors.

O.K. ↓

G CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between E.C.U. terminal ④ and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M6), (C101)
- Harness continuity between E.C.U. and E.C.C.S. relay

If N.G., repair harness or connectors.

O.K. ↓

H CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "ON".
2) Check voltage between E.C.U. terminal ㊱ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M8), (C103)
- Harness continuity between E.C.U. and ignition switch

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (E.C.C.S. relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

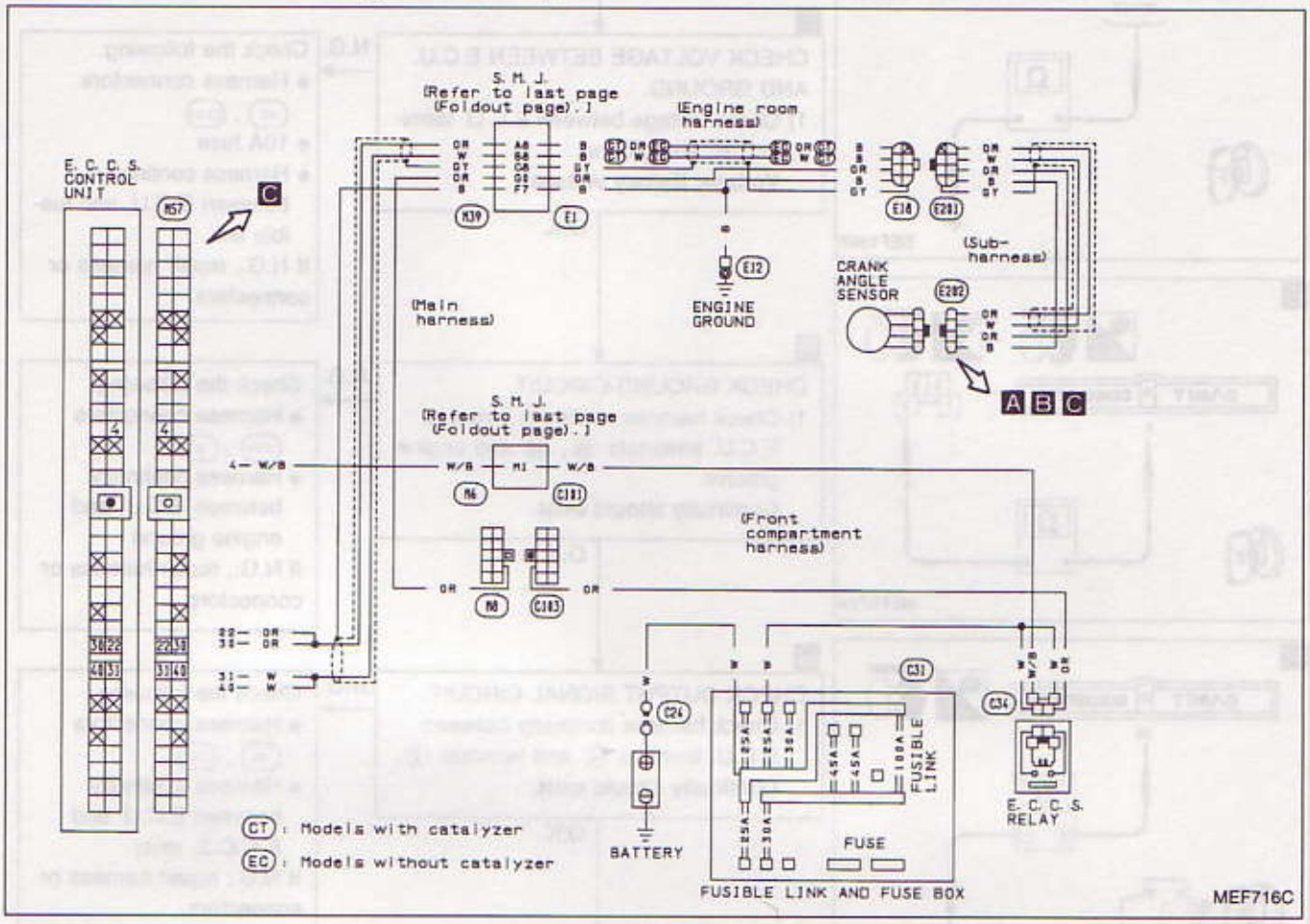
N.G. → Replace E.C.C.S. relay.

O.K. ↓

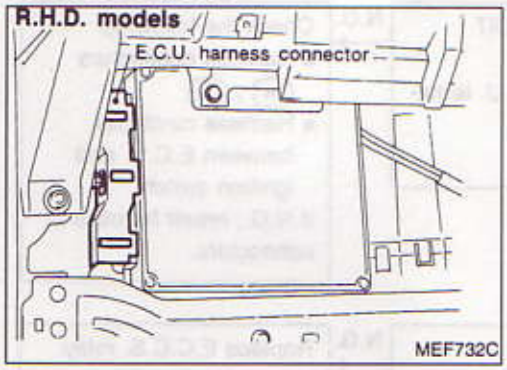
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

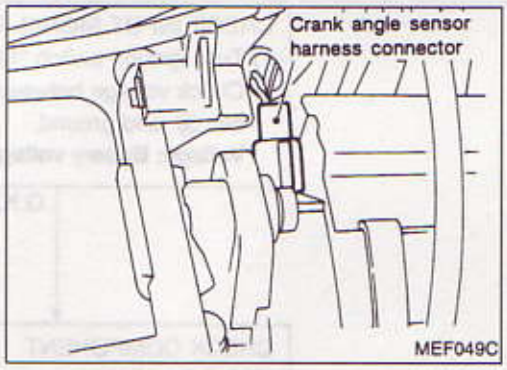
Diagnostic Procedure 23

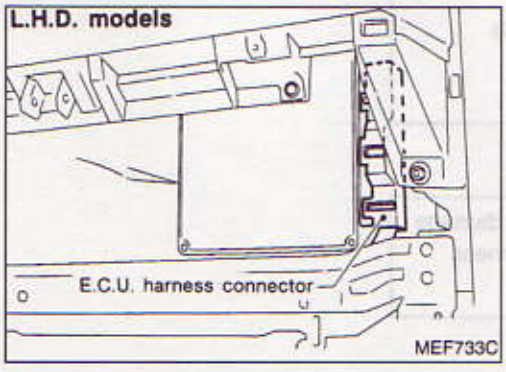
CRANK ANGLE SENSOR (Code No. 11)



Harness layout

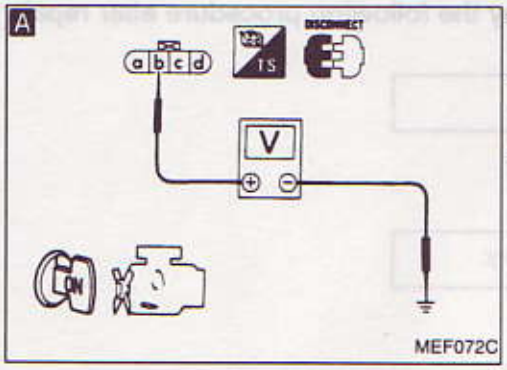






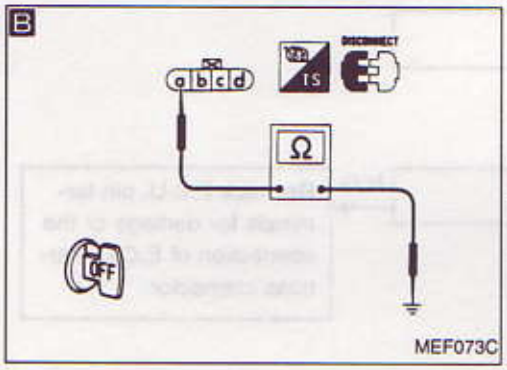
Diagnostic Procedure 23 (Cont'd)

A



MEF072C

B

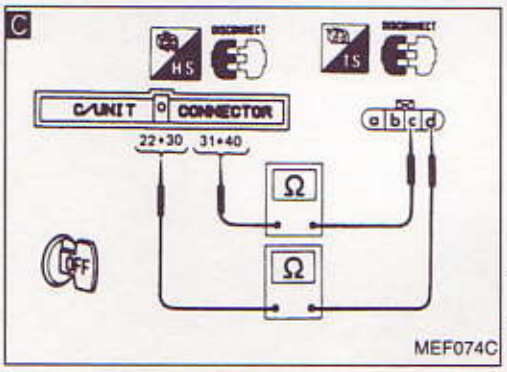


MEF073C

C

SEF317L

C



MEF074C

INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect crank angle sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal (b) and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (C103), (M8)
- Harness connectors (M39), (E1)
- Harness connectors (E18), (E201)
- Harness continuity between crank angle sensor and E.C.C.S. relay

If N.G., repair harness or connectors.

O.K. ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal (a) and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (E18), (E201)
- Harness continuity between crank angle sensor and engine ground

If N.G., repair harness or connectors.

O.K. ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect crank angle sensor harness connector.
2) Start engine.
3) Read crank angle sensor signals in "DATA MONITOR" mode with CONSULT.
rpm: 800 ± 50

N.G. → Check the following.
- Harness connectors (E39), (E1)
- Harness connectors (E18), (E201)
- Harness continuity between crank angle sensor and E.C.U.

If N.G., repair harness or connectors.

— OR —

1) Disconnect E.C.U. harness connector.
2) Check harness continuity between terminal (c) and E.C.U. terminals (31), (40) (1° signal), terminal (d) and E.C.U. terminals (22), (30) (180° signal).
Continuity should exist.

O.K. ↓

CHECK COMPONENT
(Crank angle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

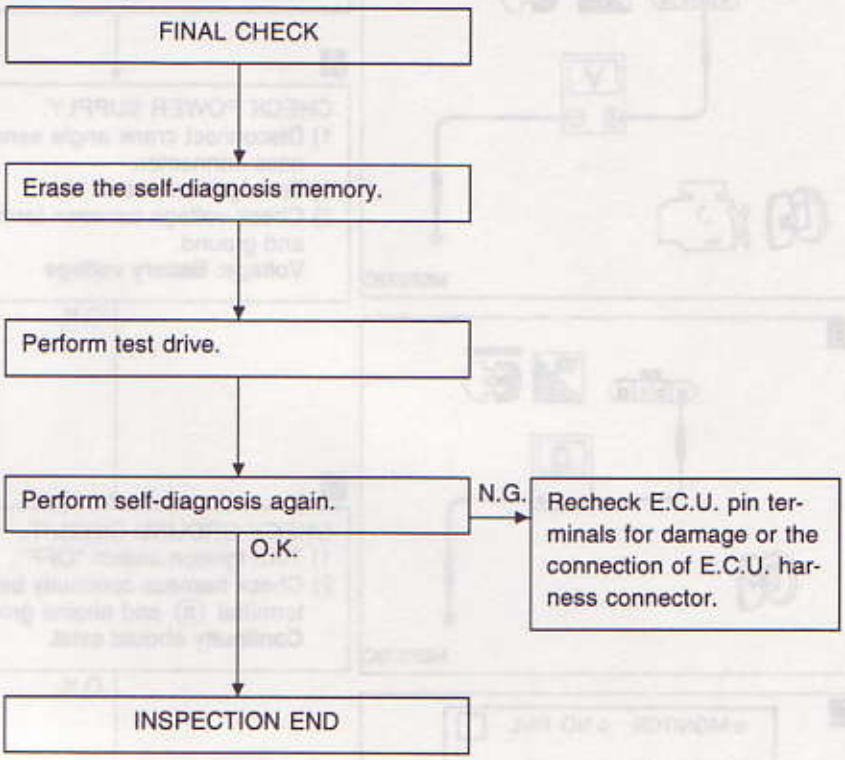
N.G. → Replace crank angle sensor.

O.K. ↓

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

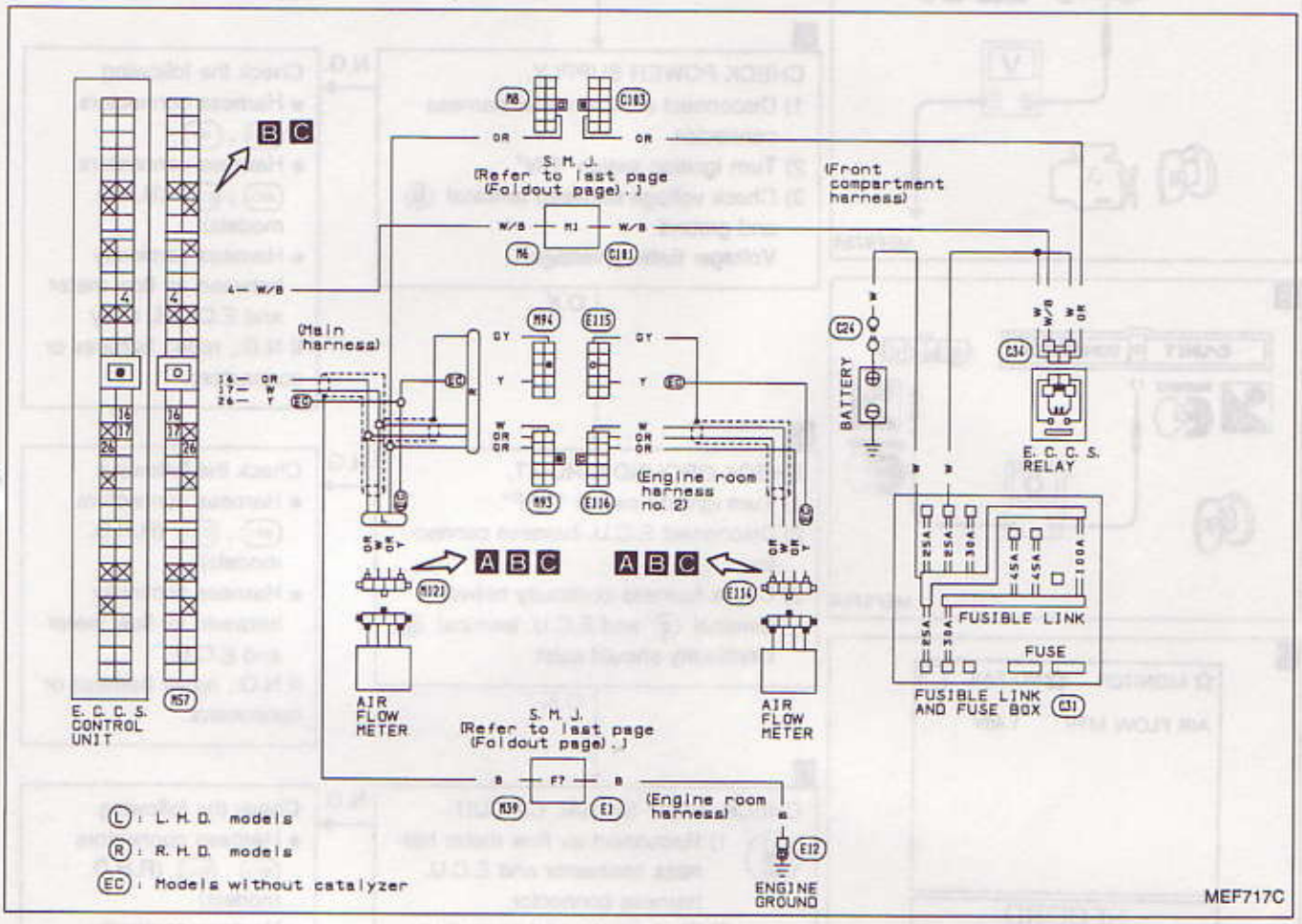
Diagnostic Procedure 23 (Cont'd)

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

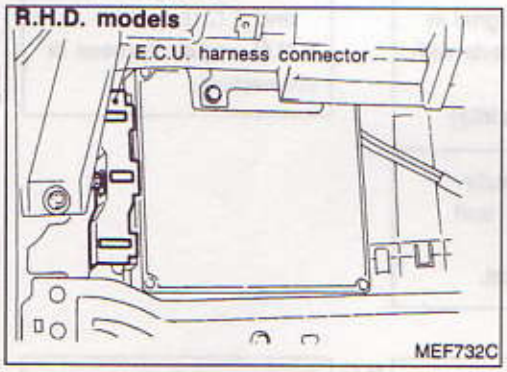


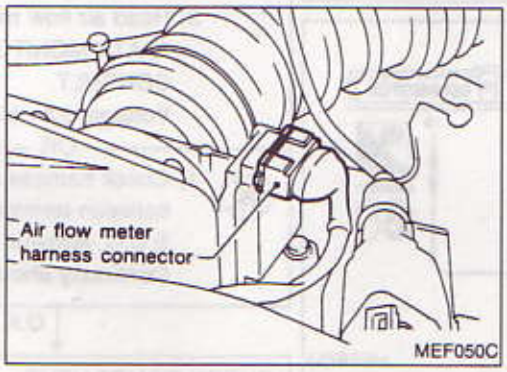
Diagnostic Procedure 24

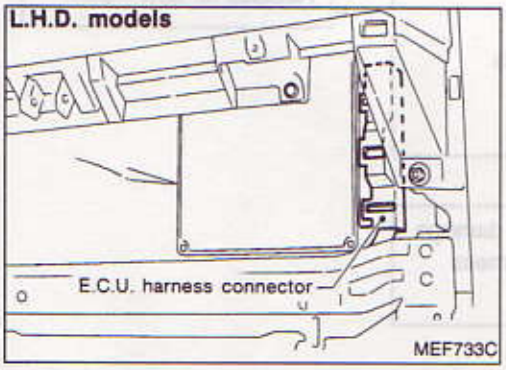
AIR FLOW METER (Code No. 12)



Harness layout

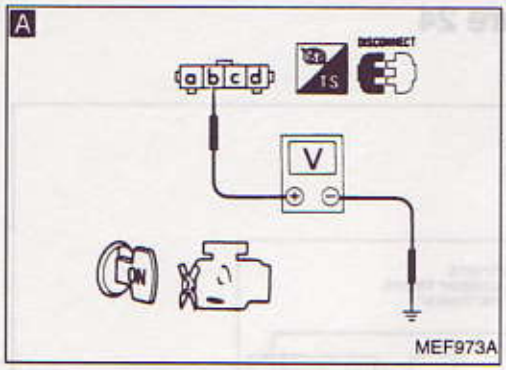






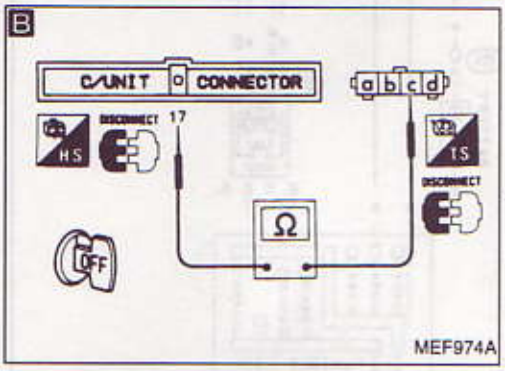
Diagnostic Procedure 24 (Cont'd)

A



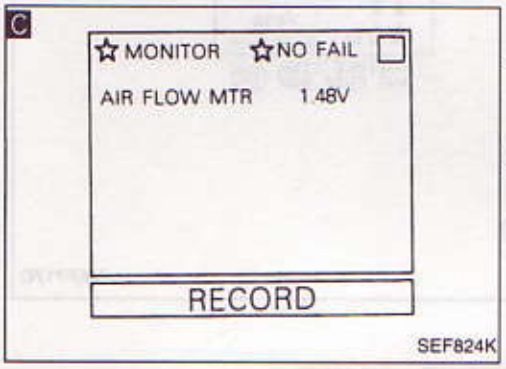
MEF973A

B



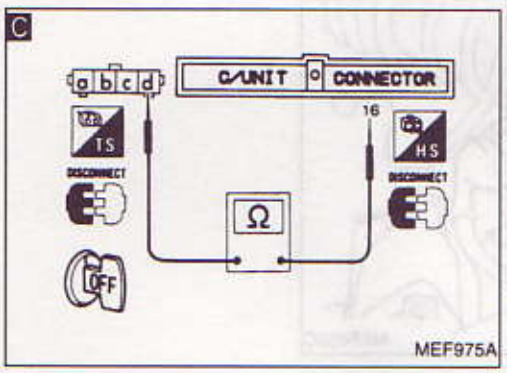
MEF974A

C



SEF824K

C



MEF975A

INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect air flow meter harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage

N.G.

Check the following.
- Harness connectors (C103), (M8)
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness continuity between air flow meter and E.C.C.S. relay

If N.G., repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Check harness continuity between terminal ⓒ and E.C.U. terminal ⑰.
Continuity should exist.

N.G.

Check the following.
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness continuity between air flow meter and E.C.U.

If N.G., repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.

1) Reconnect air flow meter harness connector and E.C.U. harness connector.
2) Start engine and warm it up sufficiently.
3) Read air flow meter signal in "DATA MONITOR" mode with CONSULT.
Voltage: 1.3 - 1.7V (At idle)

OR

1) Check harness continuity between terminal ⓓ and E.C.U. terminal ⑯.
Continuity should exist.

N.G.

Check the following.
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness continuity between air flow meter and E.C.U.

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Air flow meter).
Refer to "Electrical Components Inspection".
(See page EF & EC-155)

N.G.

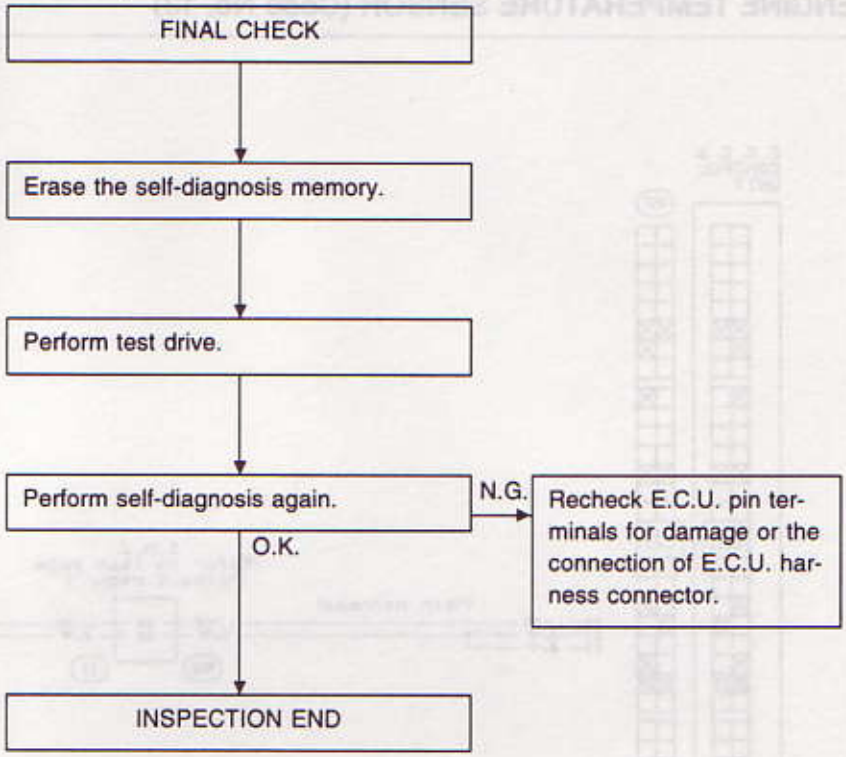
Replace air flow meter.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

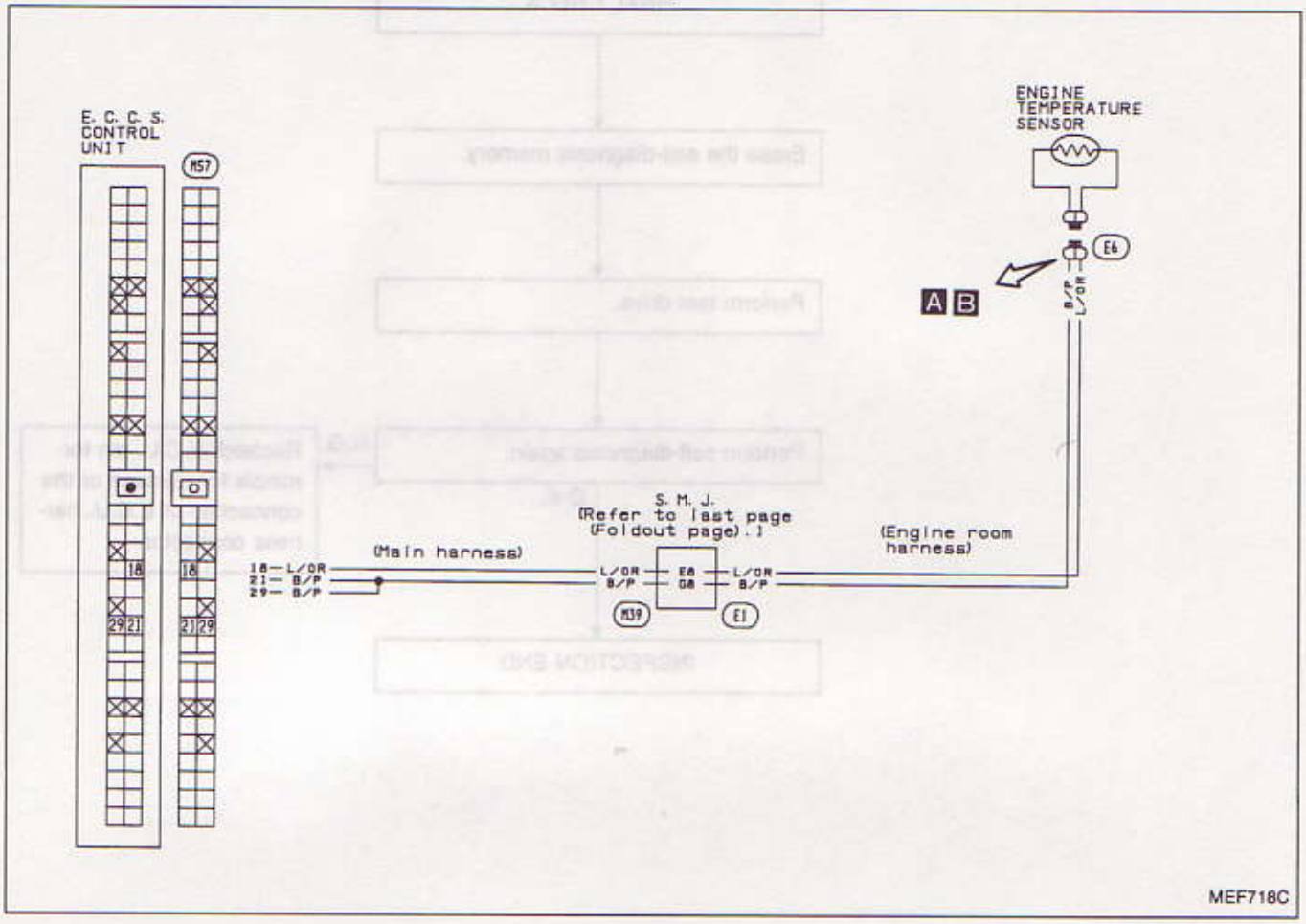
Diagnostic Procedure 24 (Cont'd)

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

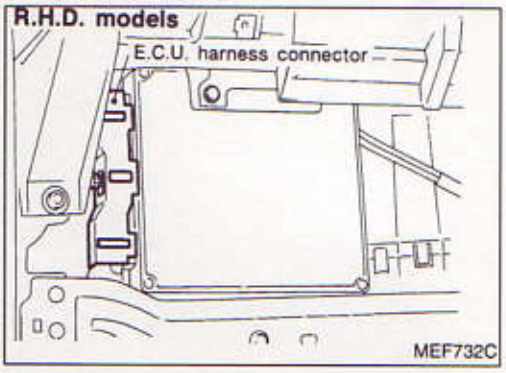


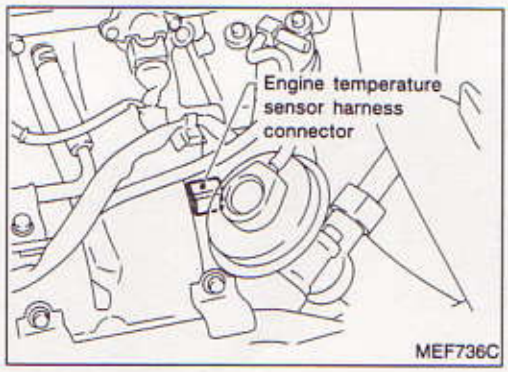
Diagnostic Procedure 25

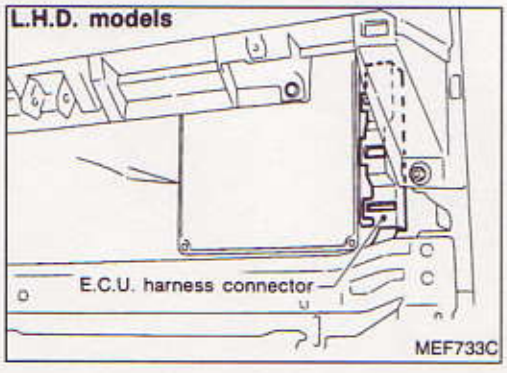
ENGINE TEMPERATURE SENSOR (Code No. 13)



Harness layout





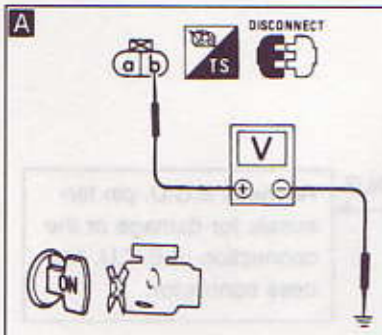


Diagnostic Procedure 25 (Cont'd)

A

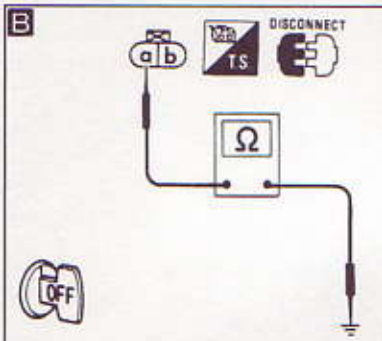
SEF825K

A



MEF754C

B



MEF755C

INSPECTION START

A

CHECK POWER SUPPLY.

1) Start engine and warm it up sufficiently.
2) Select engine temperature sensor signal in "DATA MONITOR" mode with CONSULT.
3) Stop engine
4) When restarting engine make sure that CONSULT indicates "ENG.TEMP SEN" is 50°C (122°F) or more.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and engine temperature sensor.

If N.G., repair harness or connectors.

OR

1) Disconnect engine temperature sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal (b) and ground.
Voltage: Approximately 5V

O.K.

B

CHECK GROUND CIRCUIT.

1) Turn ignition switch "OFF".
2) Check harness continuity between terminal (a) and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and engine temperature sensor.

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Engine temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

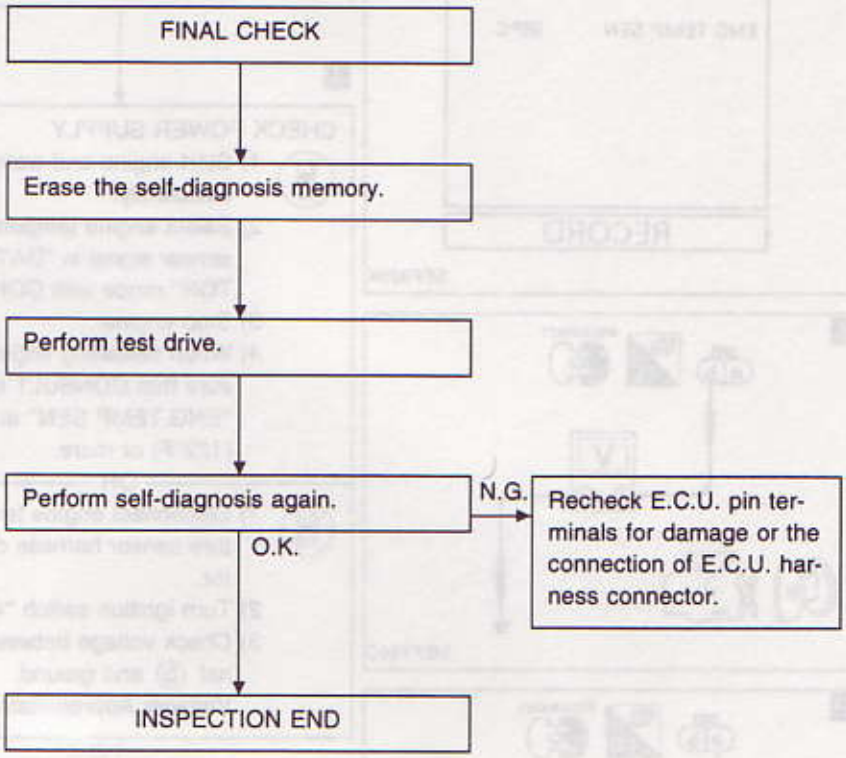
N.G. → Replace engine temperature sensor.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

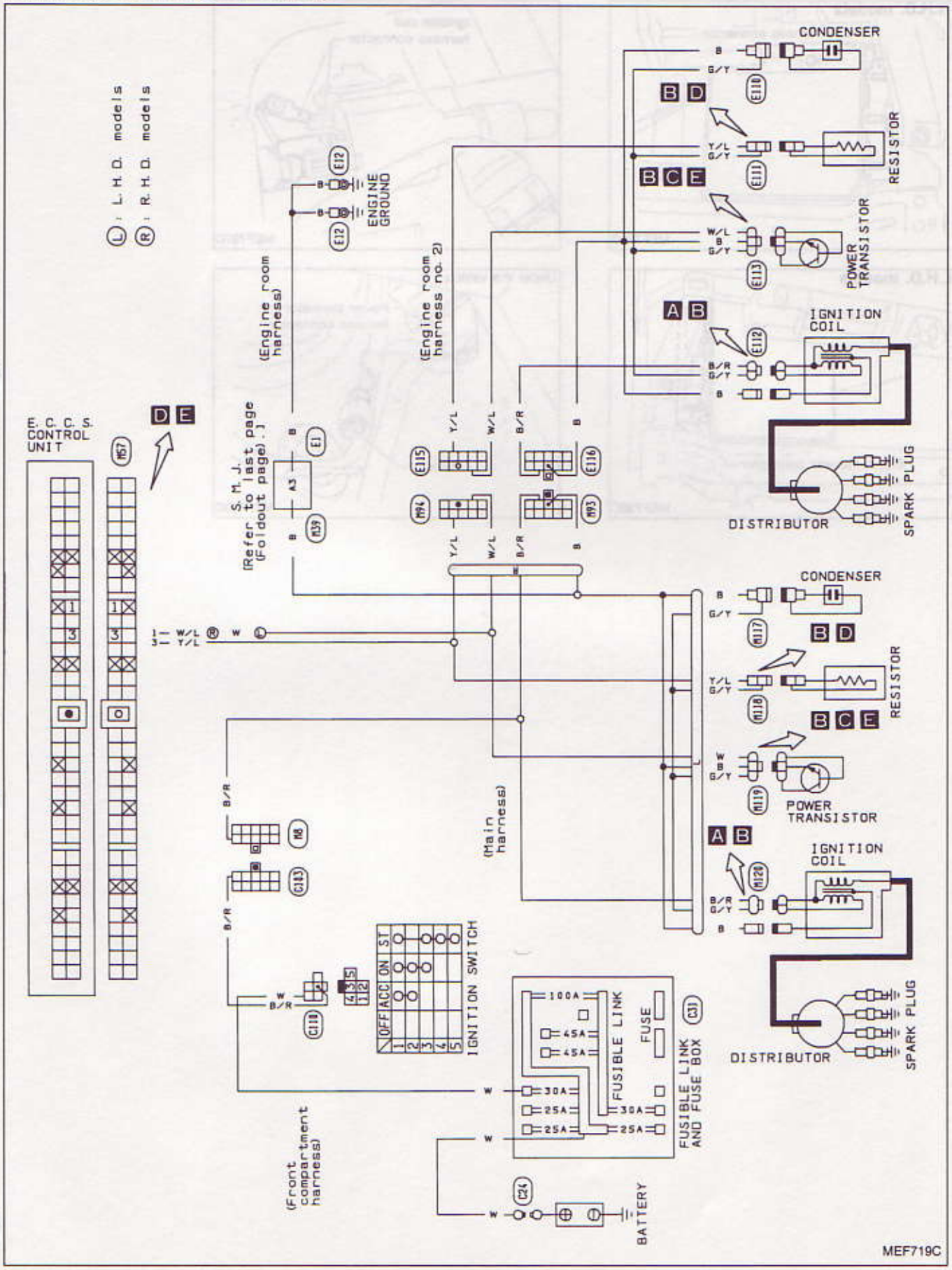
Diagnostic Procedure 25 (Cont'd)

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



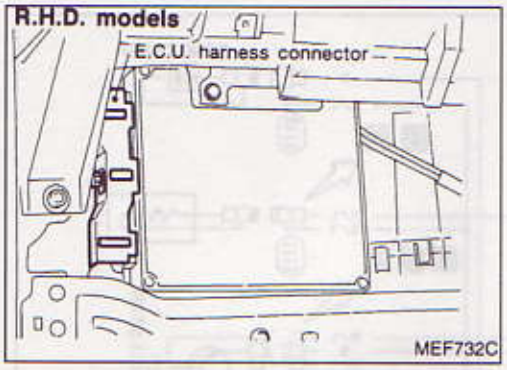
Diagnostic Procedure 26

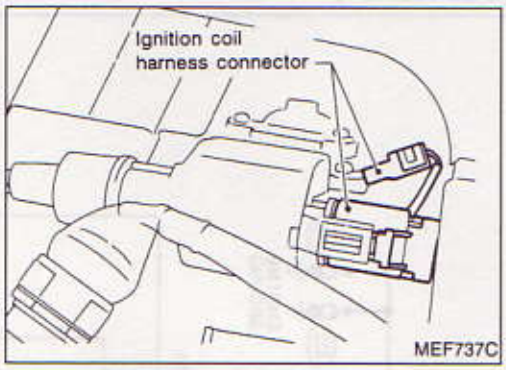
IGNITION SIGNAL (Code No. 21)

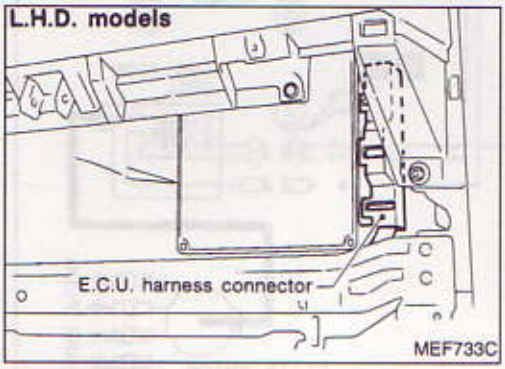


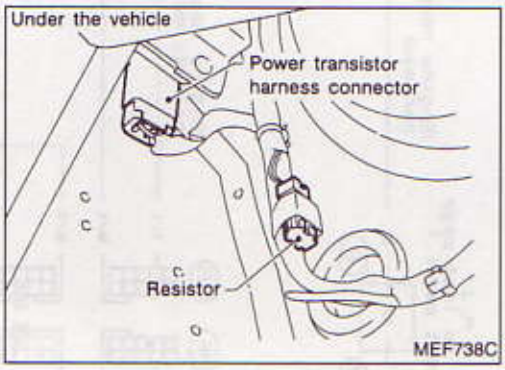
Diagnostic Procedure 26 (Cont'd)

Harness layout

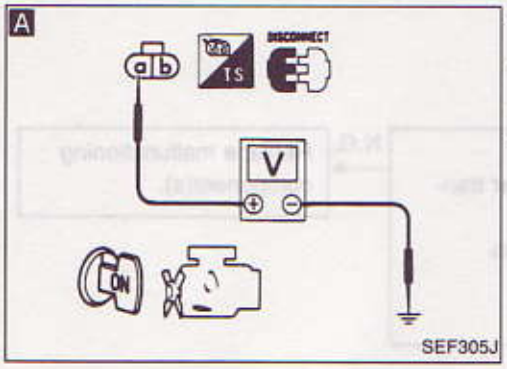








Diagnostic Procedure 26 (Cont'd)



INSPECTION START

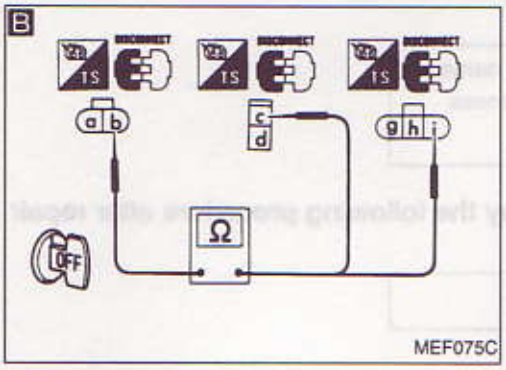
A

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

N.G. → Check the following.
- Harness connectors (C103), (M8)
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness continuity between ignition coil and ignition switch

If N.G., repair harness or connectors.

O.K. ↓



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

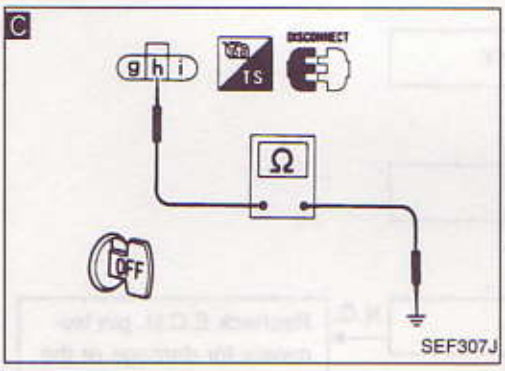
B 4) Check harness continuity between terminal (b) and terminals (c), (i).
Continuity should exist.

C 5) Check harness continuity between terminal (h) and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness connectors (M39), (E1)
- Harness continuity between power transistor and engine ground
- Harness continuity between ignition coil and power transistor
- Harness continuity between ignition coil and resistor

If N.G., repair harness or connector.

O.K. ↓



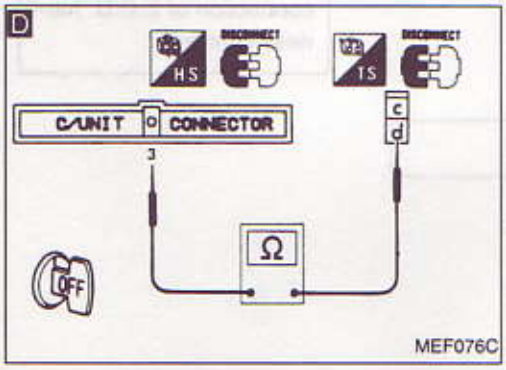
D

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between terminal (d) and E.C.U. terminal (3).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M94), (E113) (R.H.D. models)
- Harness continuity between resistor and E.C.U.

If N.G., repair harness or connector.

O.K. ↓



E

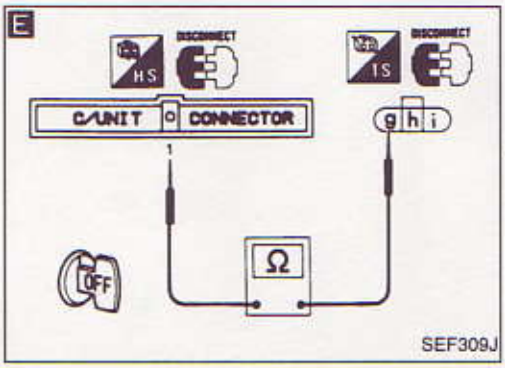
CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal (g) and E.C.U. terminal (1).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M94), (E113) (R.H.D. models)
- Harness continuity between power transistor and E.C.U.

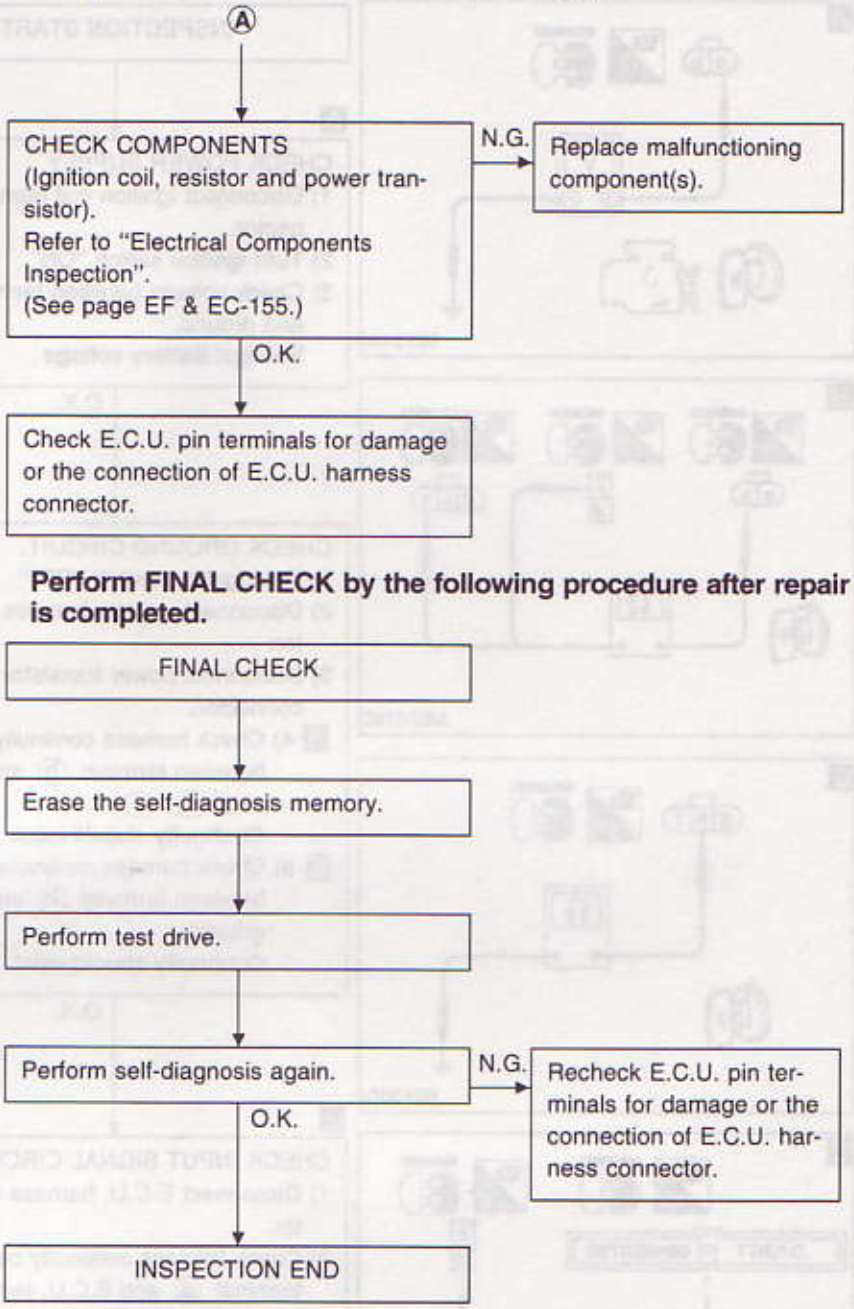
If N.G., repair harness or connectors.

O.K. ↓

Ⓐ



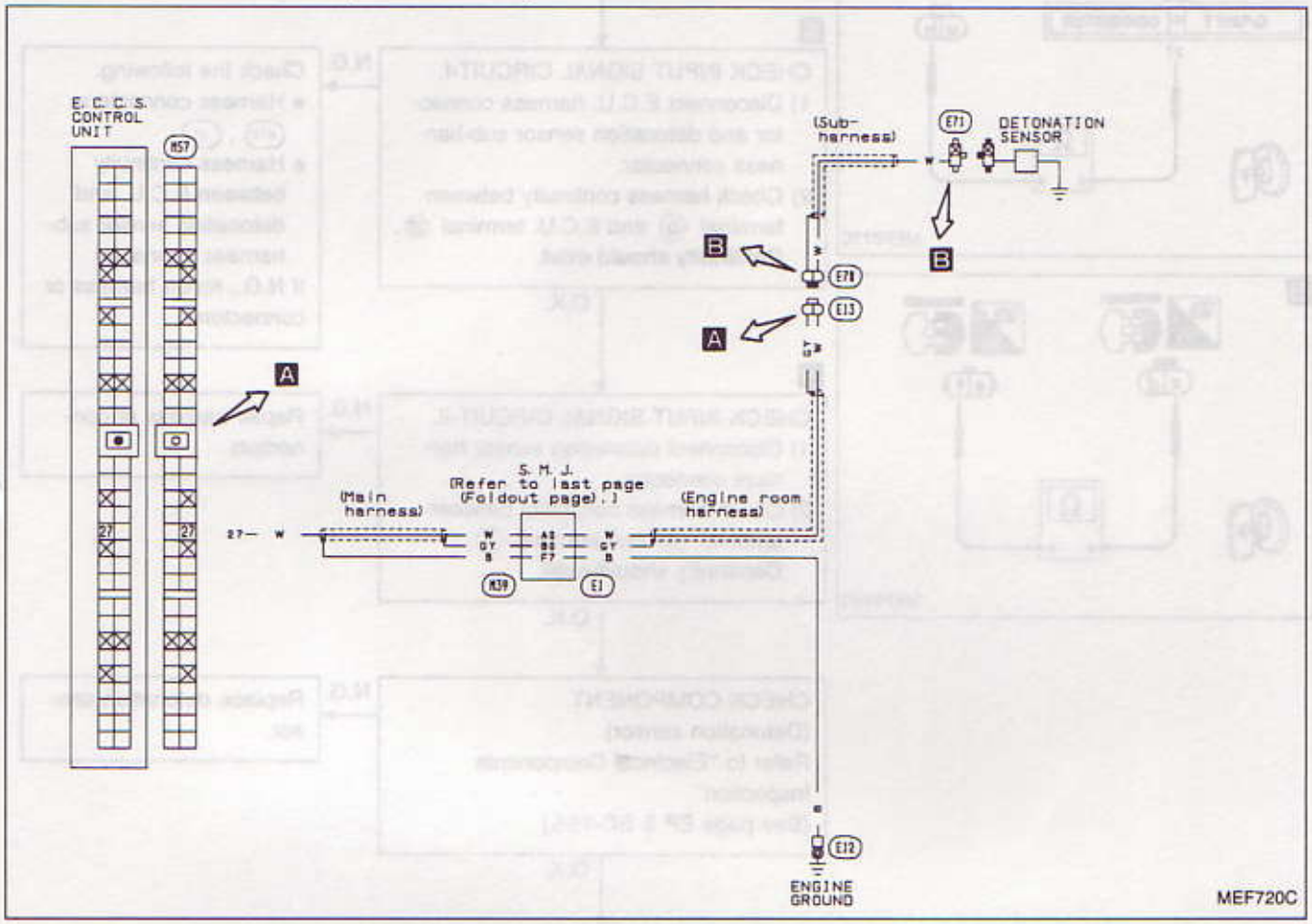
Diagnostic Procedure 26 (Cont'd)



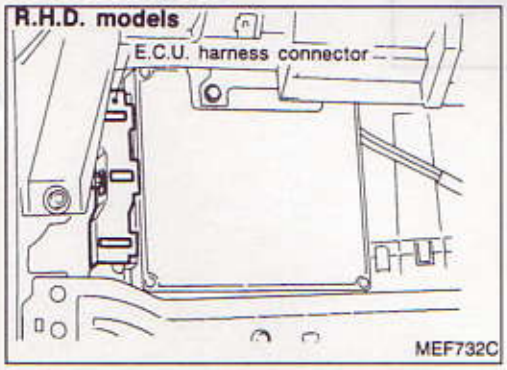
Perform FINAL CHECK by the following procedure after repair is completed.

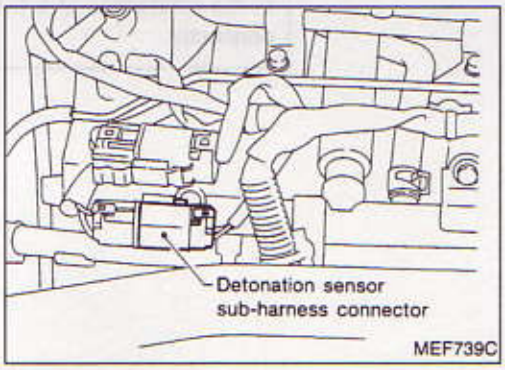
Diagnostic Procedure 27

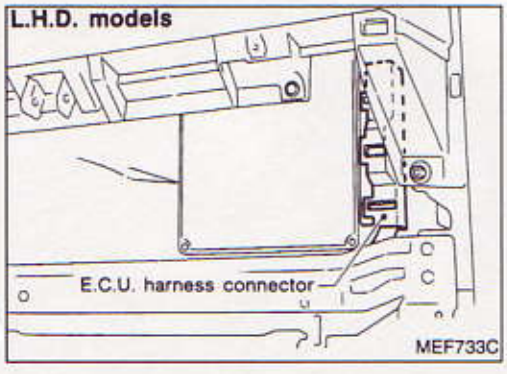
DETONATION SENSOR (Code No. 34)



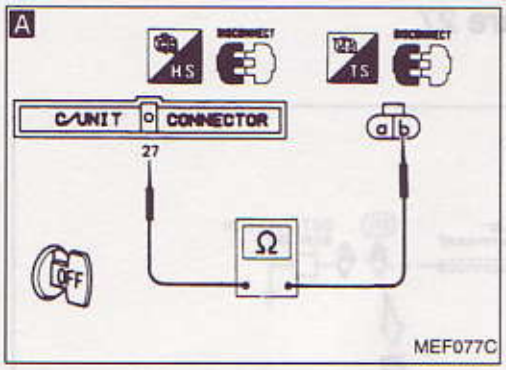
Harness layout

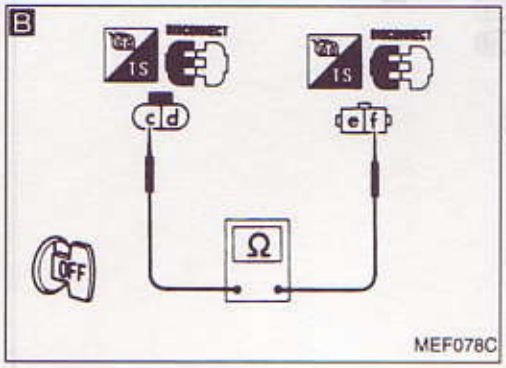






Diagnostic Procedure 27 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT-I.
1) Disconnect E.C.U. harness connector and detonation sensor sub-harness connector.
2) Check harness continuity between terminal (b) and E.C.U. terminal (27).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and detonation sensor sub-harness connector

If N.G., repair harness or connectors.

O.K. ↓

B

CHECK INPUT SIGNAL CIRCUIT-II.
1) Disconnect detonation sensor harness connector.
2) Check harness continuity between terminal (c) and terminal (f).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Detonation sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-155)

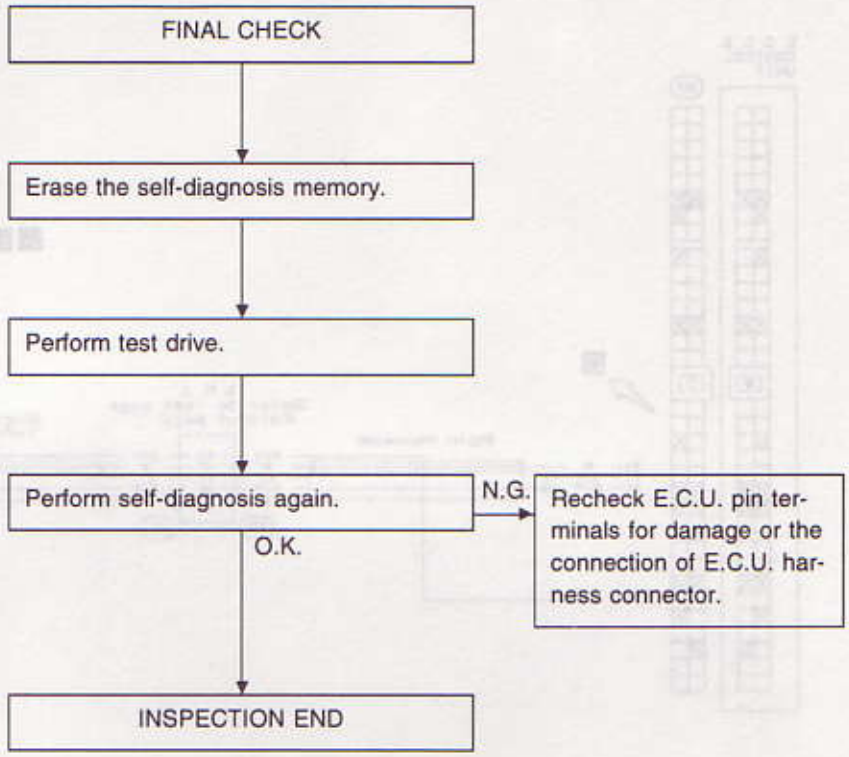
N.G. → Replace detonation sensor.

O.K. ↓

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

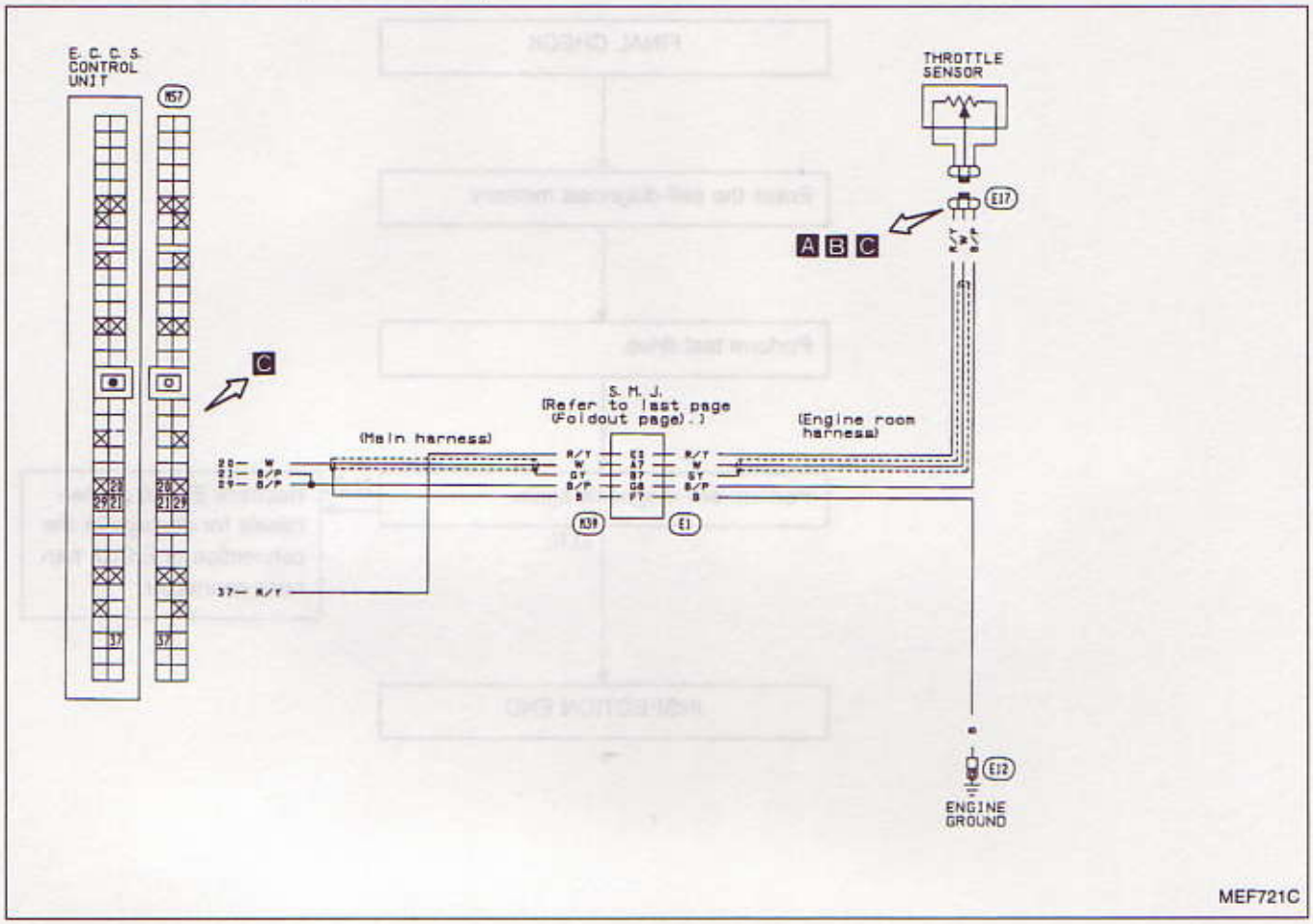
Diagnostic Procedure 27 (Cont'd)

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

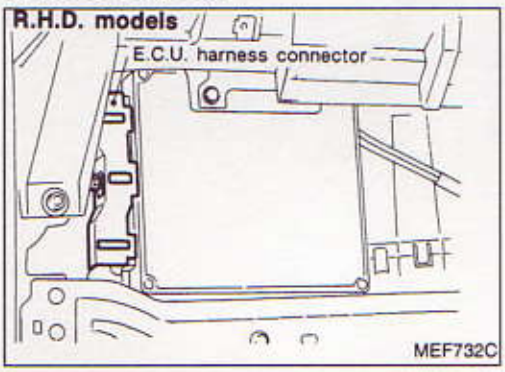


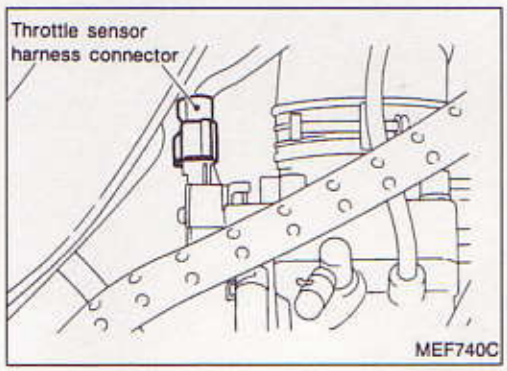
Diagnostic Procedure 28

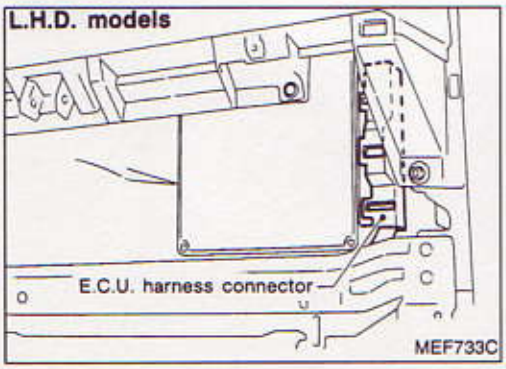
THROTTLE SENSOR (Code No. 43)



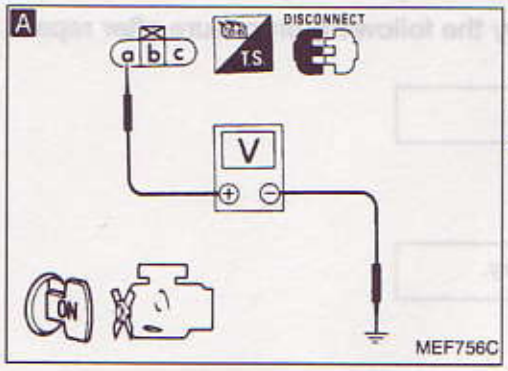
Harness layout

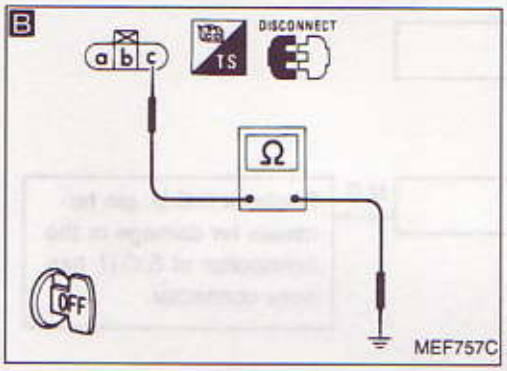


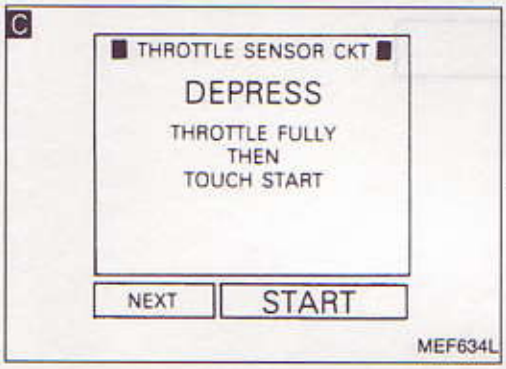


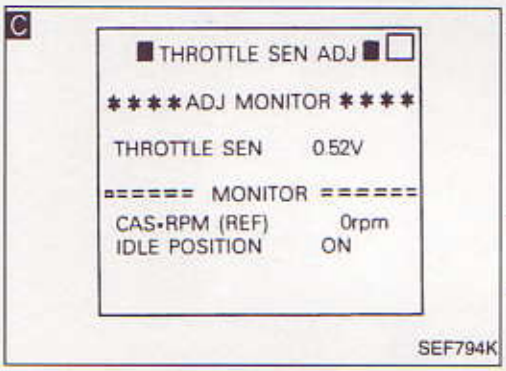


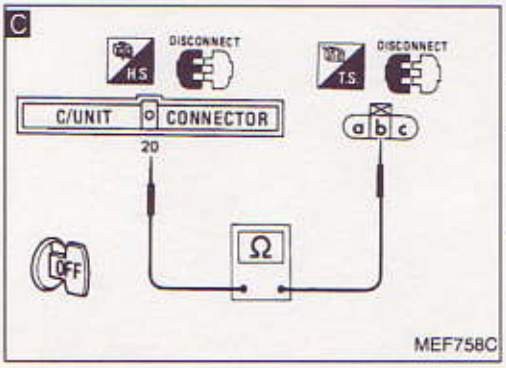
Diagnostic Procedure 28 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect throttle sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal (a) and engine ground.
Voltage: Approximately 5V

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and throttle sensor

If N.G., repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal (c) and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and throttle sensor

If N.G., repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect throttle sensor harness connector.
2) Turn ignition switch "ON".
3) Perform "THROTTLE SENSOR CKT" in "FUNCTION TEST" mode with CONSULT.

OR

3) Read throttle sensor output voltage in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed: 0.45 - 0.55V
Throttle valve fully open: Approx. 4.0V

OR

1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal (20) and terminal (b).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and throttle sensor

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Throttle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

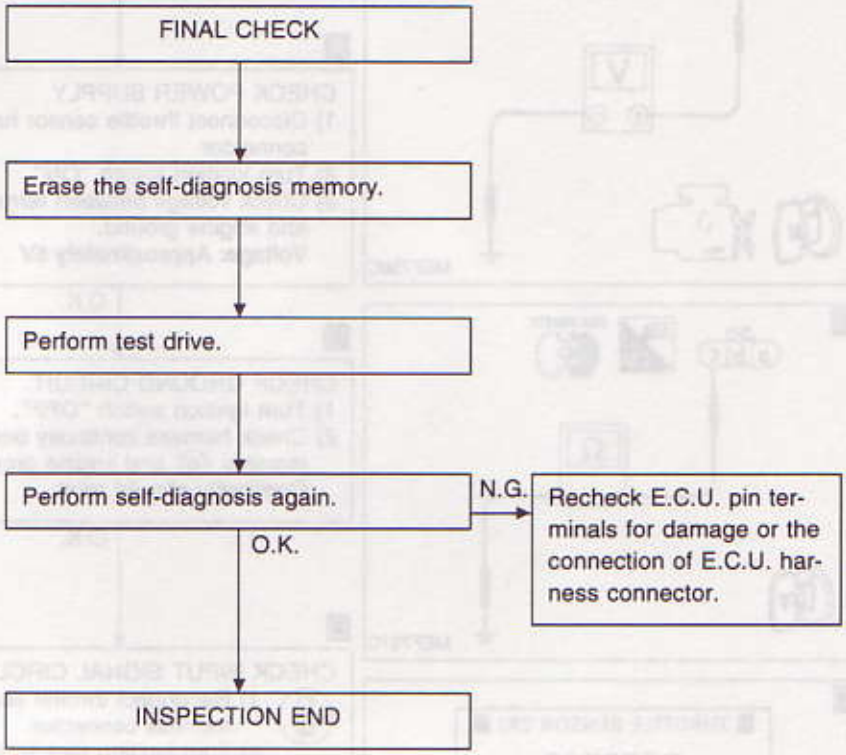
N.G. → Replace throttle sensor.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

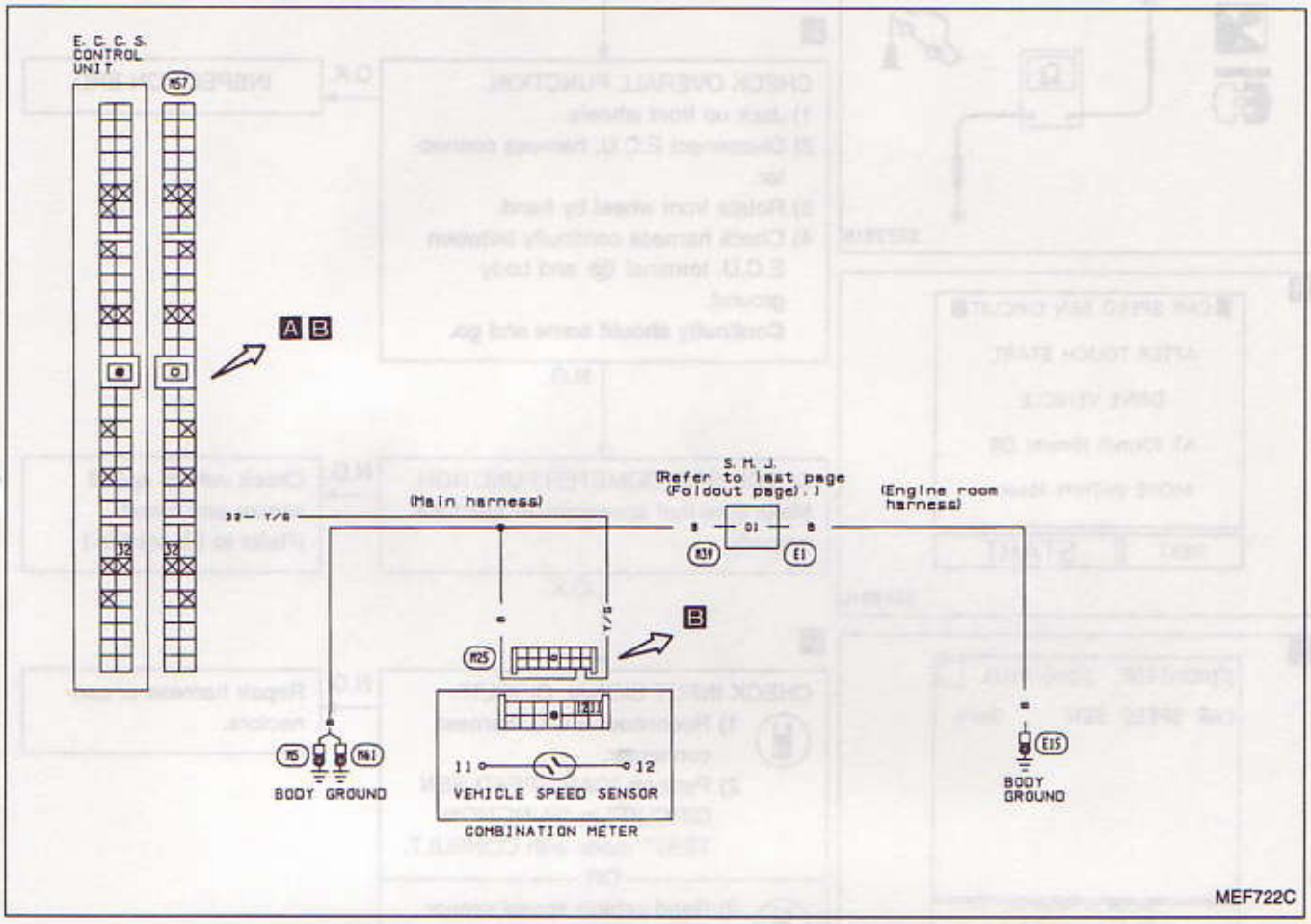
Diagnostic Procedure 28 (Cont'd)

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

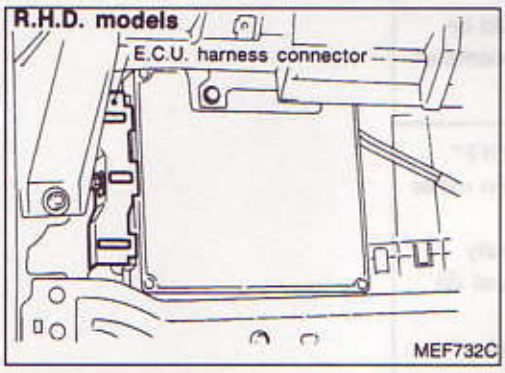


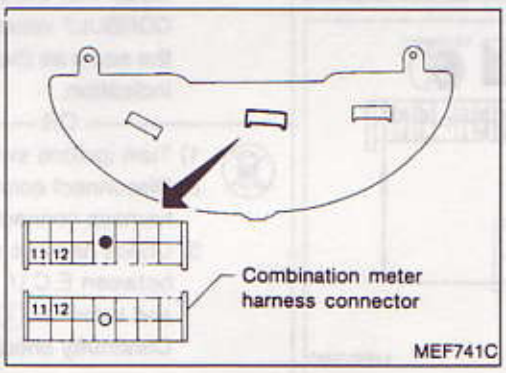
Diagnostic Procedure 29

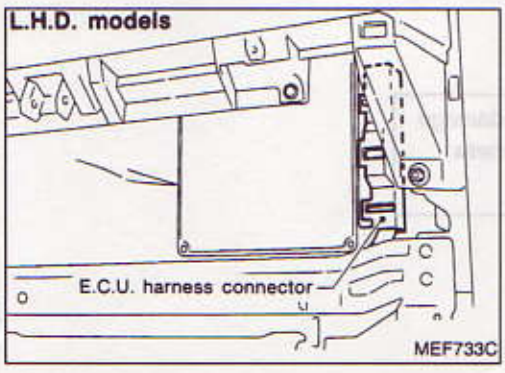
VEHICLE SPEED SENSOR (Not self-diagnostic item)



Harness layout

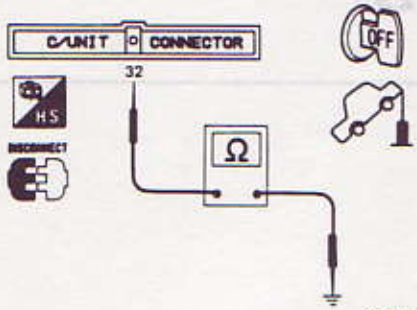






Diagnostic Procedure 29 (Cont'd)

A



SEF261K

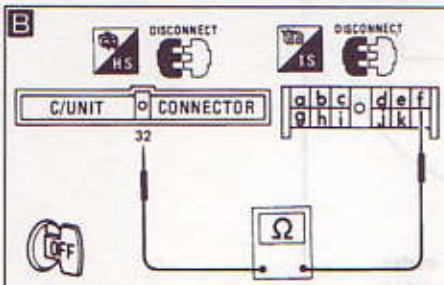
B

SEF631L

B

SEF587I

B



MEF759C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Jack up front wheels.
2) Disconnect E.C.U. harness connector.
3) Rotate front wheel by hand.
4) Check harness continuity between E.C.U. terminal (32) and body ground.
Continuity should come and go.

O.K. → INSPECTION END

N.G.

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

N.G. → Check vehicle speed sensor and circuit. (Refer to EL section.)

O.K.

B

CHECK INPUT SIGNAL CIRCUIT.

1) Reconnect E.C.U. harness connector.
2) Perform "CAR SPEED SEN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.
CONSULT value should be the same as the speedometer indication.

OR

1) Turn ignition switch "OFF".
2) Disconnect combination meter harness connector.
3) Check harness continuity between E.C.U. terminal (32) and terminal (1).
Continuity should exist.

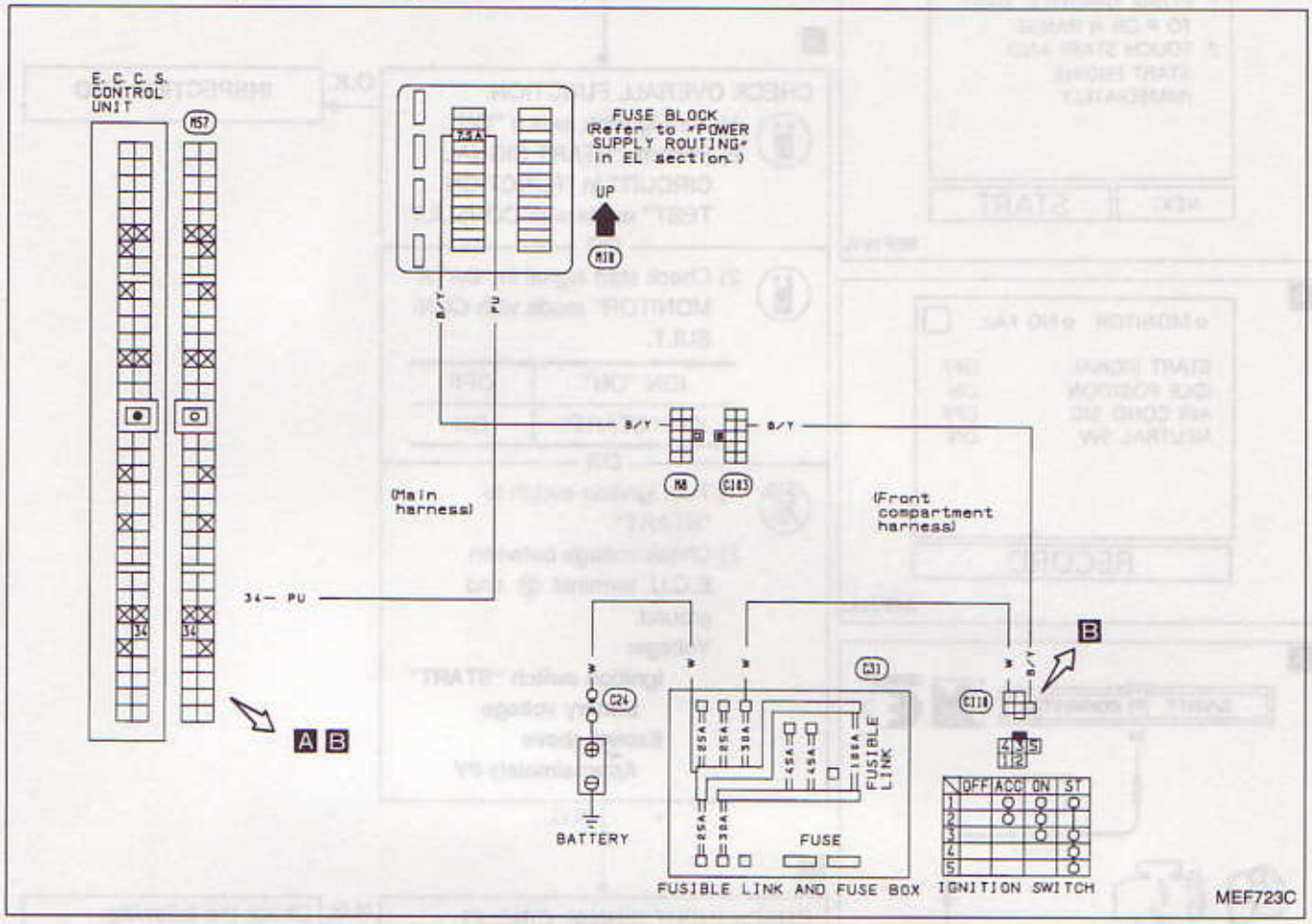
N.G. → Repair harness or connectors.

O.K.

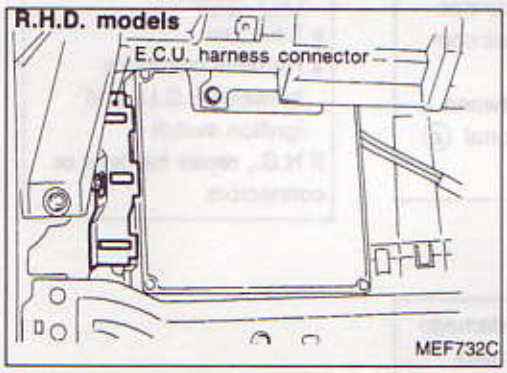
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

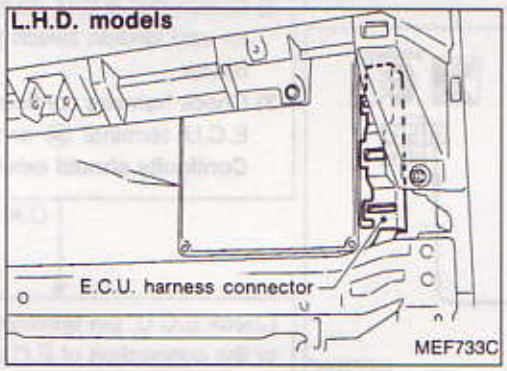
Diagnostic Procedure 30

START SIGNAL (Not self-diagnostic item)

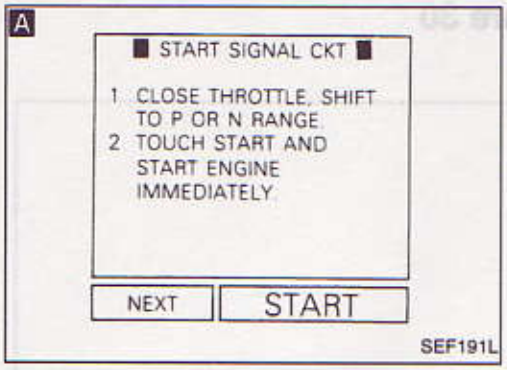


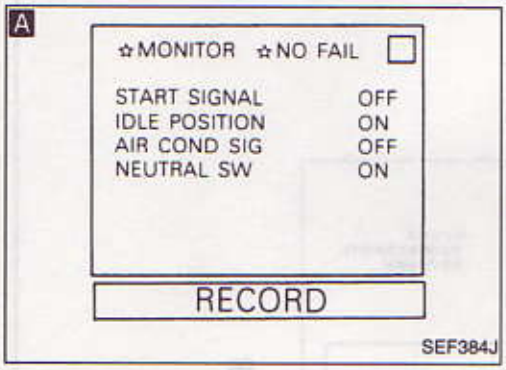
Harness layout

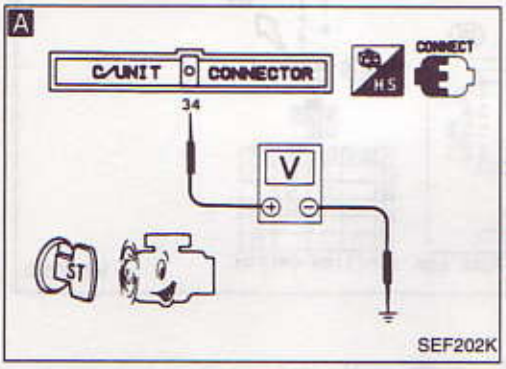


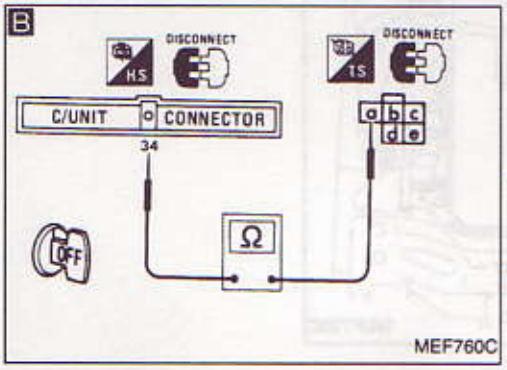


Diagnostic Procedure 30 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "START SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

2) Check start signal in "DATA MONITOR" mode with CONSULT.

IGN "ON"	OFF
IGN "START"	ON

OR

1) Turn ignition switch to "START".
2) Check voltage between E.C.U. terminal ㉞ and ground.

Voltage:

Ignition switch "START"
Battery voltage
Except above
Approximately 0V

N.G.

B

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector and ignition switch harness connector.
3) Check harness continuity between E.C.U. terminal ㉞ and terminal ⓐ.

Continuity should exist.

N.G. → Check the following.
- Harness connectors (M8), (C103)
- 7.5A fuse
- Harness continuity between E.C.U. and ignition switch

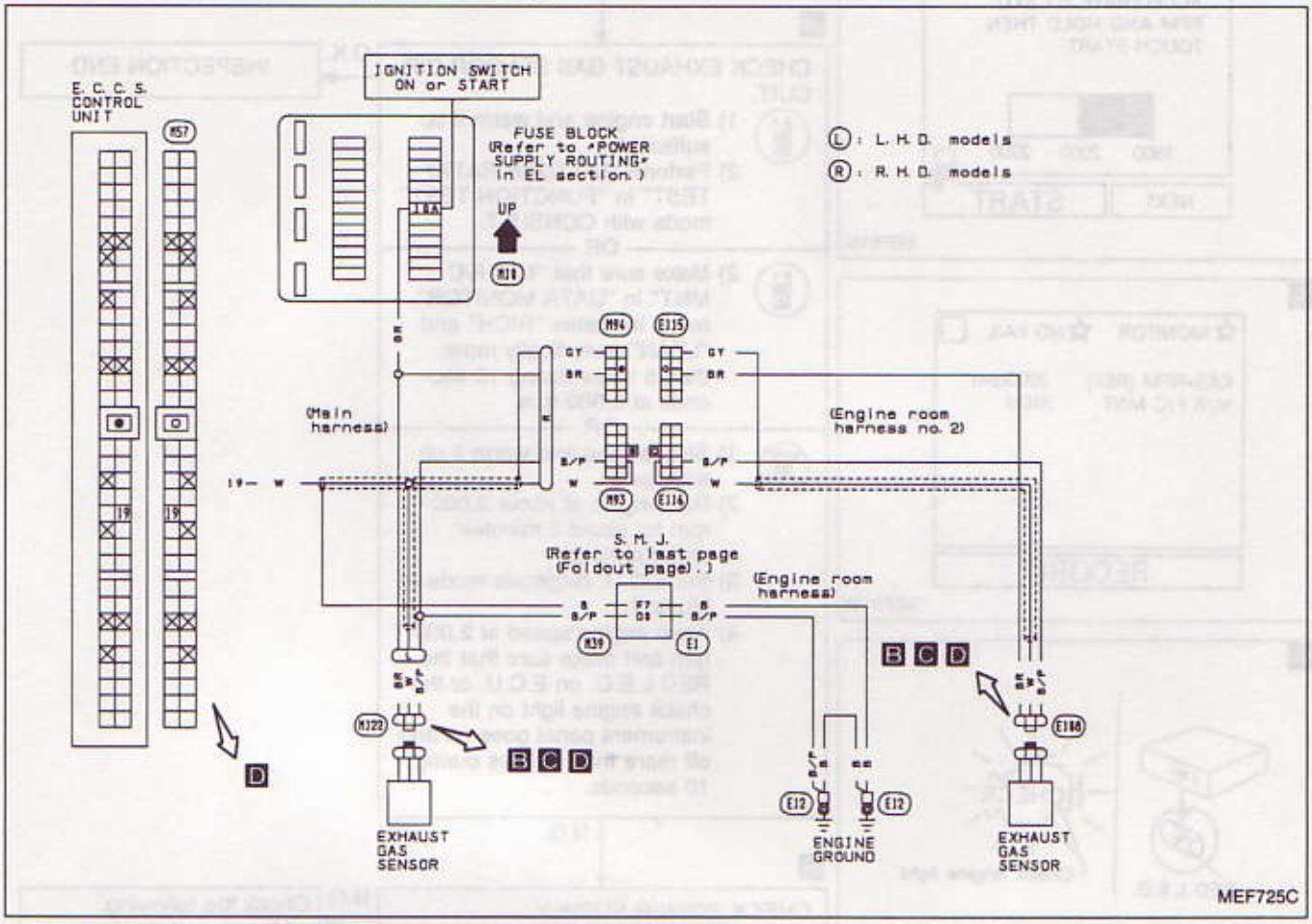
If N.G., repair harness or connectors.

O.K.

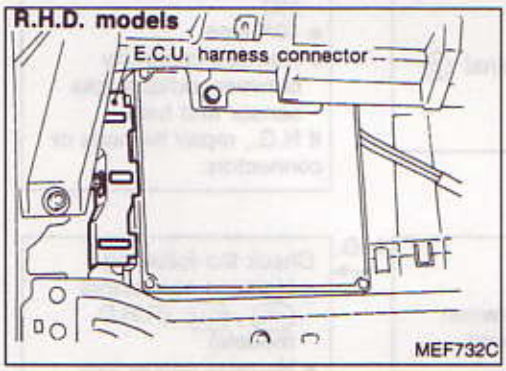
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

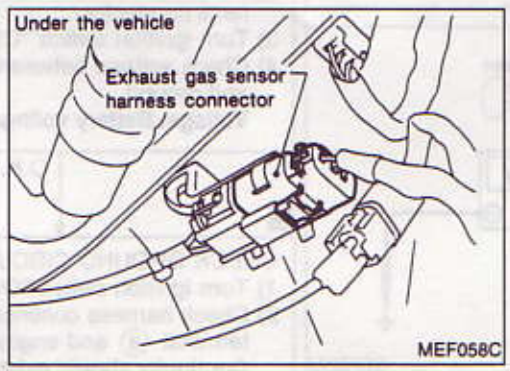
Diagnostic Procedure 31

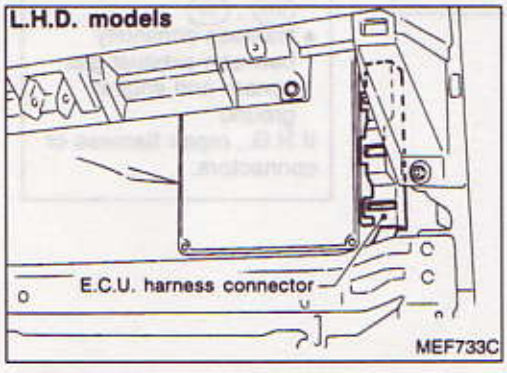
EXHAUST GAS SENSOR (Not self-diagnostic item)



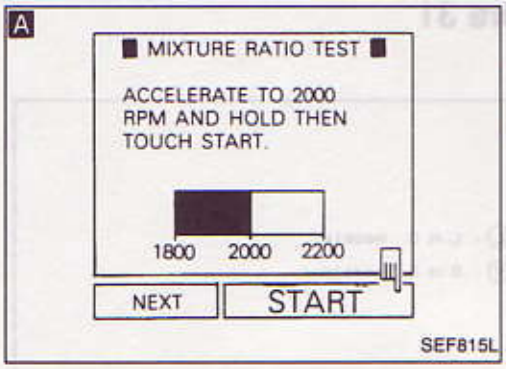
Harness layout

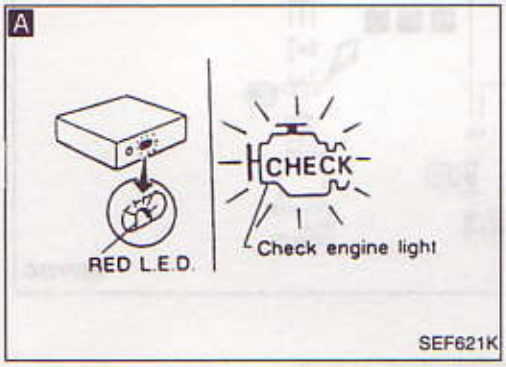


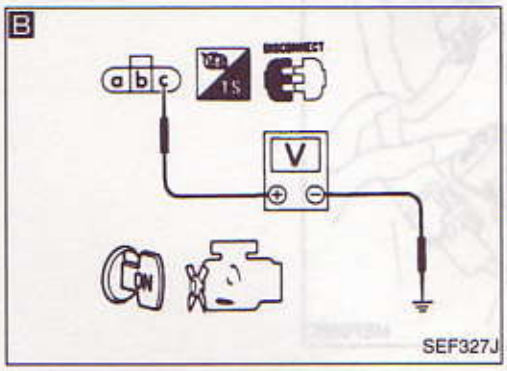


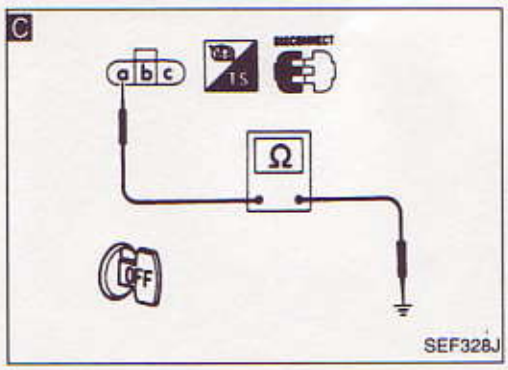


Diagnostic Procedure 31 (Cont'd)









INSPECTION START

A

CHECK EXHAUST GAS SENSOR CIRCUIT.

1) Start engine and warm it up sufficiently.
2) Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode with CONSULT.

OR

2) Make sure that "M/R F/C MNT" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm.

OR

1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Set E.C.U. diagnosis mode to Mode II.
4) Keep engine speed at 2,000 rpm and make sure that the RED L.E.D. on E.C.U. or the check engine light on the instrument panel goes on and off more than 5 times during 10 seconds.

O.K. → INSPECTION END

N.G.

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect exhaust gas sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓒ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M94), (E115) (R.H.D. models)
- 10A fuse
- Harness continuity between exhaust gas sensor and fuse

If N.G., repair harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

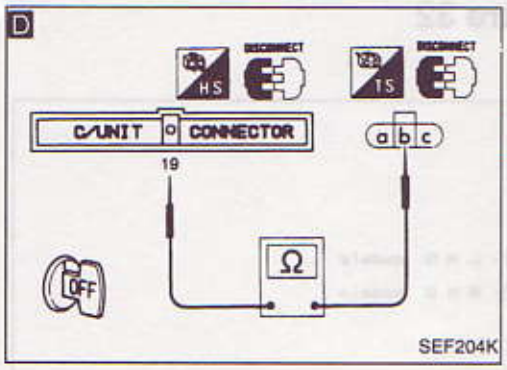
N.G. → Check the following.
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness connectors (M39), (E1)
- Harness continuity between exhaust gas sensor and engine ground

If N.G., repair harness or connectors.

O.K.

Ⓐ

Diagnostic Procedure 31 (Cont'd)



Ⓐ

D

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal ⑲ and terminal ⓑ.
Continuity should exist.

N.G. →

Check the following.
- Harness connectors (M93), (E116) (R.H.D. models)
- Harness continuity between E.C.U. and exhaust gas sensor

If N.G., repair harness or connectors.

O.K. ↓

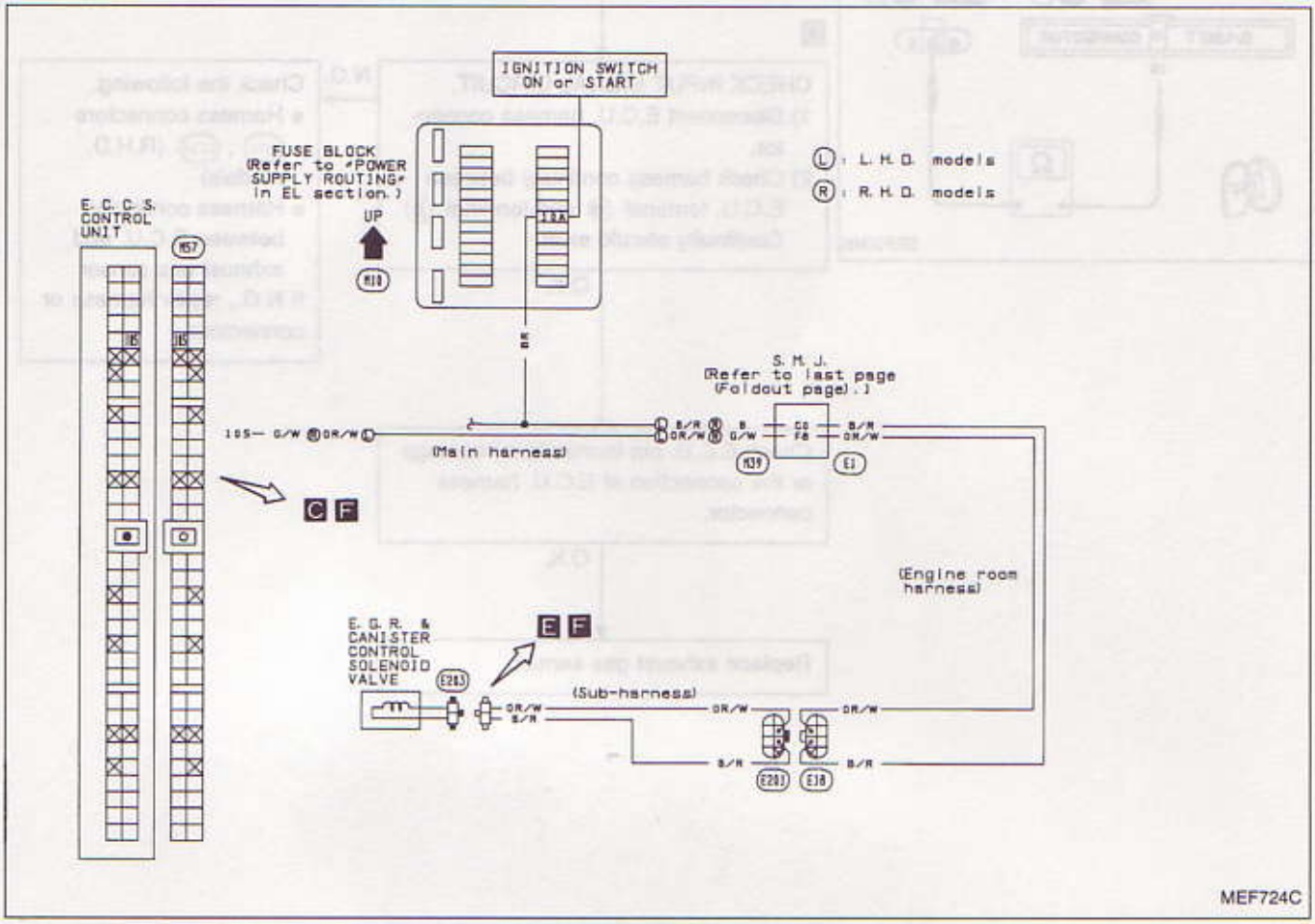
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

O.K. ↓

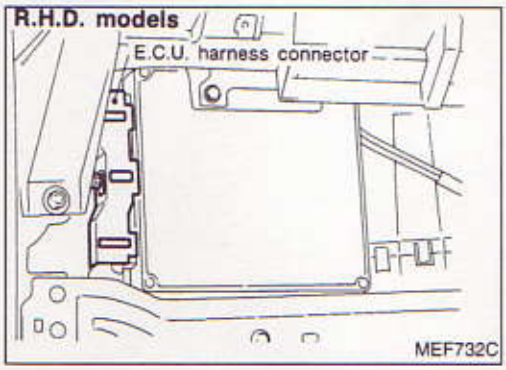
Replace exhaust gas sensor.

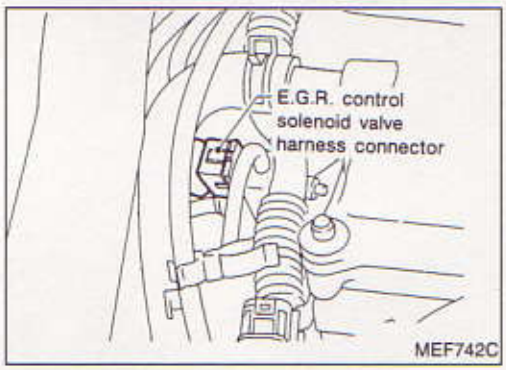
Diagnostic Procedure 32

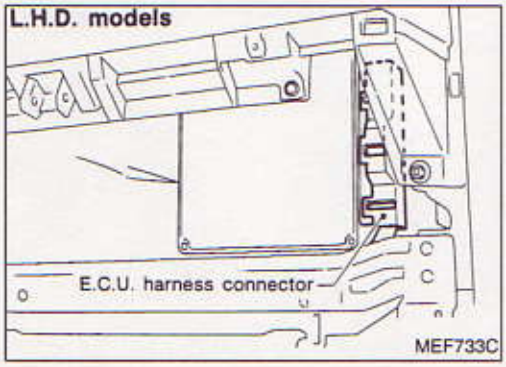
E.G.R. Control (Not self-diagnostic item)



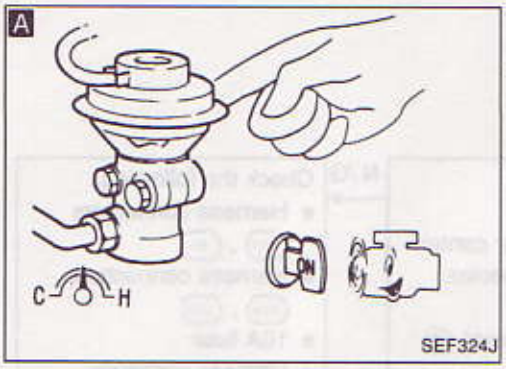
Harness layout

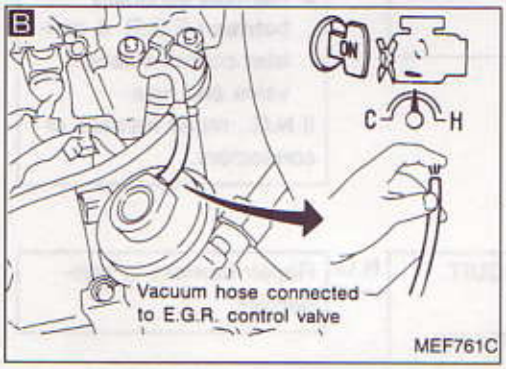


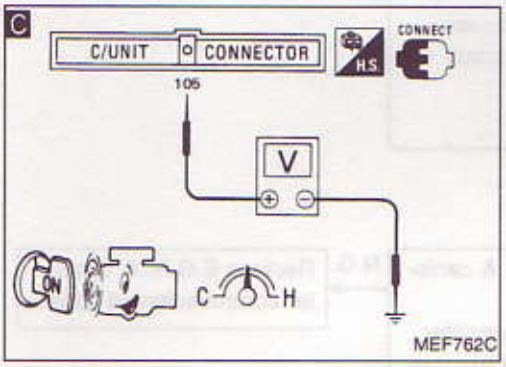


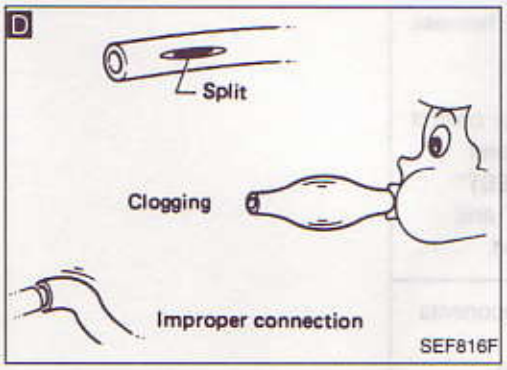


Diagnostic Procedure 32 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform self-diagnosis.
Make sure that code No. 12 is not displayed.
Make sure that E.C.U.'s C.P.U. is not in "fail-safe" state.
3) Make sure that E.G.R. control valve spring moves up and down when racing engine.
(Use your finger.)

Moves up and down → INSPECTION END

does not move up and down

B

CHECK VACUUM SOURCE TO E.G.R. CONTROL VALVE.
1) Disconnect vacuum hose to E.G.R. control valve.
2) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine speed is about 2,500 rpm:
Vacuum should exist.

O.K. → CHECK COMPONENTS (E.G.R. control valve and B.P.T. valve).
Refer to "Electrical Components Inspection". (See page EF & EC-168.)

N.G. → Replace malfunctioning component(s)

N.G.

C

CHECK CONTROL FUNCTION.
1) Check voltage between E.C.U. terminal (105) and ground under the following conditions.
Voltage:
At idle
0 - 1.0V
Engine speed is about 2,500 rpm
Battery voltage

O.K. → D

D

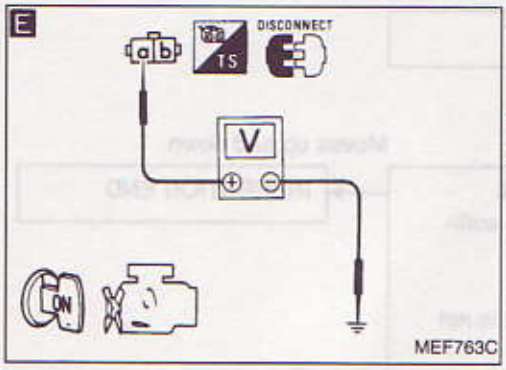
CHECK VACUUM HOSE.
1) Check vacuum hose for clogging, cracks and proper connection.

N.G.

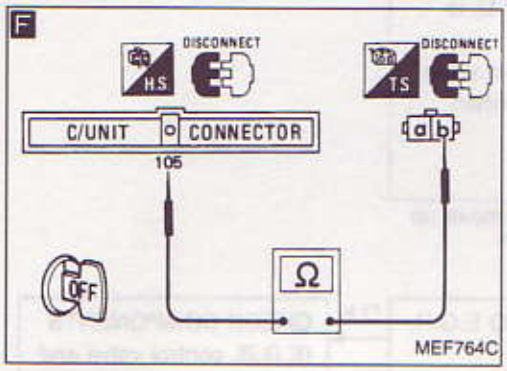
Ⓐ

Diagnostic Procedure 32 (Cont'd)

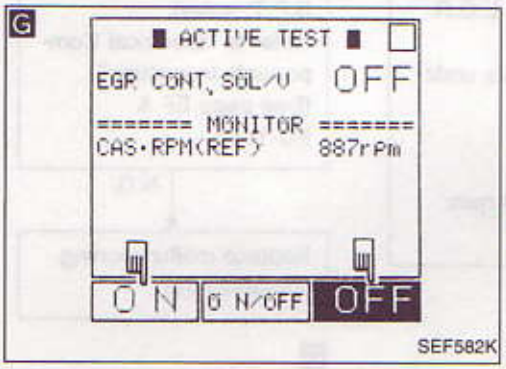
E



F



G



Ⓐ

E

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect E.G.R. & canister control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

N./G. → Check the following.
- Harness connectors (M19), (E1)
- Harness connectors (E18), (E20)
- 10A fuse
- Harness continuity between E.G.R. & canister control solenoid valve and fuse

If N.G., repair harness or connectors.

O.K. ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Check harness continuity between E.C.U. terminal (105) and terminal ⓑ
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

G

CHECK COMPONENT (E.G.R. & canister control solenoid valve).
1) Reconnect E.G.R. & canister control solenoid valve harness connector and E.C.U. harness connector.
2) Start engine.
3) Turn E.G.R. & canister control solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

N.G. → Replace E.G.R. & canister control solenoid valve.

OR

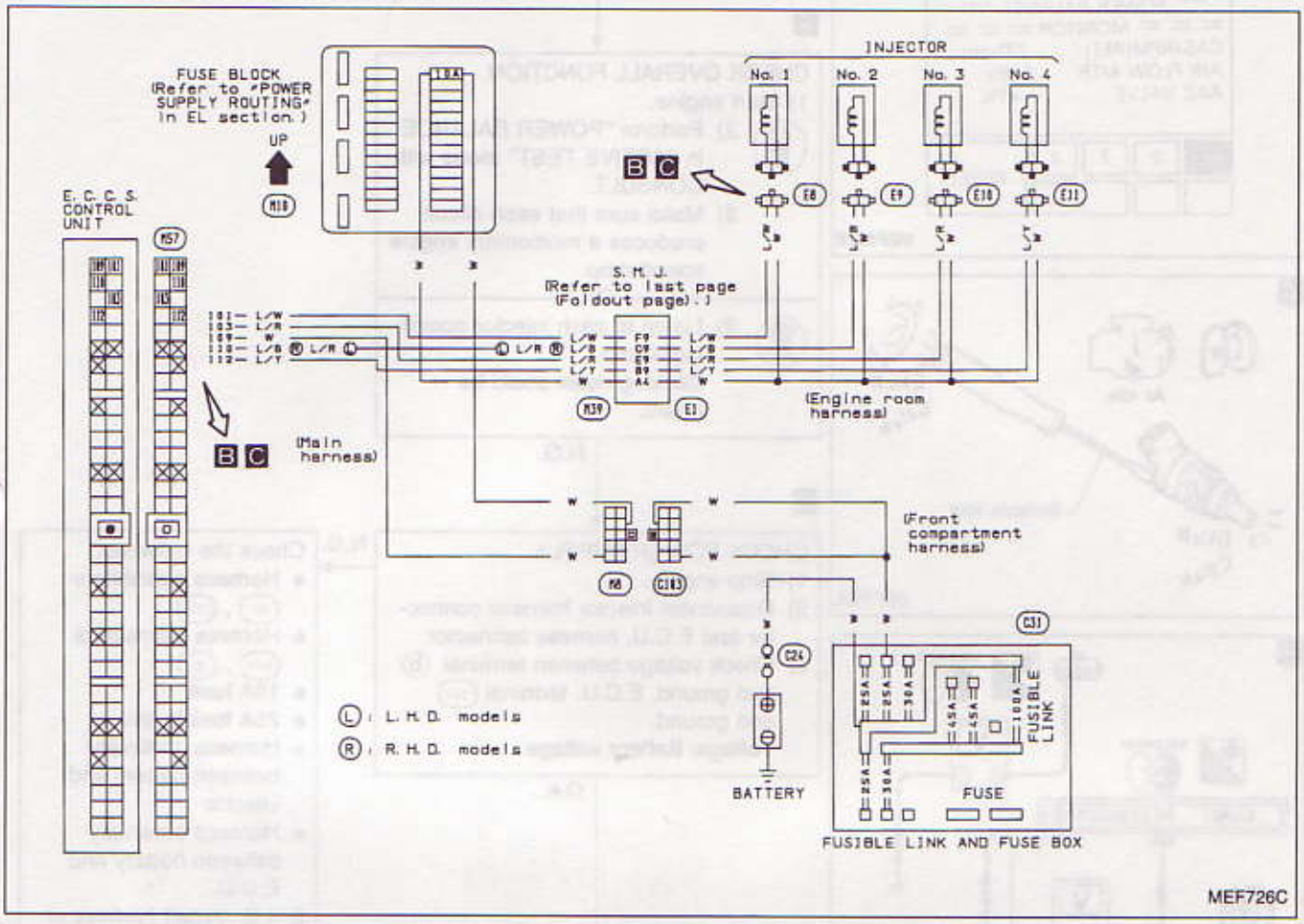
Refer to "Electrical Components Inspection".
(See page EF & EC-155).

O.K. ↓

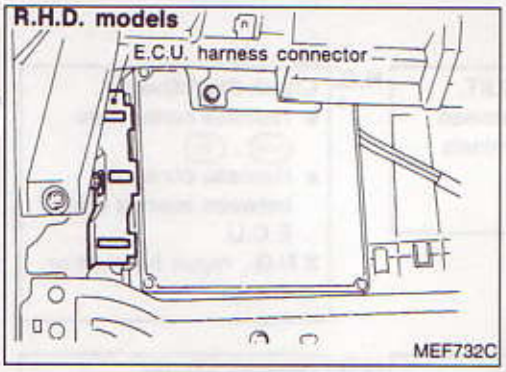
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

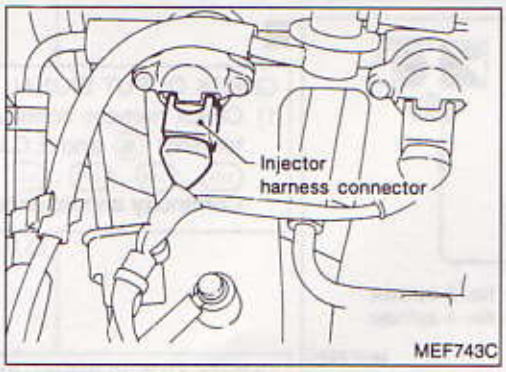
Diagnostic Procedure 33

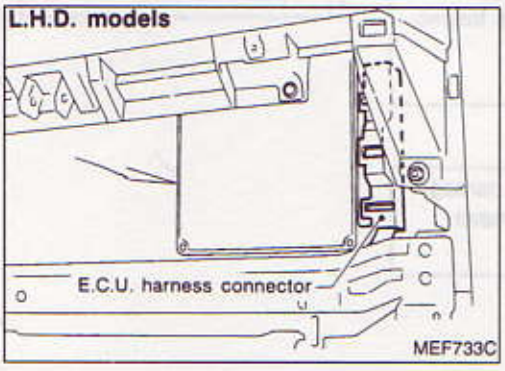
INJECTOR (Not self-diagnostic item)



Harness layout

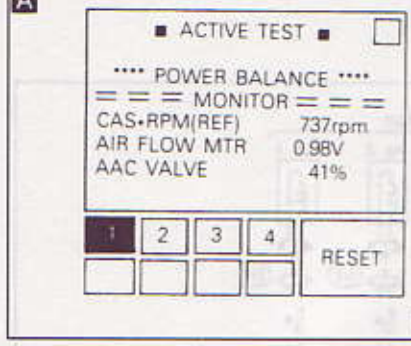






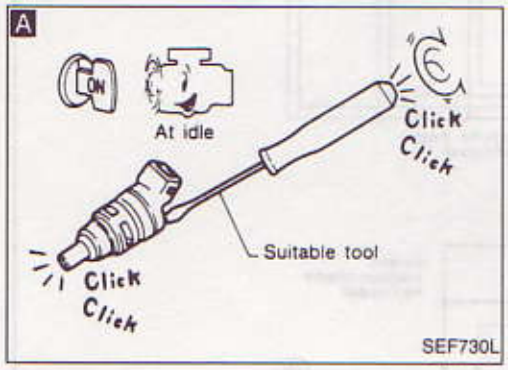
Diagnostic Procedure 33 (Cont'd)

A



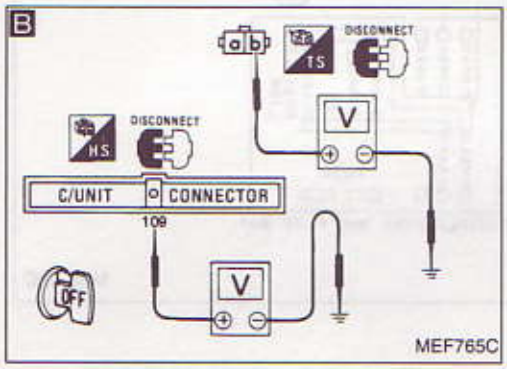
MEF587B

A



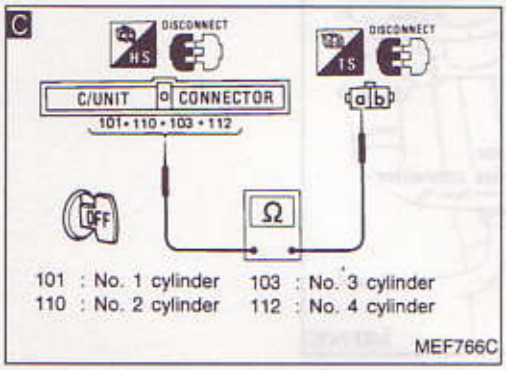
SEF730L

B



MEF765C

C



101 : No. 1 cylinder 103 : No. 3 cylinder
110 : No. 2 cylinder 112 : No. 4 cylinder

MEF766C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine.
2) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3) Make sure that each circuit produces a momentary engine speed drop.

OR

2) Listen to each injector operating sound.
Clicking noise could be heard.

N.G.

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect injector harness connector and E.C.U. harness connector.
3) Check voltage between terminal (b) and ground, E.C.U. terminal (109) and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M8), (C103)
- Harness connectors (M39), (E1)
- 10A fuse
- 25A fusible link
- Harness continuity between battery and injector
- Harness continuity between battery and E.C.U.

If N.G., repair harness or connectors.

O.K.

C

CHECK OUPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal (a) and E.C.U. terminals (101), (110), (103), (112).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between injector and E.C.U.

If N.G., repair harness or connector.

O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-155).

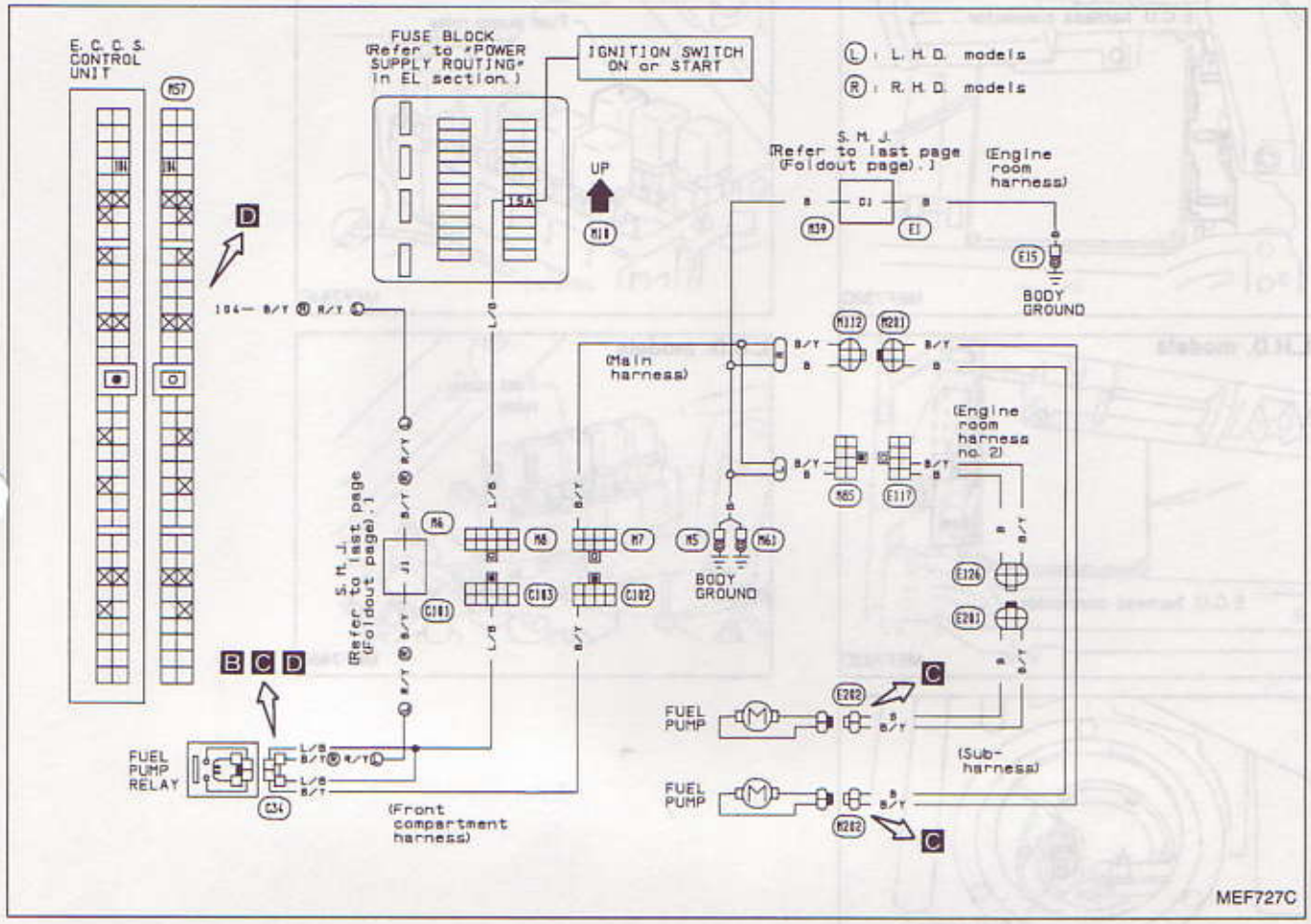
N.G. → Replace injector.

O.K.

Check E.C.U. Pin terminals for damage or the connection of E.C.U. harness connector.

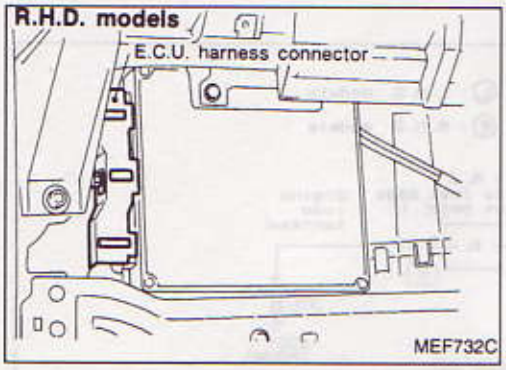
Diagnostic Procedure 34

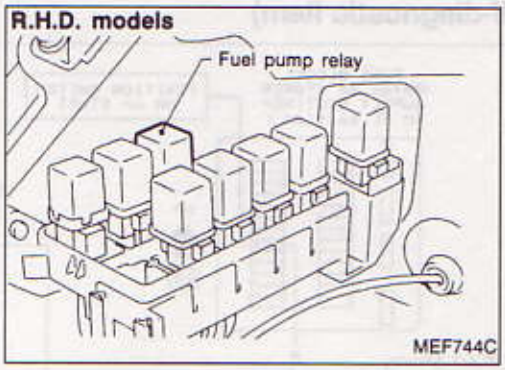
FUEL PUMP (Not self-diagnostic item)

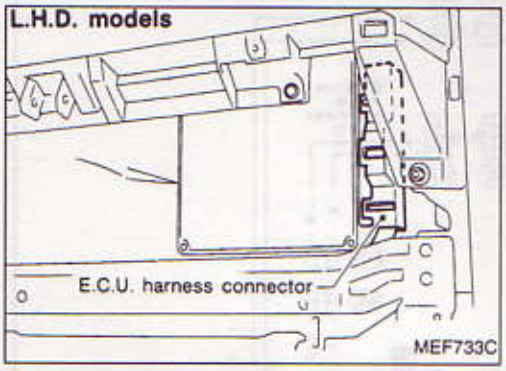


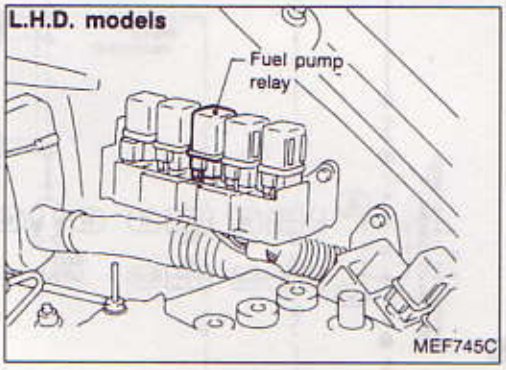
Diagnostic Procedure 34 (Cont'd)

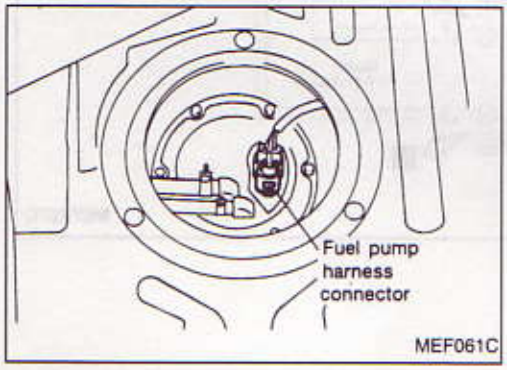
Harness layout



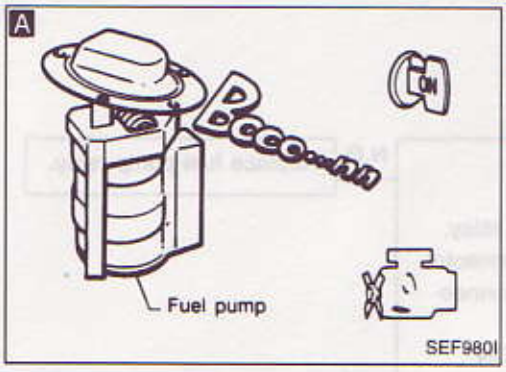








Diagnostic Procedure 34 (Cont'd)



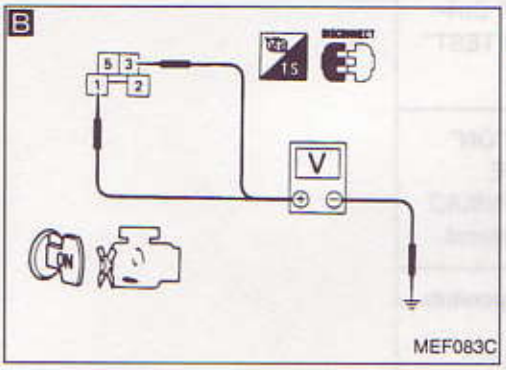
INSPECTION START

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".

O.K. → INSPECTION END

N.G.



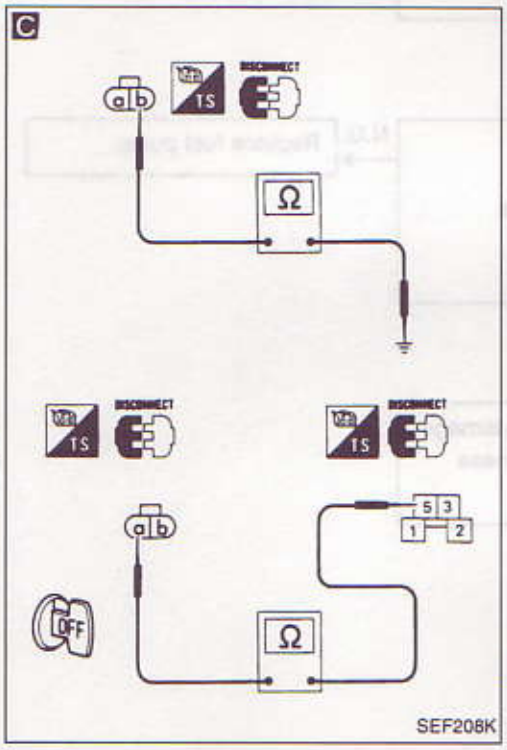
B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ③ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M8), (C103)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

If N.G., repair harness or connectors.

O.K.



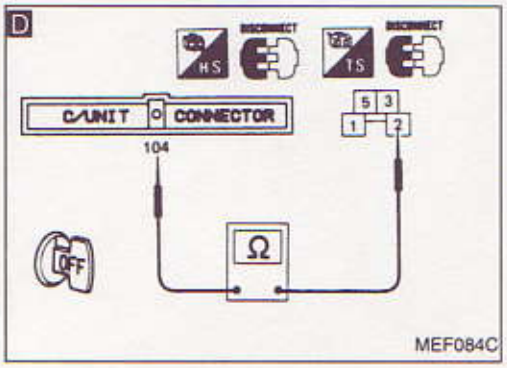
C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminal (b) and body ground, terminal (a) and terminal ⑤.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M112), (M201)
- Harness connectors (E126), (E201) (L.H.D. models)
- Harness connectors (E117), (M85) (L.H.D. models)
- Harness connectors (M7), (C102)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If N.G., repair harness or connectors.

O.K.



D

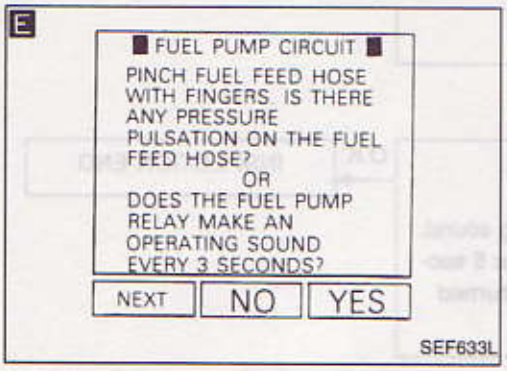
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal (104) and terminal ②.
Continuity should exist.

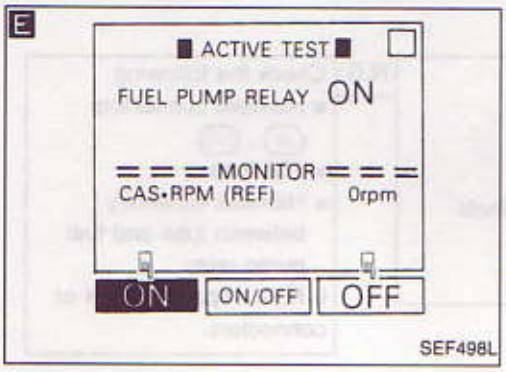
N.G. → Check the following:
- Harness connectors (M6), (C10)
- Harness continuity between E.C.U. and fuel pump relay

If N.G., repair harness or connectors.

O.K. → Ⓐ

Diagnostic Procedure 34 (Cont'd)





Ⓐ

E

CHECK COMPONENT
(Fuel pump relay).

1) Reconnect fuel pump relay, fuel pump harness connector and E.C.U. harness connector.
2) Turn ignition switch "ON".
3) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

N.G. → Replace fuel pump relay.

OR

3) Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

O.K.

CHECK COMPONENT
(Fuel pump).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

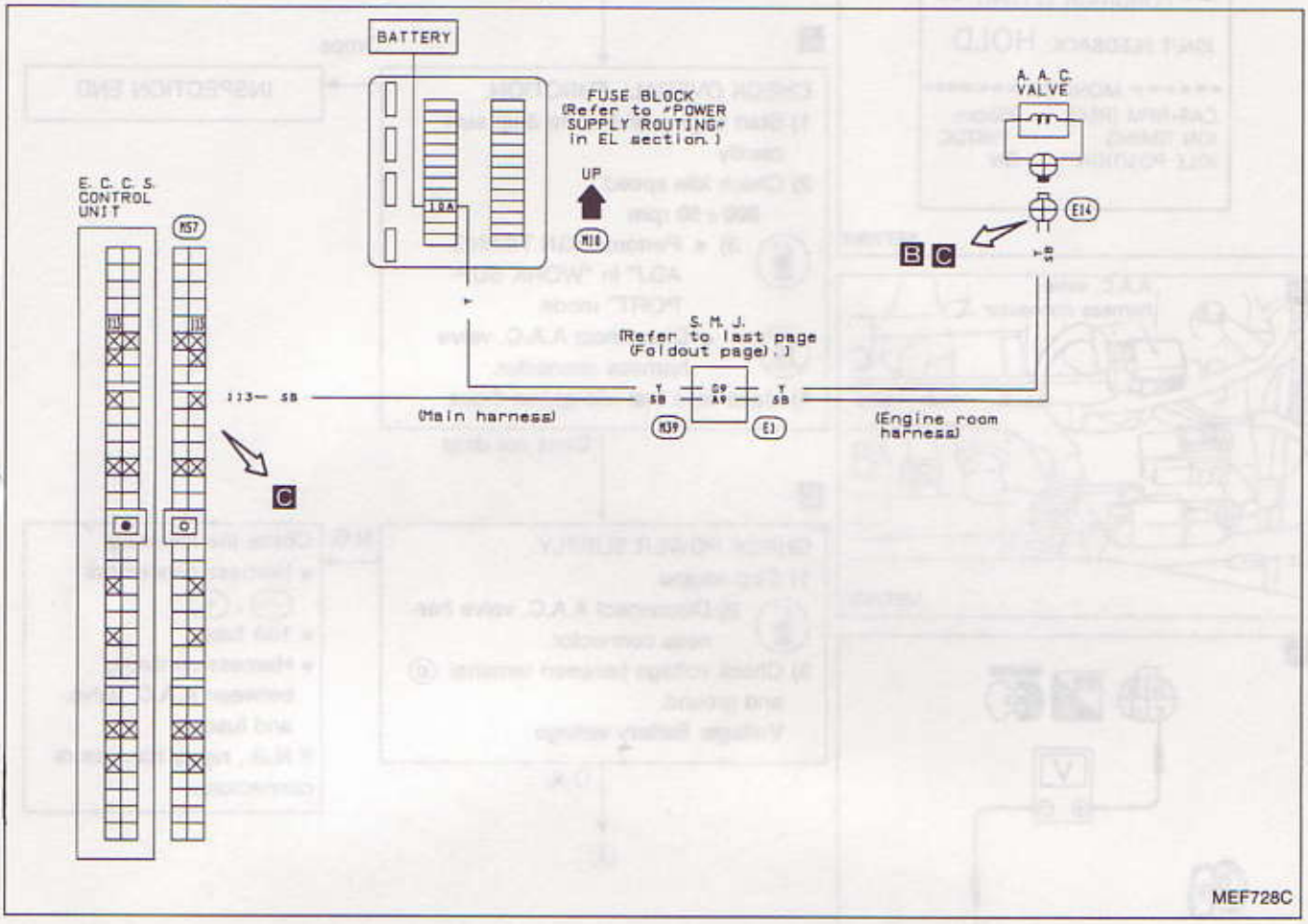
N.G. → Replace fuel pump.

O.K.

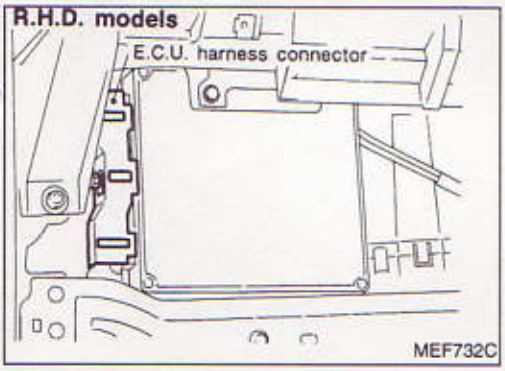
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

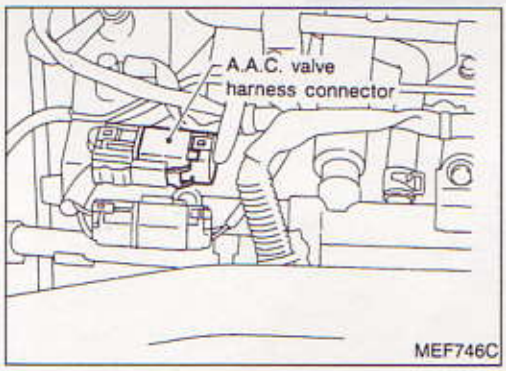
Diagnostic Procedure 35

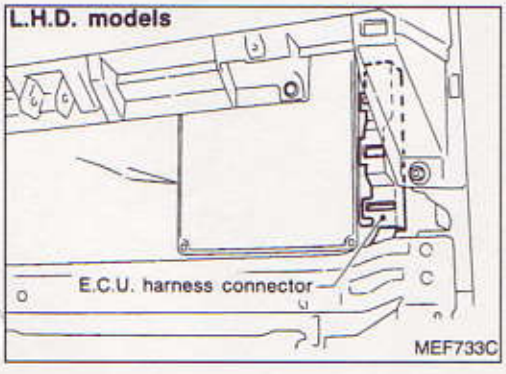
A.A.C. VALVE (Not self-diagnostic item)



Harness layout

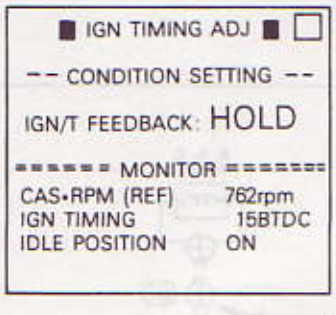






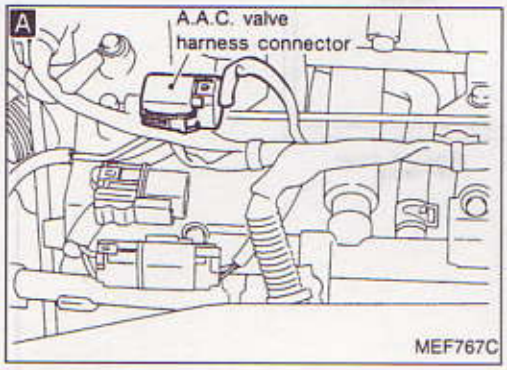
Diagnostic Procedure 35 (Cont'd)

A



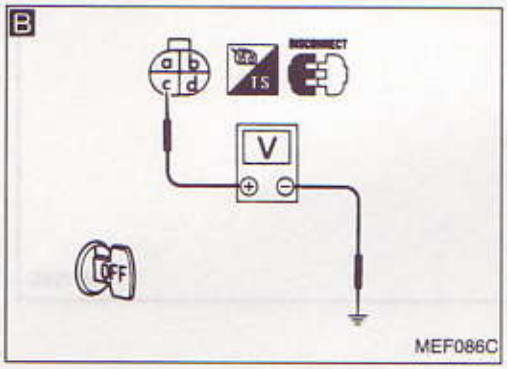
SEF786K

A



MEF767C

B



MEF086C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
800 ± 50 rpm
3) • Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode.
• Disconnect A.A.C. valve harness connector.
4) Make sure that idle speed drops.

Drops → INSPECTION END

Does not drop

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect A.A.C. valve harness connector.
3) Check voltage between terminal (c) and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M19), (X1)
- 10A fuse
- Harness continuity between A.A.C. valve and fuse

If N.G., repair harness or connectors.

O.K. → (A)

Diagnostic Procedure 35 (Cont'd)

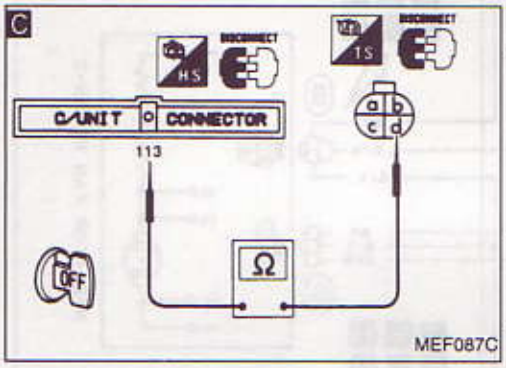
C

SEF196L

C

SEF319L

C



MEF087C

Ⓐ

C

CHECK OUTPUT SIGNAL CIRCUIT.

1) Reconnect A.A.C. valve harness connector.
2) Perform "AAC VALVE SYSTEM" in "FUNCTION TEST" mode with CONSULT.

N.G. → Check the following.
- Harness connectors (M39), (E1)
- Harness continuity between E.C.U. and A.A.C. valve

If N.G., repair harness or connectors.

OR

2) Perform "AAC VALVE OPENING TEST" in "ACTIVE TEST" mode with CONSULT.

OR

1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal (113) and terminal (d).
Continuity should exist.

O.K.

CHECK COMPONENT
(A.A.C. valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

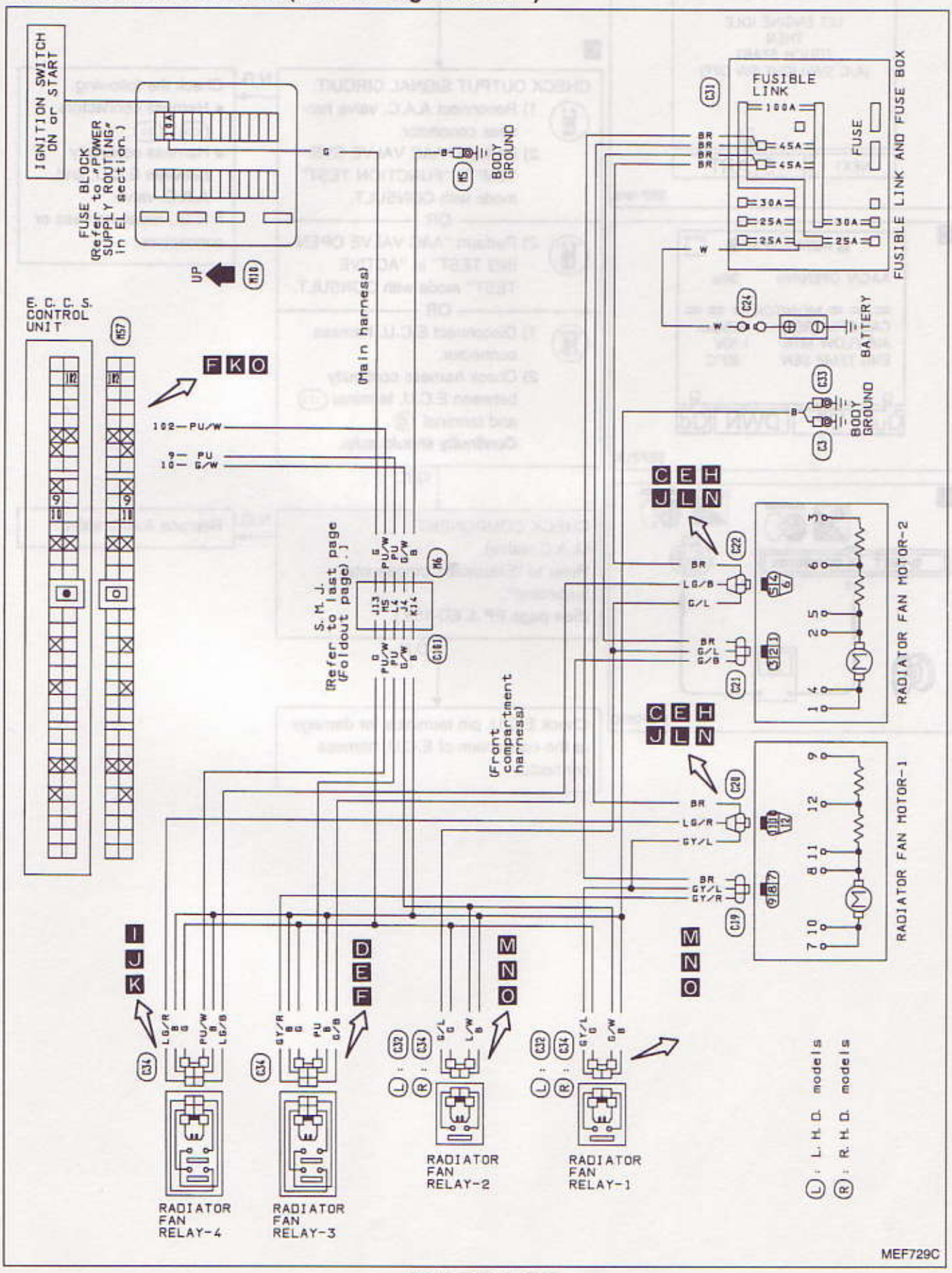
N.G. → Replace A.A.C. valve.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

Diagnostic Procedure 36

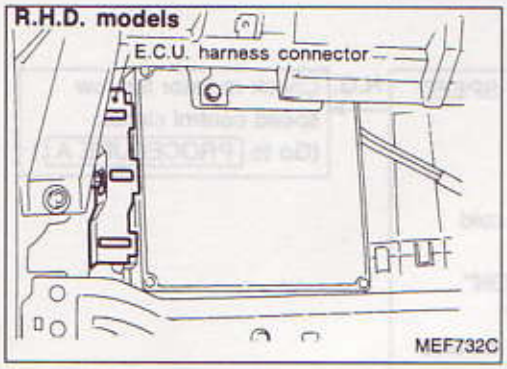
RADIATOR FAN CONTROL (Not self-diagnostic item)



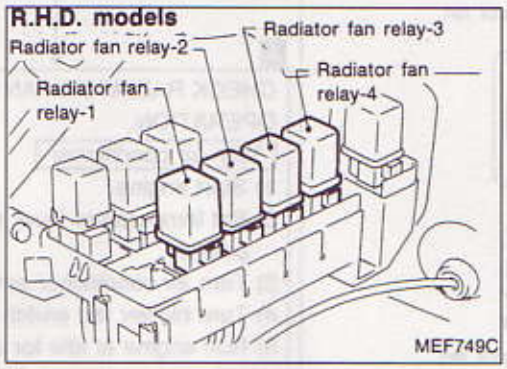
Diagnostic Procedure 36 (Cont'd)

Harness layout

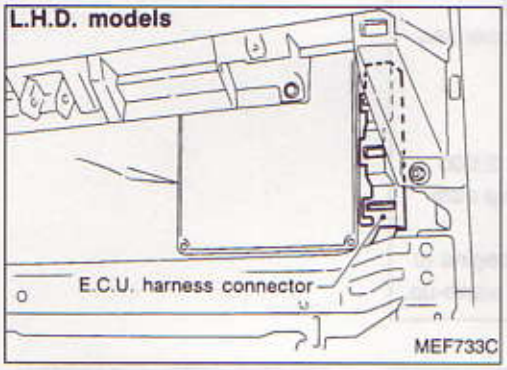
R.H.D. models



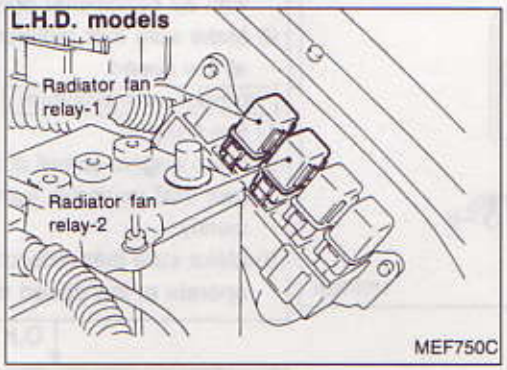
R.H.D. models

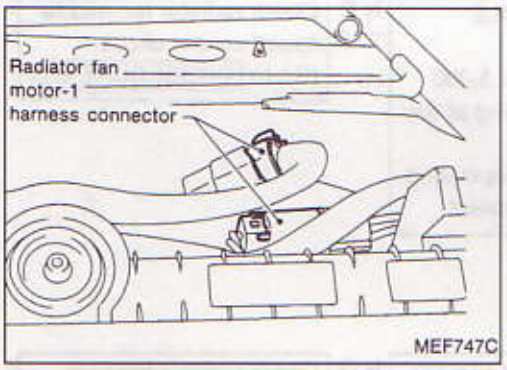


L.H.D. models

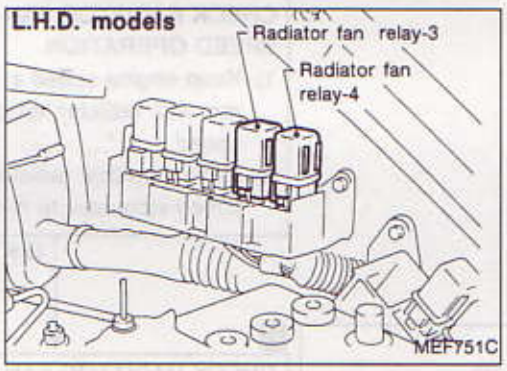


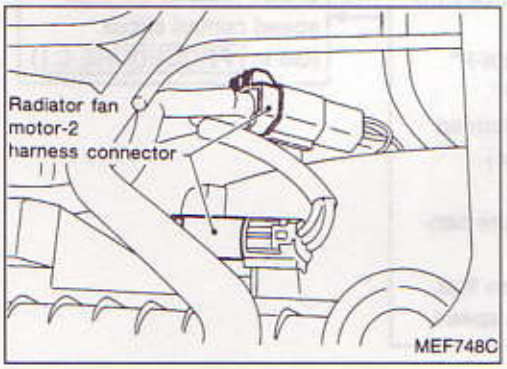
L.H.D. models





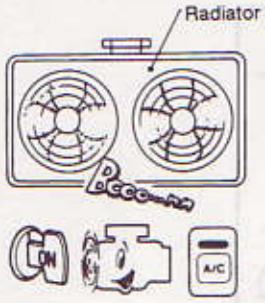
L.H.D. models



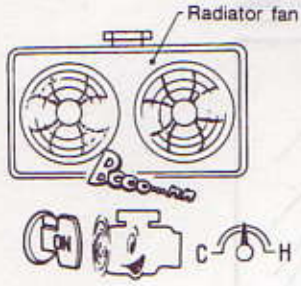


Diagnostic Procedure 36 (Cont'd)

A With air conditioner



Without air conditioner



MEF768C

INSPECTION START

A

CHECK RADIATOR FAN LOW SPEED OPERATION.

With air conditioner

1) Start engine.
2) Set temperature lever at full cold position.
3) Turn air conditioner switch "ON".
4) Turn blower fan switch "ON".
5) Run engine at idle for a few minutes with air conditioner operating.
6) Make sure that radiator fan operates at low speed.

Without air conditioner

1) Start engine.
2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
3) Make sure that radiator fan begins to operate at low speed during warm-up.

N.G. → Check radiator fan low speed control circuit. (Go to PROCEDURE A.)

O.K.

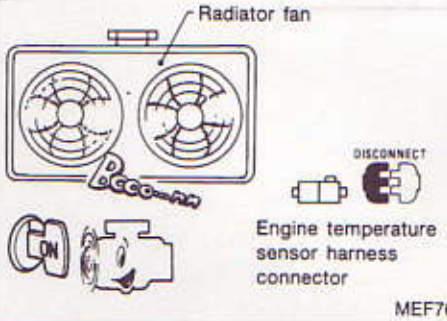
CHECK RADIATOR FAN MIDDLE SPEED OPERATION.

1) Keep engine speed at about 3,000 rpm with radiator fan operating at low speed.
2) Make sure that radiator fan operating speed increases to middle speed.

N.G. → Check radiator fan middle speed control circuit. (Go to PROCEDURE B.)

O.K.

B



MEF769C

B

CHECK RADIATOR FAN HIGH SPEED OPERATION.

1) Turn air conditioner switch "OFF".
2) Turn blower fan switch "OFF".
(Step 1) and 2) are only performed for model with air conditioner.)
3) Stop engine.
4) Disconnect engine temperature sensor harness connector.
5) Restart engine and make sure that radiator fan operates at high speed.

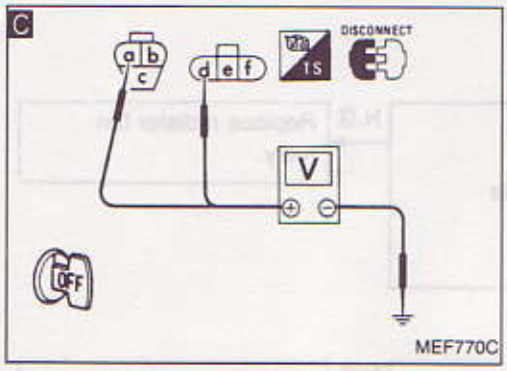
N.G. → Check radiator fan high speed control circuit. (Go to PROCEDURE C.)

O.K.

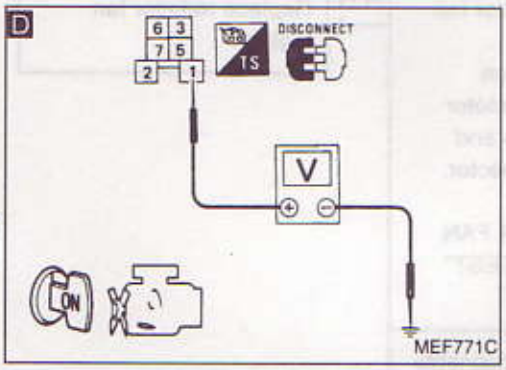
INSPECTION END

Diagnostic Procedure 36 (Cont'd)

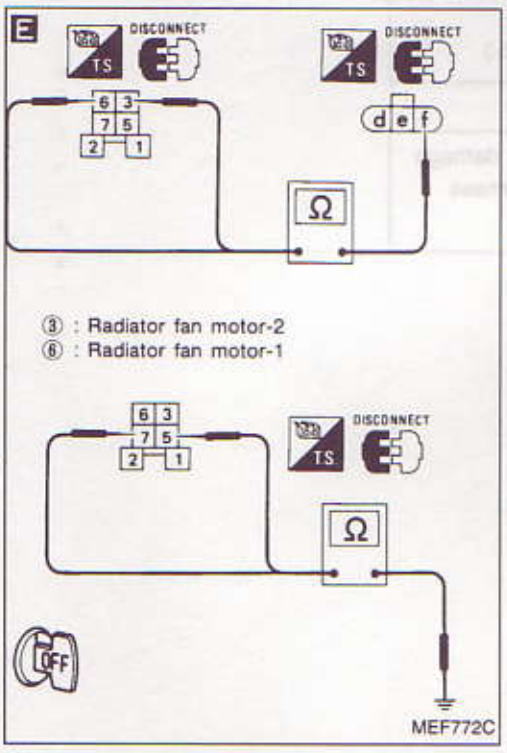
C



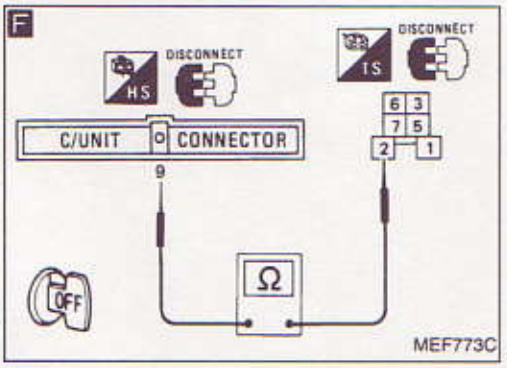
D



E



F



PROCEDURE A

INSPECTION START

CHECK POWER SUPPLY.
1) Turn air conditioner switch "OFF".
2) Turn blower fan switch "OFF".
(Step 1) and 2) are only performed for model with air conditioner.)
3) Stop engine.
4) Disconnect radiator fan motor-1 harness connector and radiator fan motor-2 harness connector.

C 5) Check voltage between terminals ⓐ, ⓓ and ground.
Voltage: Battery voltage

6) Disconnect radiator fan relay-3.
7) Turn ignition switch"ON".

D 8) Check voltage between terminal ① and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M6), (C101)
- 100A fusible link
- 45A fusible link
- 10A fuse
- Harness continuity between battery and radiator fan motors
- Harness continuity between fuse and radiator fan relay-3.

If N.G., repair harness or connectors.

O.K.

E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ③, ⑥ and terminal ⓕ, terminals ⑤, ⑦ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal ⑨ and terminal ②.
Continuity should exist.

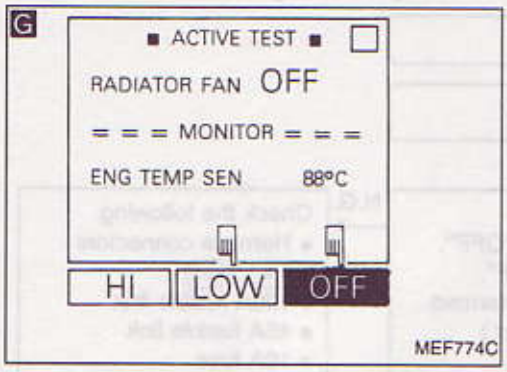
N.G. → Check the following.
- Harness connectors (M6), (C101)
- Harness continuity between E.C.U. and radiator fan relay-3.

If N.G., repair harness or connectors.

O.K.

Ⓐ

Diagnostic Procedure 36 (Cont'd)



Ⓐ

CHECK COMPONENT
(Radiator fan relay-3.)
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

N.G. → Replace radiator fan relay.

O.K.

G

CHECK COMPONENTS (radiator fan motors.)

1) Reconnect radiator fan relay-3, radiator fan motor hyarness connectors and E.C.U. harness connector.
2) Start engine.
3) Perform "RADIATOR FAN TEST" in "ACTIVE TEST" mode with CONSULT.

N.G. → Replace radiator fan motors.

OR

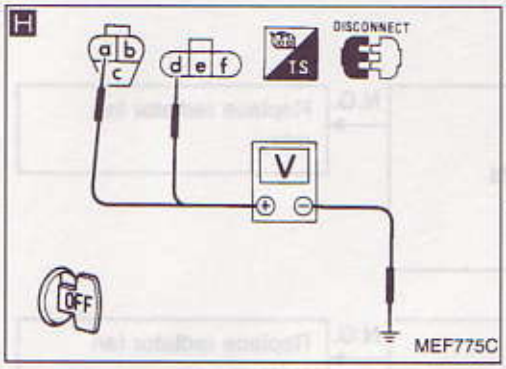
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

O.K.

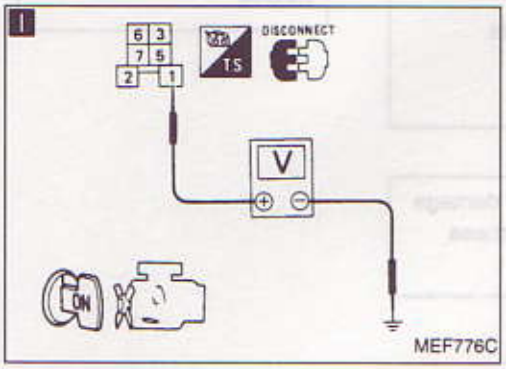
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

Diagnostic Procedure 36 (Cont'd)

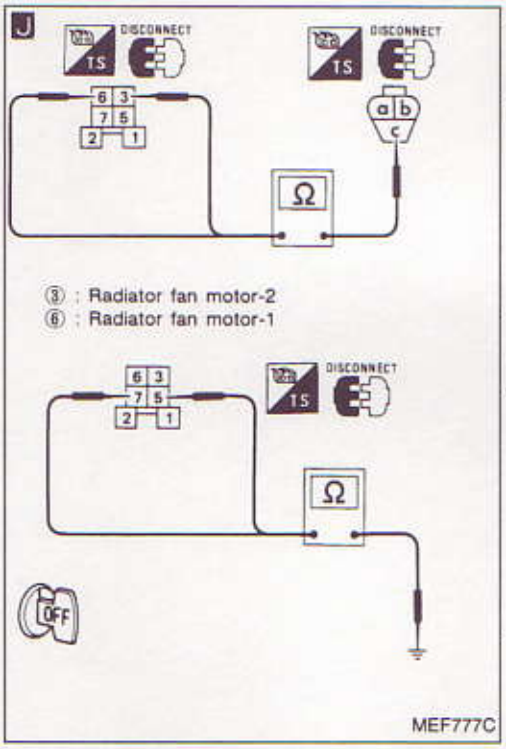
H



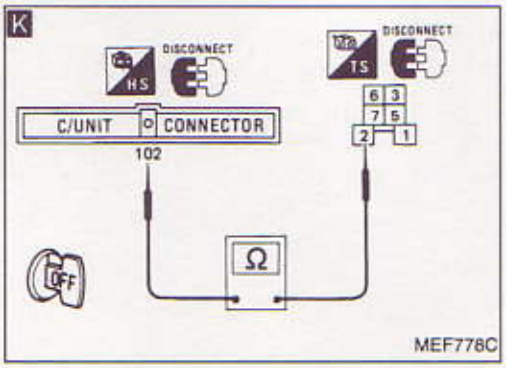
I



J



K



PROCEDURE B

INSPECTION START

CHECK POWER SUPPLY.
1) Turn air conditioner switch "OFF".
2) Turn blower fan switch "OFF".
(Step 1) and 2) are only performed for model with air conditioner.)
3) Stop engine.
4) Disconnect radiator fan motor-1 harness connector and radiator fan motor-2 harness connector.
H 5) Check voltage between terminals ⓐ, ⓓ and ground.
Voltage: Battery voltage
6) Disconnect radiator fan relay-4.
7) Turn ignition switch "ON".
I 8) Check voltage between terminal ① and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between battery and radiator fan motors
- Harness continuity between fuse and radiator fan relay-① -4

If N.G., repair harness or connectors.

O.K.

J

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ③, ⑥ and terminal ⓒ, terminals ⑤, ⑦ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

K

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal (102) and terminal ②.
Continuity should exist.

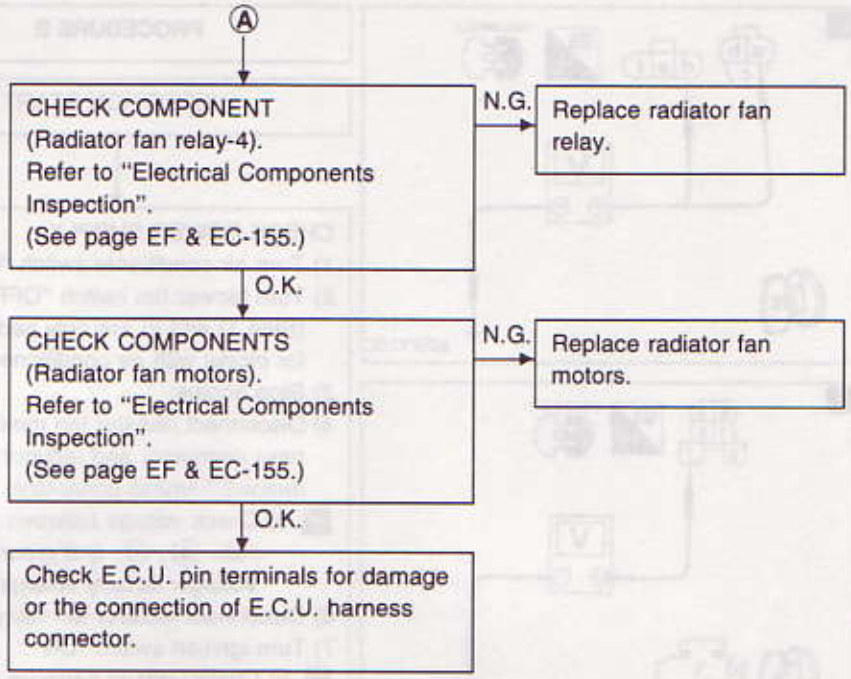
N.G. → Check the following.
- Harness connectors (M6), (C101)
- Harness continuity between E.C.U. and radiator fan relay-① -4

If N.G., repair harness or connectors.

O.K.

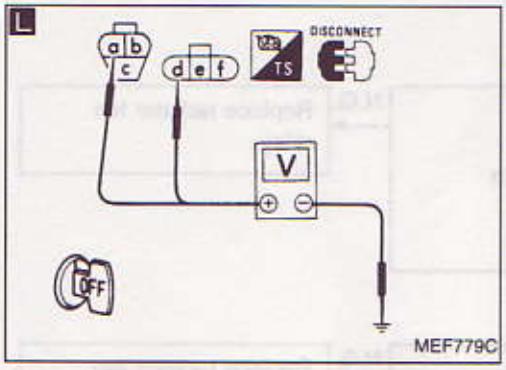
Ⓐ

Diagnostic Procedure 36 (Cont'd)



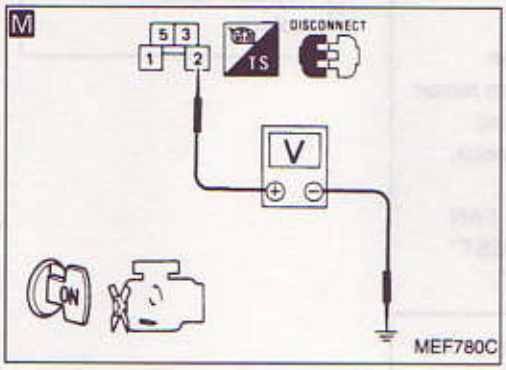
Diagnostic Procedure 36 (Cont'd)

L



MEF779C

M



MEF780C

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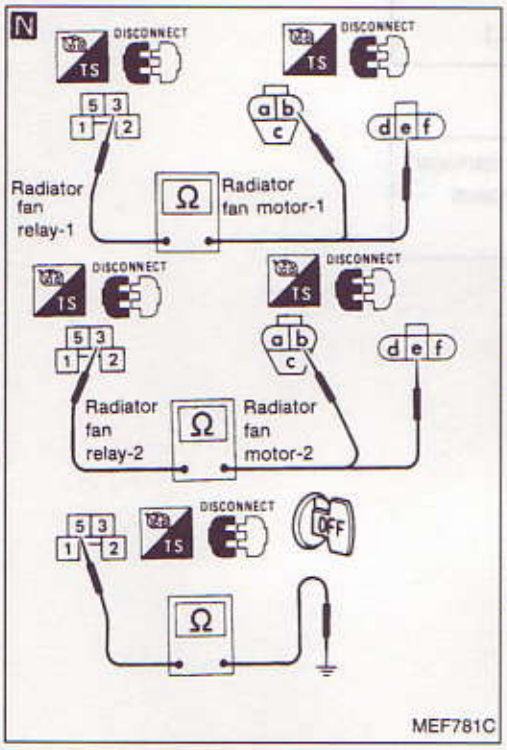
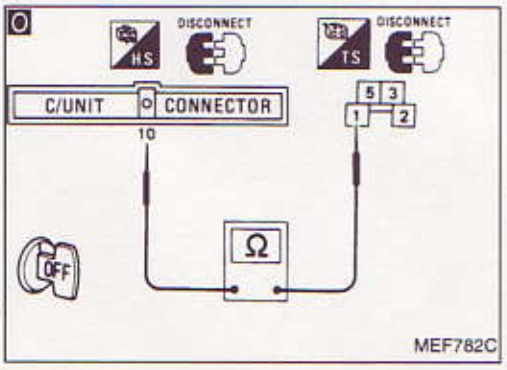


MEF781C

O



MEF782C

PROCEDURE C

INSPECTION START

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect radiator fan motor-1 harness connector and radiator fan motor-2 harness connector.

L 3) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage

4) Disconnect radiator fan relay-1 and radiator fan relay-2.
5) Turn ignition switch "ON".

M 6) Check voltage between terminal ② and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between battery and radiator fan motors
- Harness continuity between fuse and radiator fan relay-1, -2

If N.G., repair harness or connectors.

O.K. ↓

N

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ③ and terminals ⓑ, ⓔ, terminal ⑤ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

O

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal ⑩ and terminal ①.
Continuity should exist.

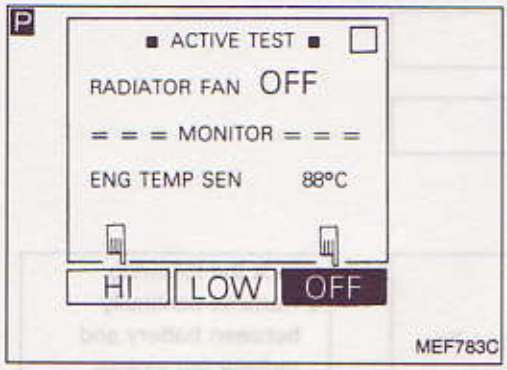
N.G. → Check the following.
- Harness connectors (M6), (C101)
- Harness continuity between E.C.U. and radiator fan relay-1, -2

If N.G., repair harness or connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 36 (Cont'd)



Ⓐ

CHECK COMPONENT
(Radiator fan relay-1, -2).
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

N.G. → Replace radiator fan relay.

O.K.

P

CHECK COMPONENTS
(Radiator fan motors).

1) Reconnect radiator fan relay-1, -2, radiator fan motor harness connectors and E.C.U. harness connector.
2) Start engine.
3) Perform "RADIATOR FAN TEST" in "ACTIVE TEST" mode with CONSULT.

N.G. → Replace radiator fan motors.

OR

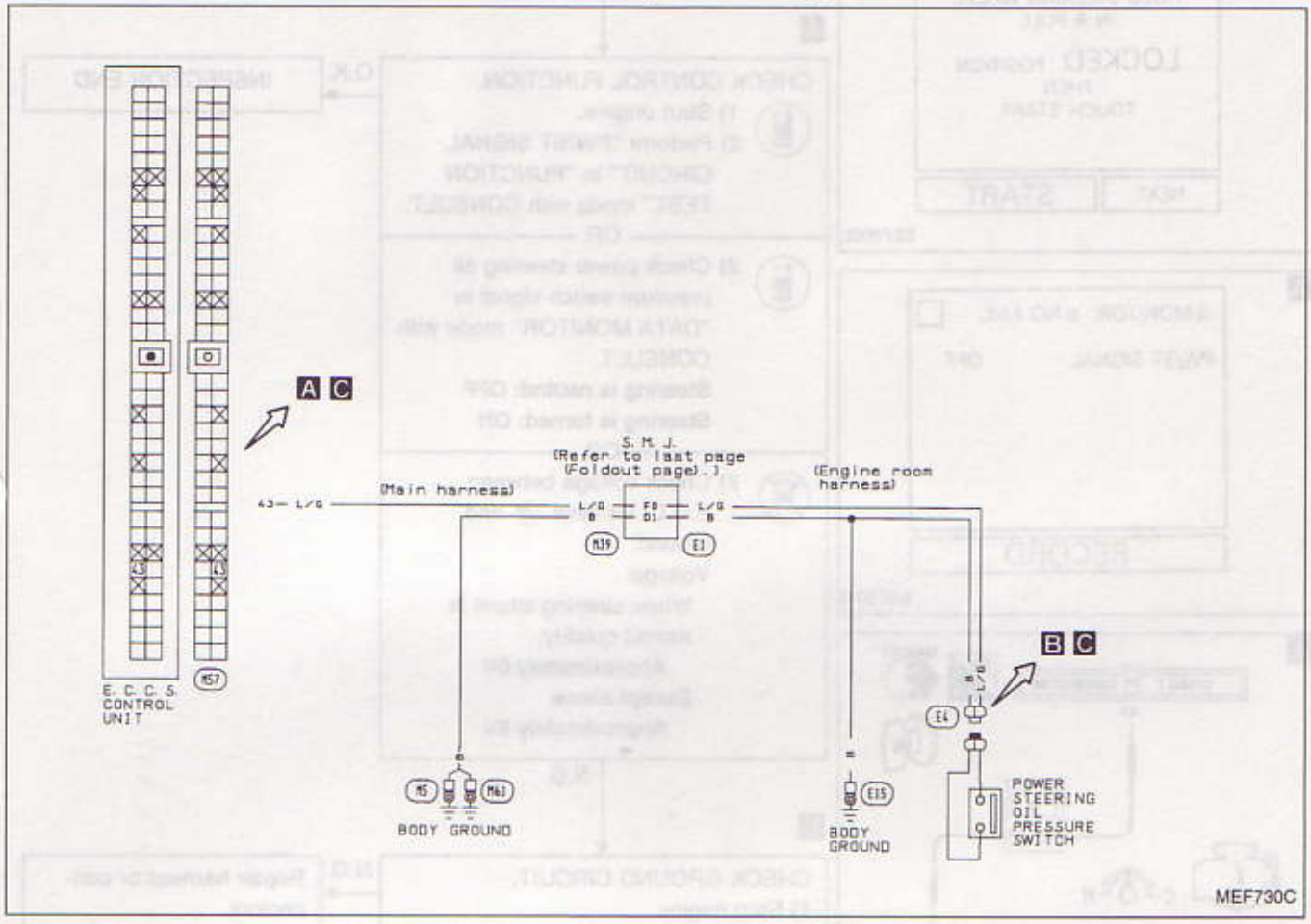
Refer to "Electrical Components Inspection".
(See page EF & EC-155.)

O.K.

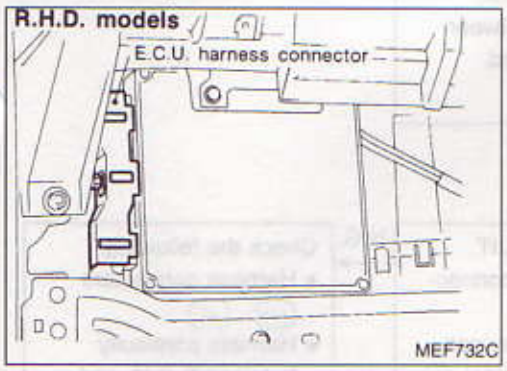
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

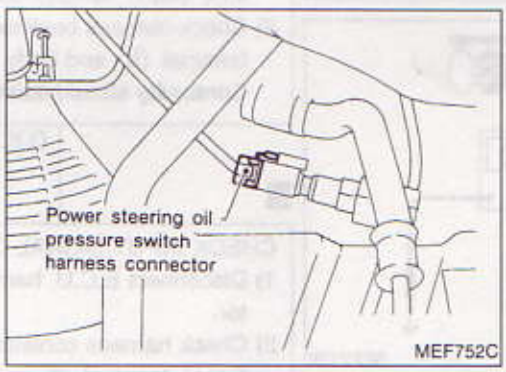
Diagnostic Procedure 37

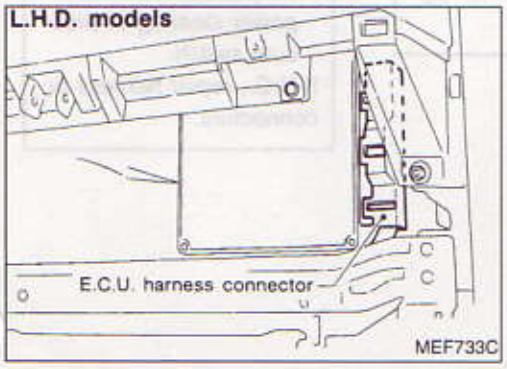
POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)



Harness layout

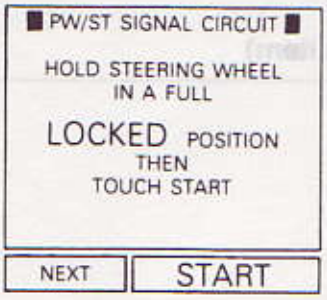






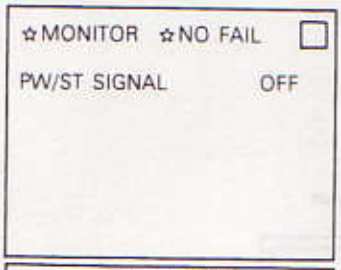
Diagnostic Procedure 37 (Cont'd)

A



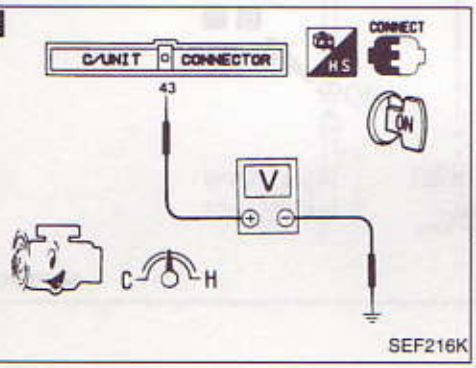
SEF200L

A



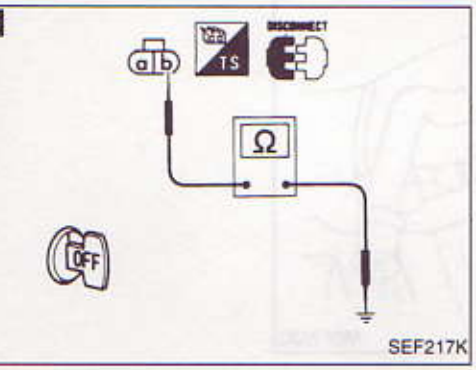
SEF591I

A



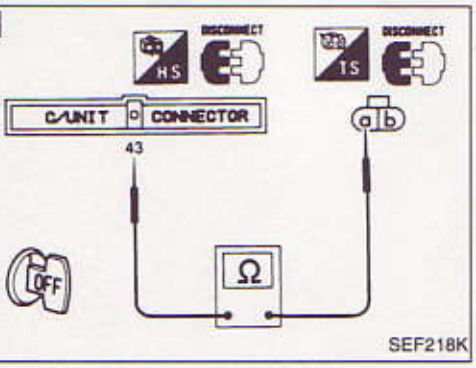
SEF216K

B



SEF217K

C



SEF218K

INSPECTION START

A

CHECK CONTROL FUNCTION.

1) Start engine.
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

2) Check power steering oil pressure switch signal in "DATA MONITOR" mode with CONSULT.
Steering is neutral: OFF
Steering is turned: ON

OR

2) Check voltage between E.C.U. terminal (43) and ground.
Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 8V

N.G.

B

CHECK GROUND CIRCUIT.

1) Stop engine.
2) Disconnect power steering oil pressure switch harness connector.
3) Check harness continuity between terminal (b) and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.

1) Disconnect E.C.U. harness connector.
2) Check harness continuity between E.C.U. terminal (43) and terminal (a).
Continuity should exist.

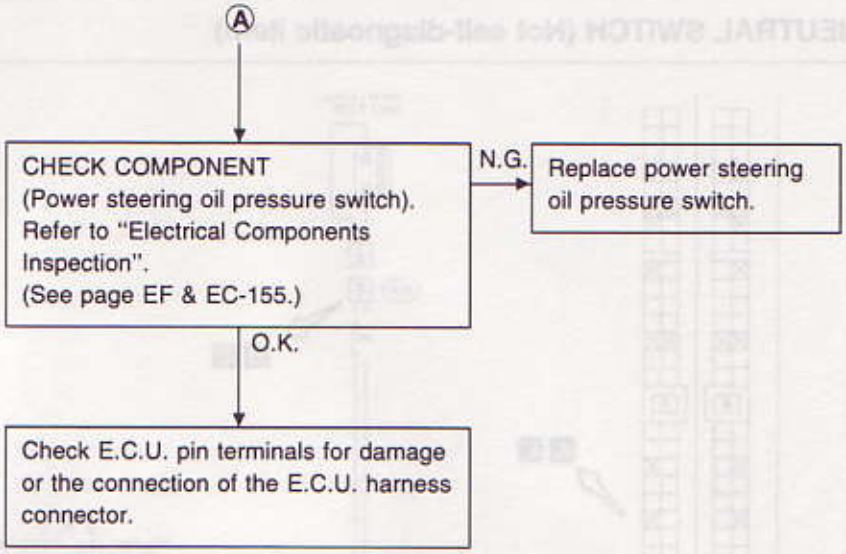
N.G. → Check the following.
- Harness connectors (M39), (X1)
- Harness continuity between E.C.U. and power steering oil pressure switch

If N.G., repair harness or connectors.

O.K.

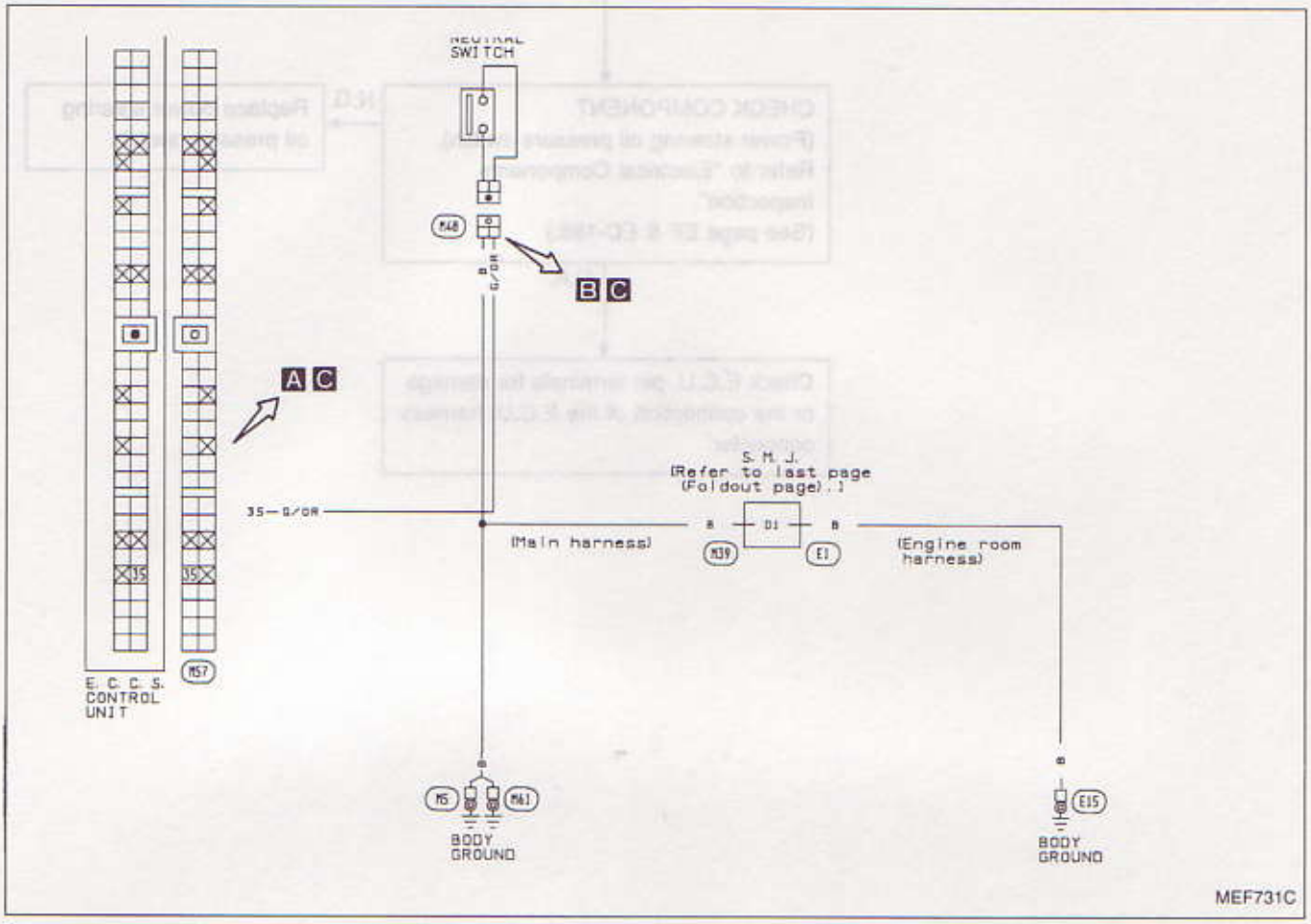
Ⓐ

Diagnostic Procedure 37 (Cont'd)

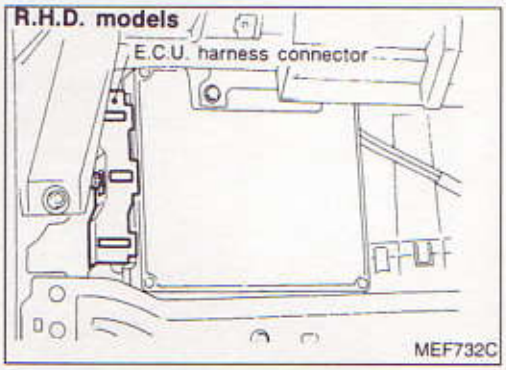


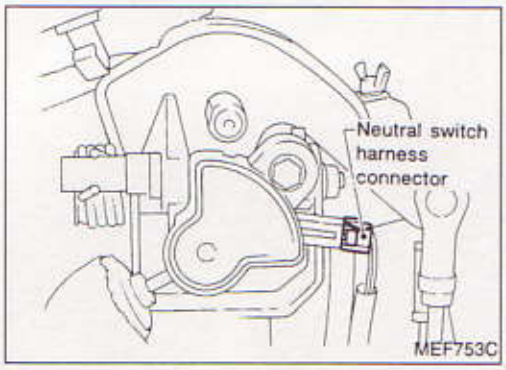
Diagnostic Procedure 38

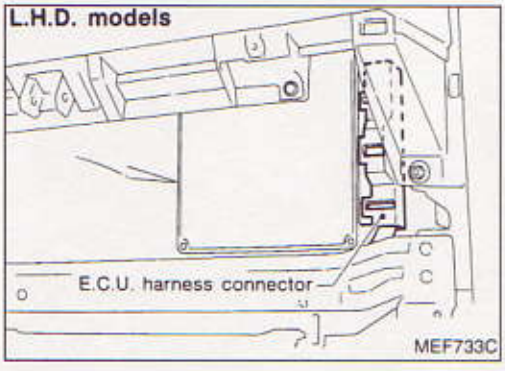
NEUTRAL SWITCH (Not self-diagnostic item)



Harness layout

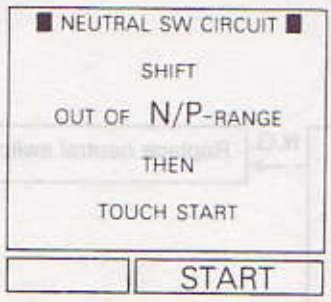






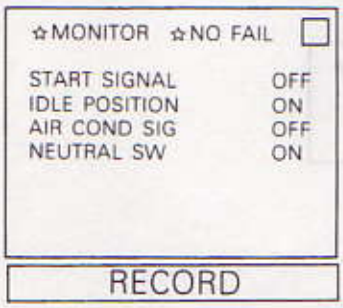
Diagnostic Procedure 38 (Cont'd)

A



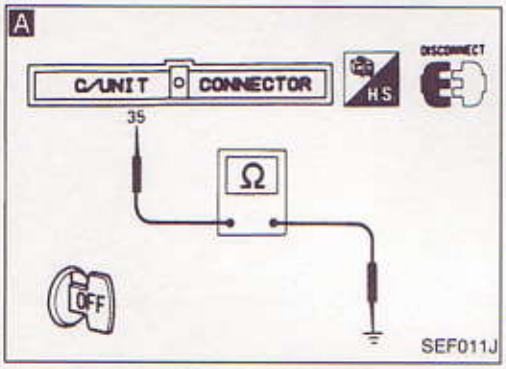
SEF206L

A



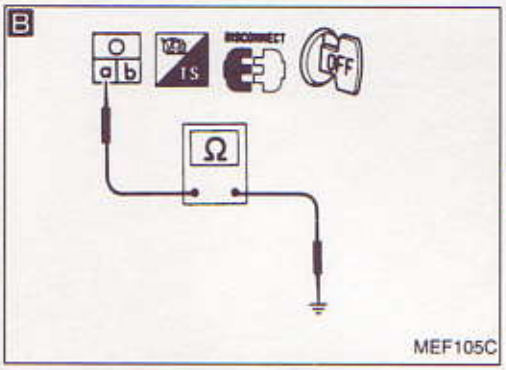
SEF384J

A



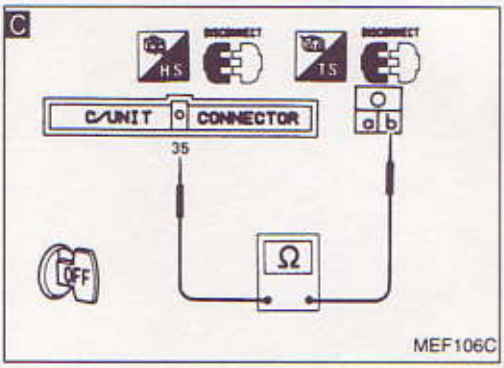
SEF011J

B



MEF105C

C



MEF106C

INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "NEUTRAL SW CIRCUIT" in "FUNCTION TEST" mode with CONSULT.
Neutral position: ON
Except above: OFF

O.K. → INSPECTION END

OR

2) Check neutral switch signal in "DATA MONITOR" mode with CONSULT.
Neutral position: ON
Except above: OFF

OR

1) Set shift lever to the neutral position.
2) Disconnect E.C.U. harness connector.
3) Check harness continuity between E.C.U. terminal ㉟ and body ground.
Continuity should exist.

N.G.

Turn ignition switch "OFF".

B

CHECK GROUND CIRCUIT.

1) Disconnect neutral switch harness connector.
2) Check harness continuity between terminal ⓐ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

Disconnect E.C.U. harness connector.

C

CHECK INPUT SIGNAL CIRCUIT.

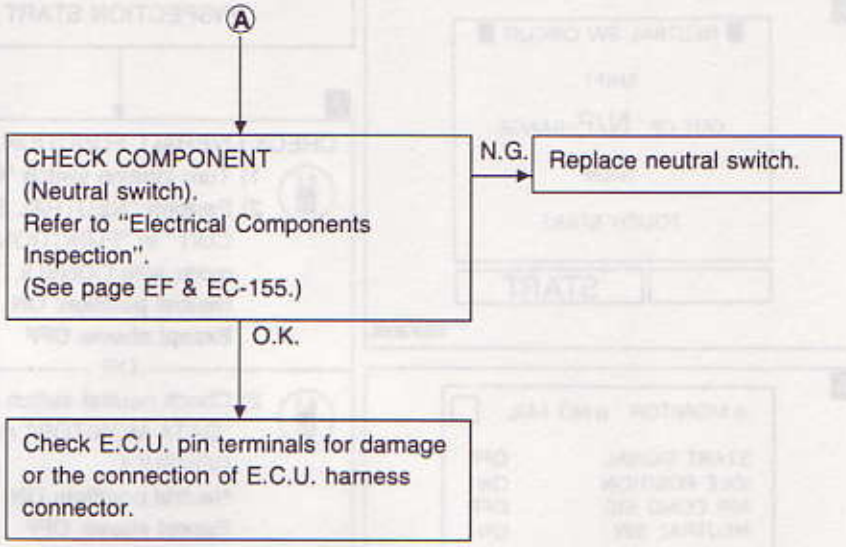
1) Check harness continuity between E.C.U. terminal ㉟ and terminal ⓑ.
Continuity should exist.

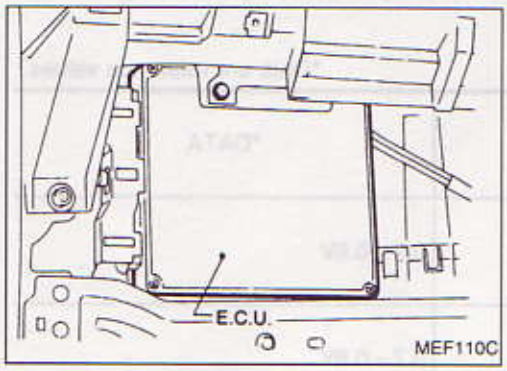
N.G. → Repair harness or connectors.

O.K.

Ⓐ

Diagnostic Procedure 38 (Cont'd)



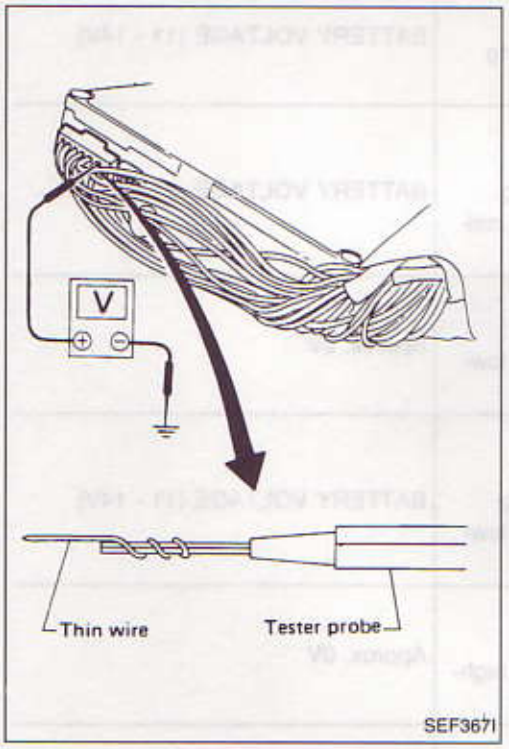


Electrical Components Inspection

E.C.U. INPUT/OUTPUT SIGNAL INSPECTION

1. E.C.U. is located behind the glove box. For this inspection, remove the glove box.

2. Remove E.C.U. harness protector.



3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

Electrical Components Inspection (Cont'd)

E.C.U. inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └Idle speed	0.4 - 0.6V
		Engine is running. └Engine speed is 2,000 rpm	0.7 - 0.9V
3	Ignition check	Engine is running. └Idle speed	Approximately 12V
4	E.C.C.S. relay (Self-shut off)	Engine is running. Ignition switch "OFF" └For a few seconds after turning ignition switch "OFF"	0 - 1V
		Ignition switch "OFF" └In a few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
9	Radiator fan relay (Low-speed)	Engine is running. ├Radiator fan is not operating. └Radiator fan is operating at middle- or high-speed.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Radiator fan is operating at low-speed.	Approx. 0V
10	Radiator fan relay (High-speed)	Engine is running. ├Radiator fan is not operating. └Radiator fan is operating at low- or middle-speed.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Radiator fan is operating at high-speed.	Approx. 0V
11	Air conditioner relay	Engine is running. └Both A/C switch and blower switch are "ON".	0.6 - 0.8V
		Engine is running. └A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
16	Air flow meter	Engine is running. (Warm-up condition) └Idle speed	1.3 - 1.7V
		Engine is running. (Warm-up condition) └Engine speed is 2,000 rpm.	1.7 - 2.1V
18	Engine temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine water temperature.
19	Exhaust gas sensor	Engine is running. └After warming up sufficiently.	0 - Approximately 1.5V
20	Throttle sensor	Ignition switch "ON" └Accelerator pedal released	0.45 - 0.55V
		Ignition switch "ON" └Accelerator pedal fully depressed	Approximately 4V
22 30	Crank angle sensor (Reference signal)	Engine is running. └**Do not run engine at high speed under no-load.**	0.2 - 0.5V
27	Detonation sensor	Engine is running. └Idle speed	2.0 - 3.0V
31 40	Crank angle sensor (Position signal)	Engine is running. └**Do not run engine at high speed under no-load.**	2.0 - 3.0V
34	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
35	Neutral switch	Ignition switch "ON" └Neutral	0V
		Ignition switch "ON" └Except the above gear position	Approximately 6V
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle sensor power supply	Ignition switch "ON"	Approximately 5V
38 47	Power supply for E.C.U.	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. └Both air conditioner switch and blower switch are "ON".	Approximately 0V
		Engine is running. └Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

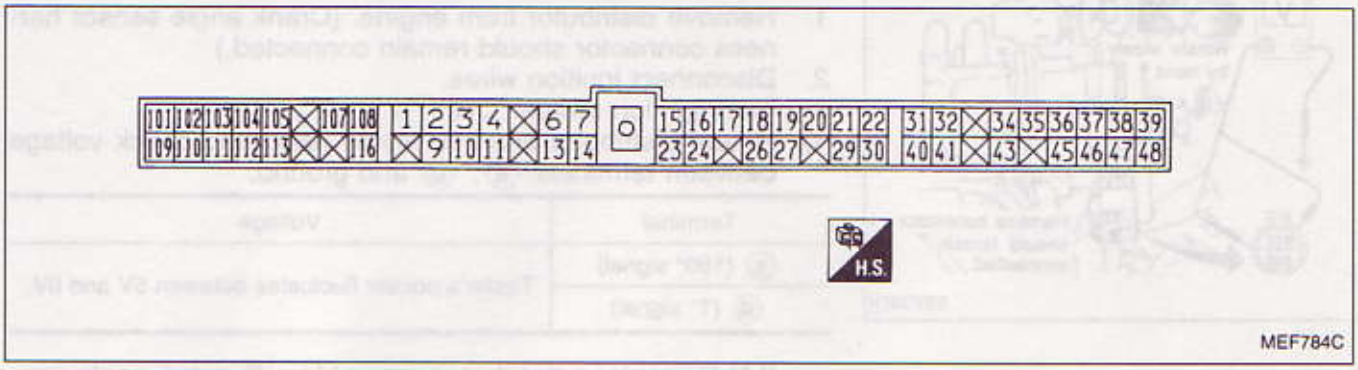
Electrical Components Inspection (Cont'd)

*Data are reference values.

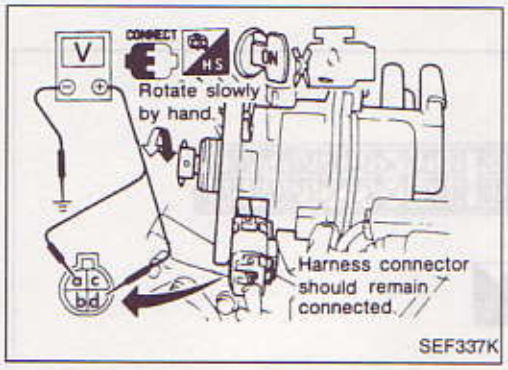
TERMINAL NO.	ITEM	CONDITION	*DATA
43	Power steering oil pressure switch	Engine is running. └Steering wheel is being turned.	0V
		Engine is running. └Steering wheel is not being turned.	Approximately 8V
46	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
102	Radiator fan relay (Middle speed)	Engine is running. ├Radiator fan is not operating. └Radiator fan is operating at low- or high-speed.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Radiator fan is operating at middle-speed.	0.6 - 0.8V
104	Fuel pump relay	Ignition switch "ON" └For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
105	E.G.R. & canister control solenoid valve	Engine is running. (Warm-up condition) └Idle speed	Approx. 0V
		Engine is running. └Engine speed is about 2,500 rpm	BATTERY VOLTAGE (11 - 14V)
113	A.A.C. valve	Engine is running. └Idle speed	9 - 14V
		Engine is running at idle. ├Steering wheel is being turned. ├Air conditioner is operating. ├Rear defogger is "ON". └Headlamp are in high position.	5 - 9V

Electrical Components Inspection (Cont'd)

E.C.U. HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

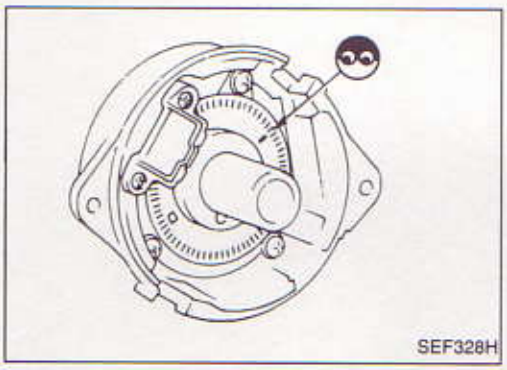


CRANK ANGLE SENSOR

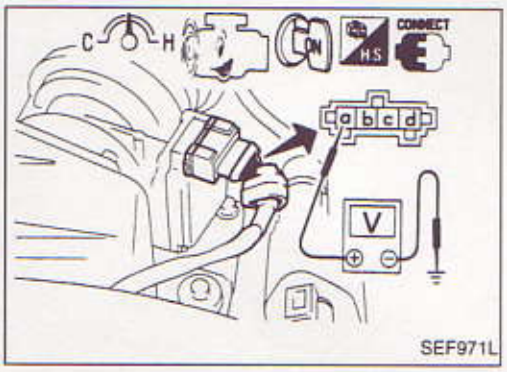
1. Remove distributor from engine. (Crank angle sensor harness connector should remain connected.)
2. Disconnect ignition wires.
3. Turn ignition switch "ON".
4. Rotate distributor shaft slowly by hand and check voltage between terminals ⓐ, ⓓ and ground.

Terminal	Voltage
ⓐ (180° signal)	Tester's pointer fluctuates between 5V and 0V.
ⓓ (1° signal)	

If N.G., replace distributor assembly with crank angle sensor.



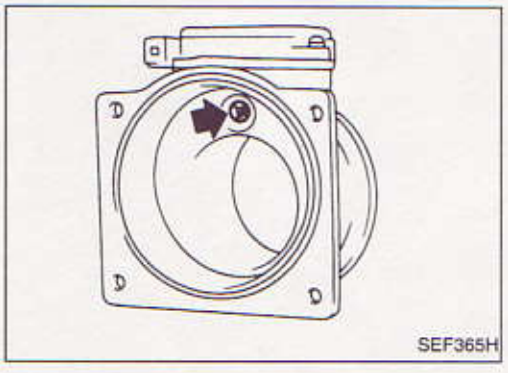
5. Visually check signal plate for damage or dust.



AIR FLOW METER

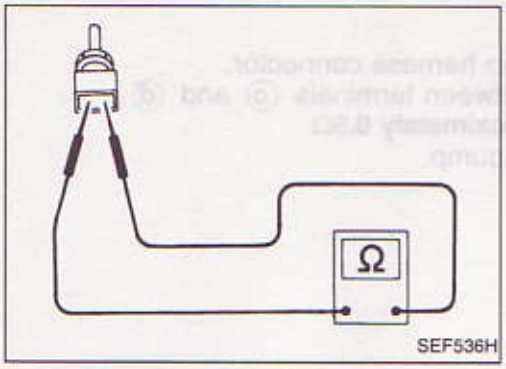
1. Peel air flow meter harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ⓐ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warm-up sufficiently.)	1.3 - 1.8V



5. If N.G., remove air flow meter from air duct. Check hot wire for damage or dust.

Electrical Components Inspection (Cont'd)

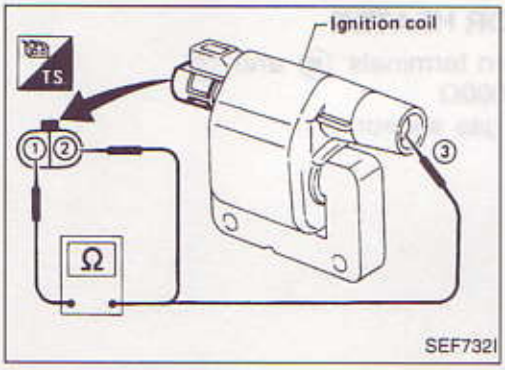


ENGINE TEMPERATURE SENSOR

1. Disconnect engine temperature sensor harness connector.
2. Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
80 (176)	0.30 - 0.33

If N.G., replace engine temperature sensor.

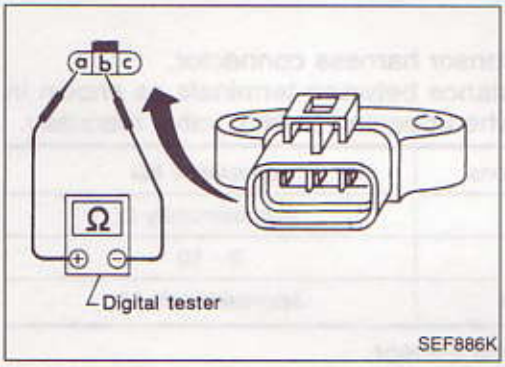


IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
① - ②	Approximately 1.0 Ω
① - ③	Approximately 10 kΩ

If N.G., replace ignition coil.



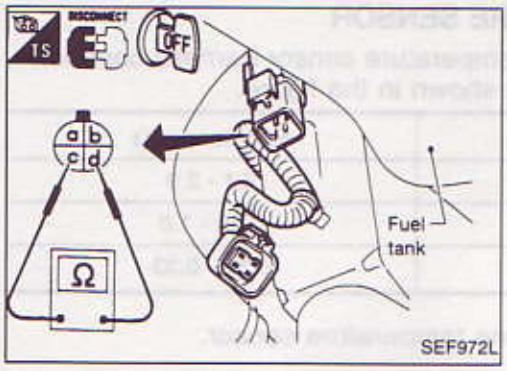
POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals with a digital tester as shown in the figure.

⊖ terminal side / ⊕ terminal side	Terminal ⓐ		Terminal ⓑ		Terminal ⓒ	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ⓐ	—	—	∞	O.K.	∞	O.K.
	—	—	Not ∞ or 0	N.G.	Not ∞ or 0	N.G.
	—	—	0	N.G.	0	N.G.
Terminal ⓑ	∞	N.G.	—	—	∞	N.G.
	Not ∞ or 0	O.K.	—	—	Not ∞ or 0	O.K.
	0	N.G.	—	—	0	N.G.
Terminal ⓒ	∞	N.G.	∞	N.G.	—	—
	Not ∞ or 0	O.K.	Not ∞ or 0	O.K.	—	—
	0	N.G.	0	N.G.	—	—

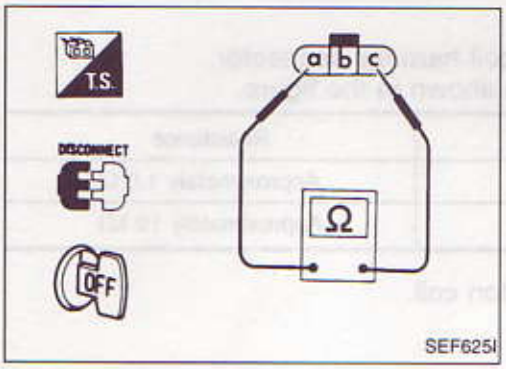
If N.G., replace power transistor.

Electrical Components Inspection (Cont'd)



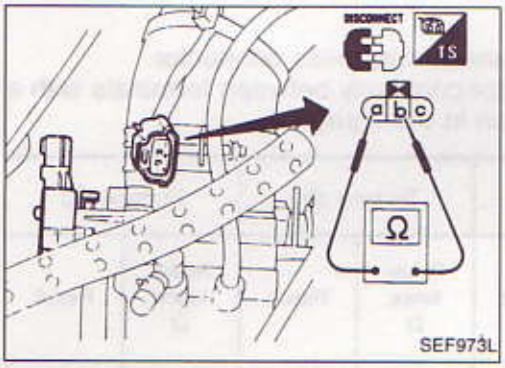
FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓒ and ⓓ.
   Resistance: Approximately 0.5Ω
   If N.G., replace fuel pump.



EXHAUST GAS SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.
Resistance: 3 - 1,000Ω
If N.G., replace exhaust gas sensor.



THROTTLE SENSOR

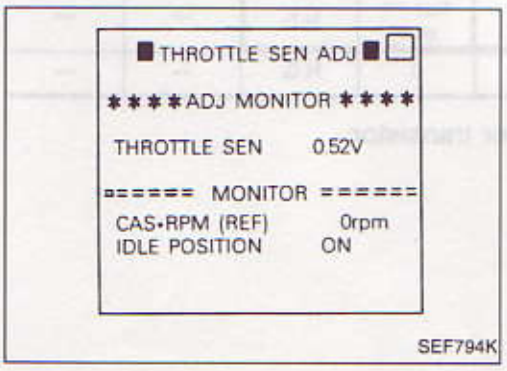
1. Disconnect throttle sensor harness connector.
2. Make sure that resistance between terminals as shown in the figure changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 2
Partially released	2 - 10
Completely depressed	Approximately 10

If N.G., replace throttle sensor.

Adjustment

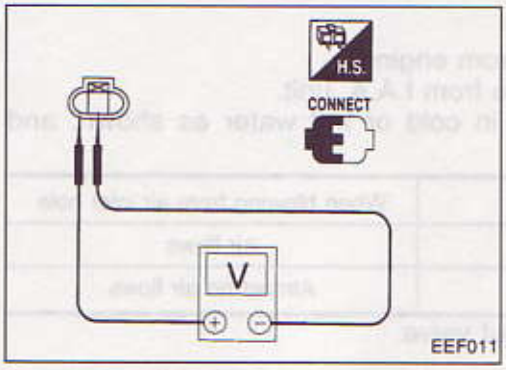
If throttle sensor is replaced or removed, it is necessary to install in proper position, by following the procedure as shown below:



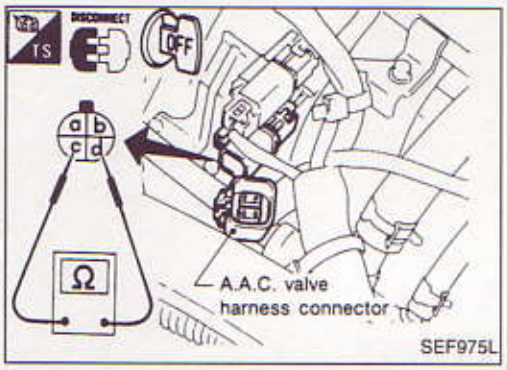
1. Install throttle sensor body in throttle chamber. Do not tighten bolts. Leave bolts loose.
2. Connect throttle sensor harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THROTTLE SEN ADJ" in "WORK SUPPORT" mode.

   Measure output voltage of throttle sensor using voltmeter.

Electrical Components Inspection (Cont'd)



5. Adjust by rotating throttle sensor body so that output voltage is 0.45 to 0.55V.
6. Tighten mounting bolts.
7. Disconnect throttle sensor harness connector for a few seconds and then reconnect it.



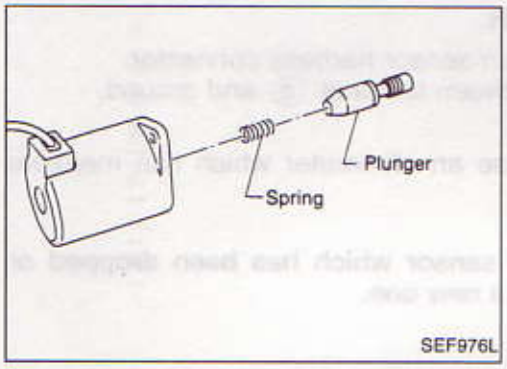
A.A.C. VALVE

Disconnect A.A.C. valve harness connector.

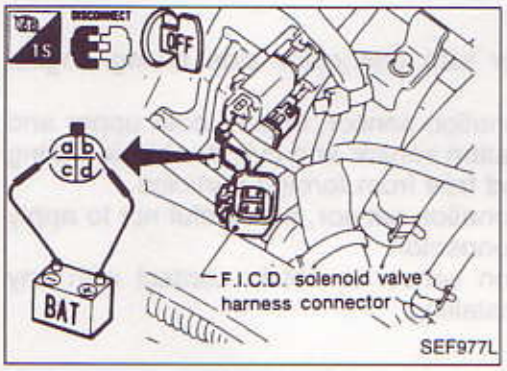
- Check resistance between terminals ⓒ and ⓓ.

Resistance:

Approximately 10Ω



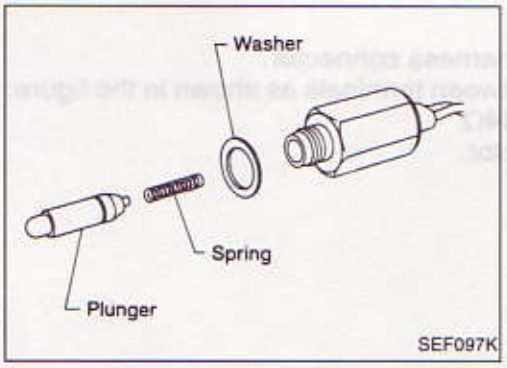
- Check plunger for seizing or sticking.
- Check for broken spring.



F.I.C.D. SOLENOID VALVE

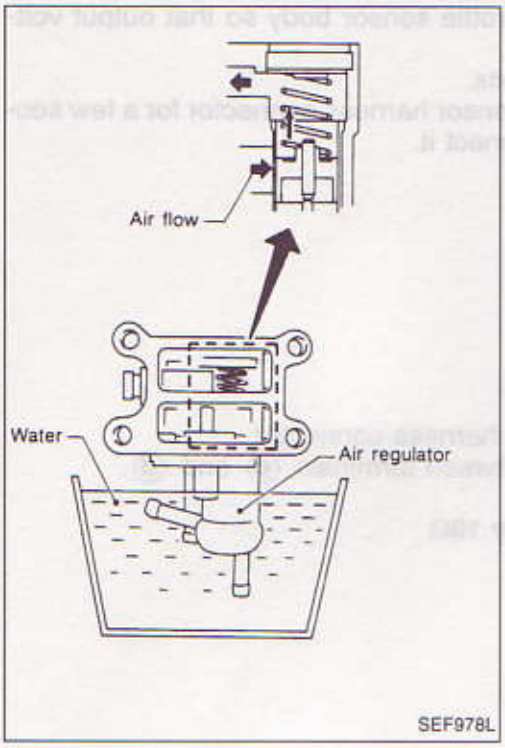
Disconnect F.I.C.D. solenoid valve harness connector.

- Check for clicking sound when applying 12V direct current to terminals.



- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Components Inspection (Cont'd)

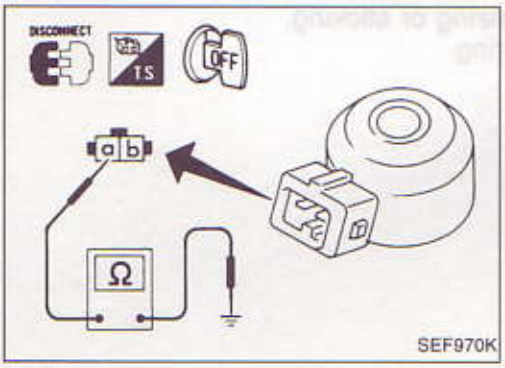


AIR REGULATOR

1. Remove I.A.A. unit from engine.
2. Remove A.A.C. valve from I.A.A. unit.
3. Immerse I.A.A. unit in cold or hot water as shown, and check air flow.

Water temperature	When blowing from air inlet hole
20°C (68°F)	Air flows
80°C (176°F) or more	Almost no air flows

If N.G., replace air cut valve.



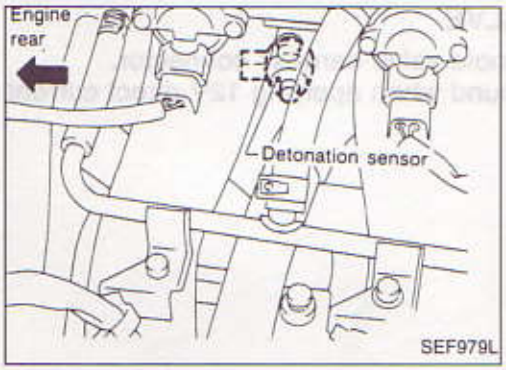
DETONATION SENSOR

1. Disconnect detonation sensor harness connector.
2. Check continuity between terminal ⓐ and ground.

Continuity should exist.

- It is necessary to use an ohmmeter which can measure more than 10 MΩ.

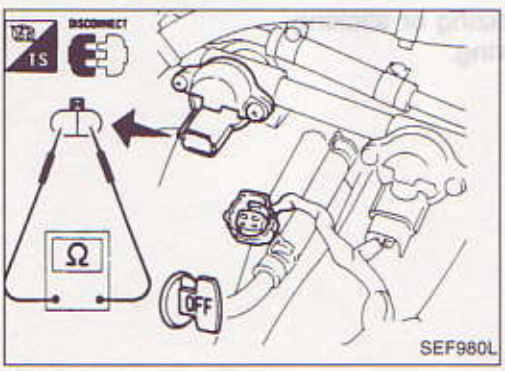
CAUTION:
Discard any detonation sensor which has been dropped or undergone shocks; use a new one.



Installation

Install detonation sensor with connector side facing engine rear.

- When installing detonation sensor, ensure both upper and lower sides of detonation sensor and cylinder block mating surface are clean and free from foreign particles.
- When tightening detonation sensor, be careful not to apply excessive force to connector.
- Make sure detonation sensor is not in contact with any adjacent part after installing.

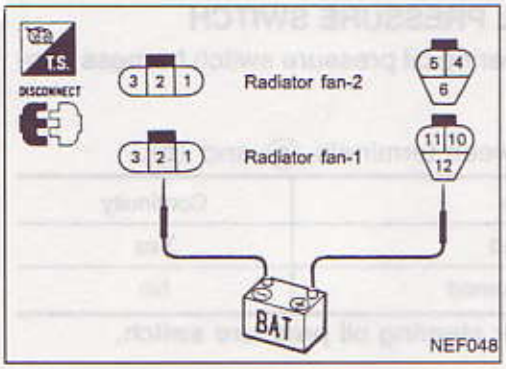


INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω
   If N.G., replace injector.

Electrical Components Inspection (Cont'd)

RADIATOR FAN MOTORS



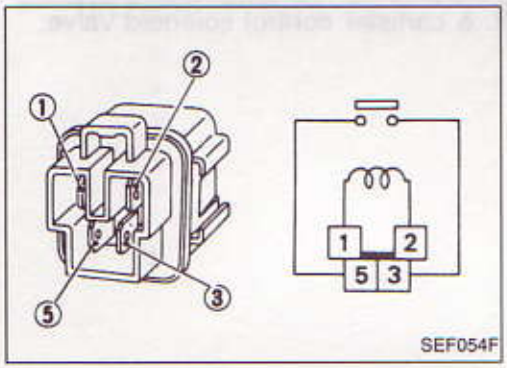
1. Disconnect radiator fan motor harness connectors.
2. Supply radiator fan motor terminals with battery voltage and check operation.

Speed	Radiator Fan Motor-1		Radiator Fan Motor-2	
	⊕	⊖	⊕	⊖
Low	7 or 10	9	1 or 4	3
Medium	7 or 10	12	1 or 4	6
High	7 or 10	8 or 11	1 or 4	2 or 5

Radiator fan motor should operate.

If N.G., replace radiator fan motor.

E.C.C.S. RELAY, RADIATOR FAN RELAYS AND FUEL PUMP RELAY

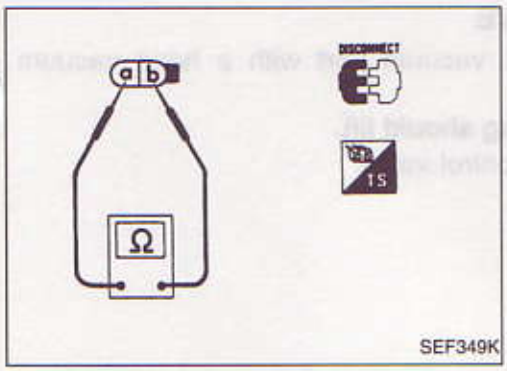


Check continuity between terminals ③ and ⑤.

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

If N.G., replace relay.

NEUTRAL SWITCH

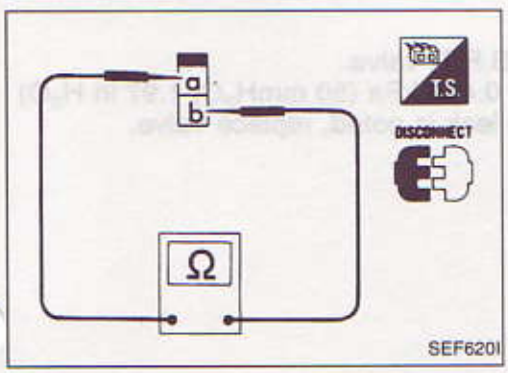


Check continuity between terminals ⓐ and ⓑ.

Conditions	Continuity
Shift to Neutral	Yes
Shift to other position	No

If N.G., replace relay.

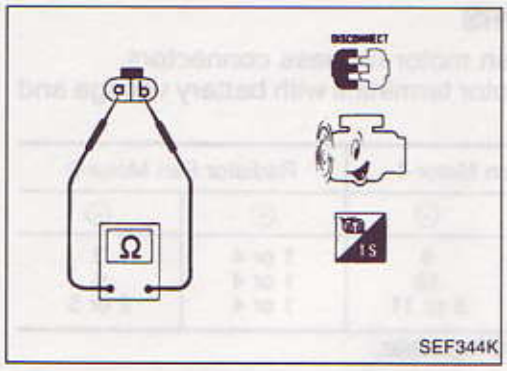
RESISTOR



1. Disconnect resistor harness connector.
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 2.2 kΩ

If N.G., replace resistor.

Electrical Components Inspection (Cont'd)

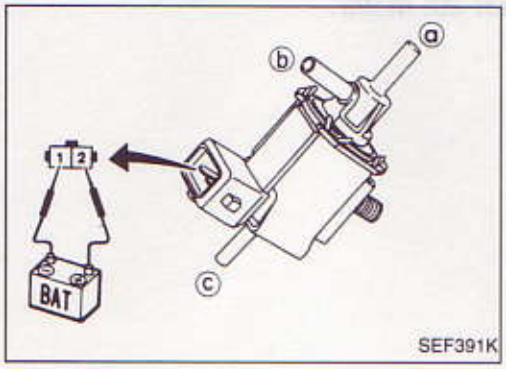


POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Start engine.
3. Check continuity between terminals ⓐ and ⓑ.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If N.G., replace power steering oil pressure switch.

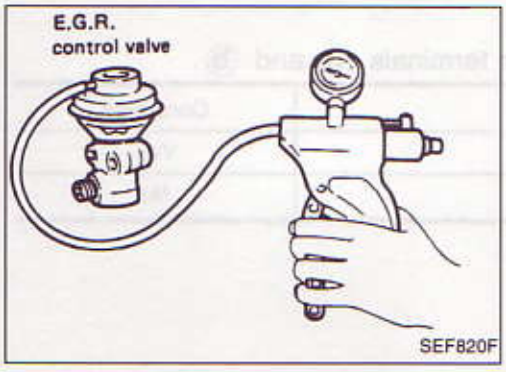


E.G.R. & CANISTER CONTROL SOLENOID VALVE

1. Disconnect E.G.R. & canister control solenoid valve harness connector.
2. Check solenoid valve, following the table as shown below:

Condiions	Air passage continuity between ⓐ and ⓑ	Air passage continuity between ⓐ and ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If N.G., replace E.G.R. & canister control solenoid valve.

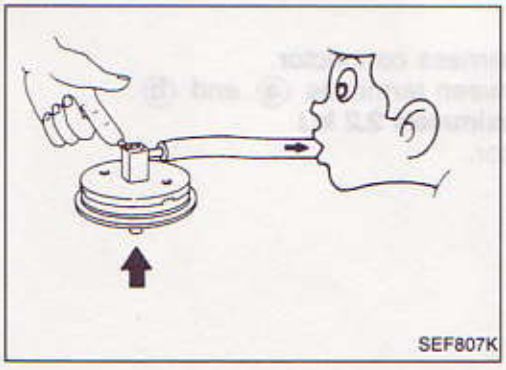


E.G.R. CONTROL VALVE

Apply vacuum to E.G.R. vacuum port with a hand vacuum pump.

E.G.R. control valve spring should lift.

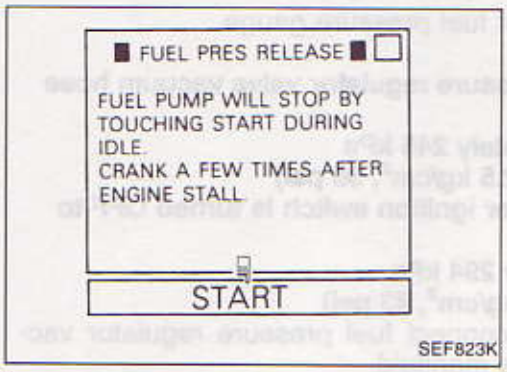
If N.G., replace E.G.R. control valve.



B.P.T. VALVE

Plug one of two ports of B.P.T. valve.

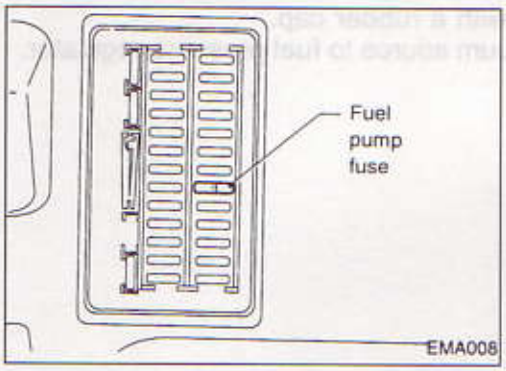
Apply a presssure above 0.490 kPa (50 mmH_2O, 1.97 in H_2O) to check for leakage. If a leak is noted, replace valve.



Releasing Fuel Pressure

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

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



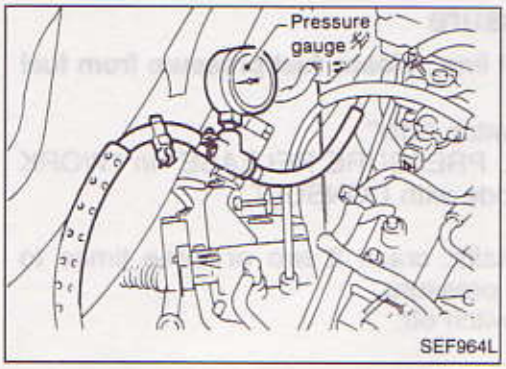
1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuel pump fuse.

Fuel Pressure Check

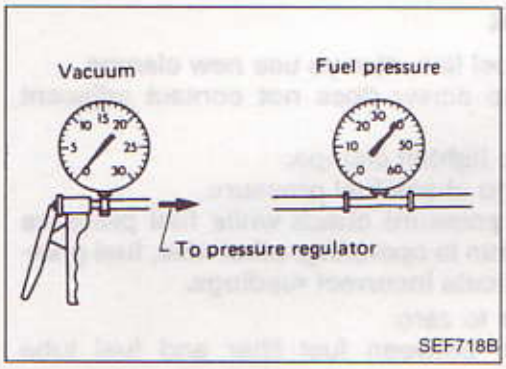
a. When reconnecting fuel line, always use new clamps.
b. Make sure that clamp screw does not contact adjacent parts.
c. Use a torque driver to tighten clamps.
d. Use Pressure Gauge to check fuel pressure.
e. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.

Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 245 kPa (2.45 bar, 2.5 kg/cm^2, 36 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approximately 294 kPa (2.94 bar, 3.0 kg/cm^2, 43 psi)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

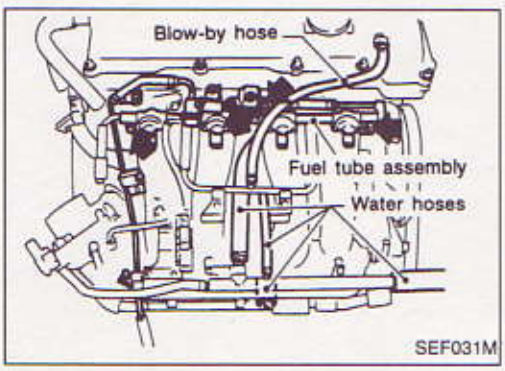


9. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

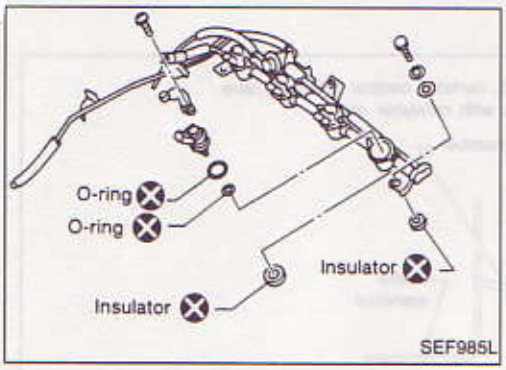
Injector Removal and Installation

1. Release fuel pressure to zero.
2. Disconnect injector harness connectors.
3. Disconnect vacuum hose from pressure regulator.
4. Disconnect fuel hoses from fuel tube assembly.



5. Remove injectors with fuel tube assembly.

Injector Removal and Installation (Cont'd)



6. Push out any malfunctioning injector from fuel tube assembly.

Do not extract injector by pinching connector.

7. Replace or clean injector as necessary.
8. Install injector to fuel tube assembly.

Always replace O-rings and insulators with new ones.
Lubricate O-rings with a smear of silicone oil.

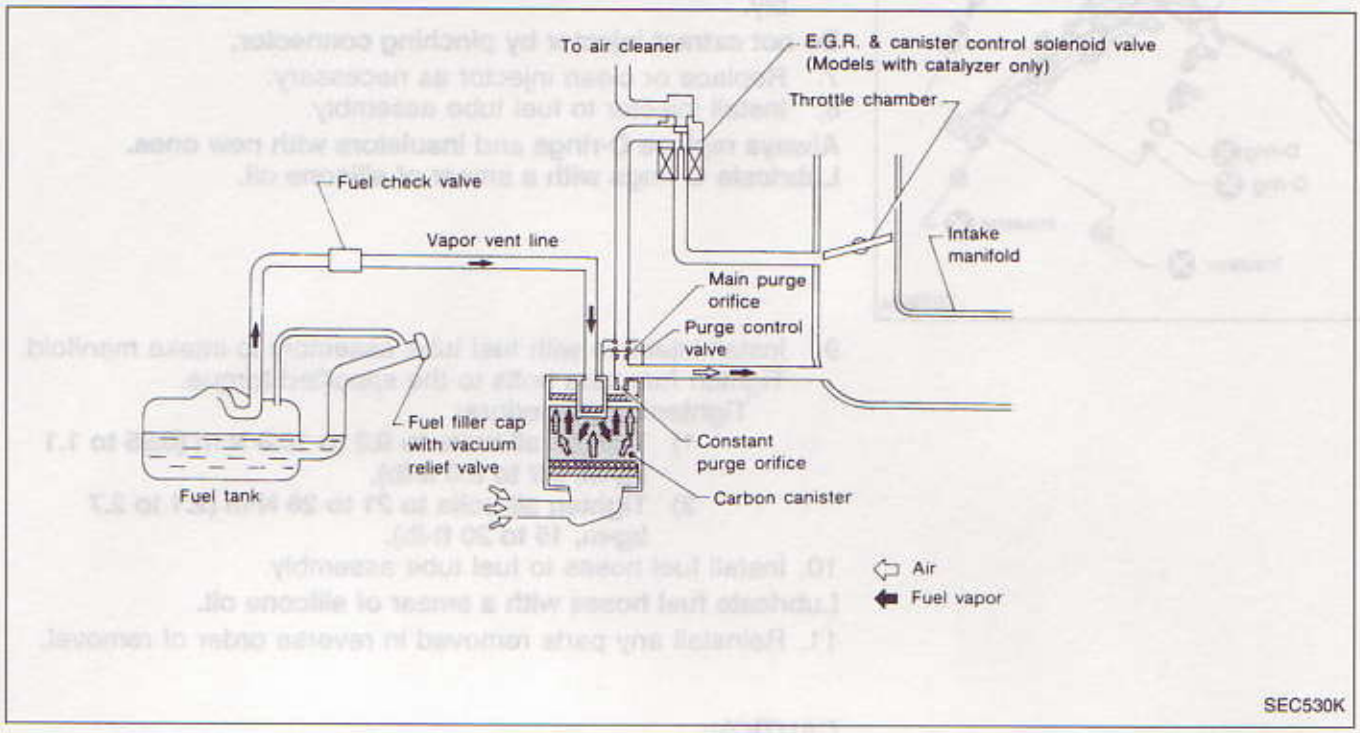
9. Install injectors with fuel tube assembly to intake manifold. Tighten fuel tube bolts to the specified torque.
   Tightening procedure:
   1) **Tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).**
   2) **Tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).**
10. Install fuel hoses to fuel tube assembly.

Lubricate fuel hoses with a smear of silicone oil.

11. Reinstall any parts removed in reverse order of removal.

CAUTION:
After properly connecting fuel hose to injector and fuel tube assembly, check connection for fuel leakage.

Description

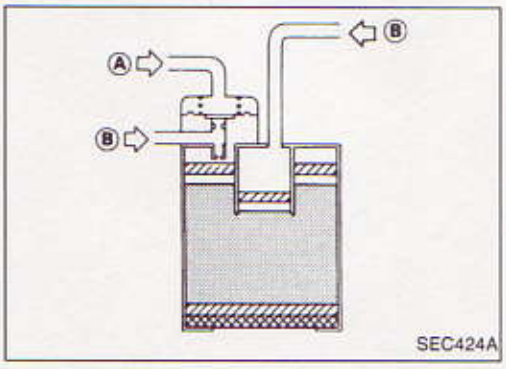


The evaporative emission control system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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 rises higher, 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

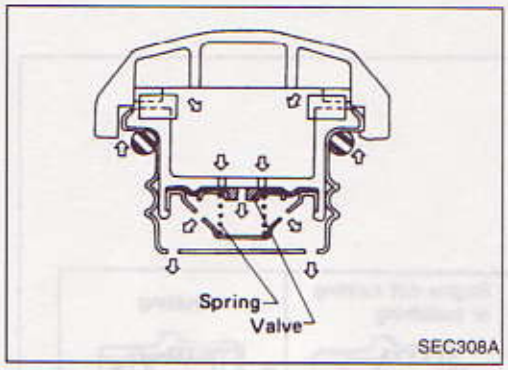
CARBON canister

Check carbon canister as follows:

Ⓐ : Blow air and ensure that there is no leakage.

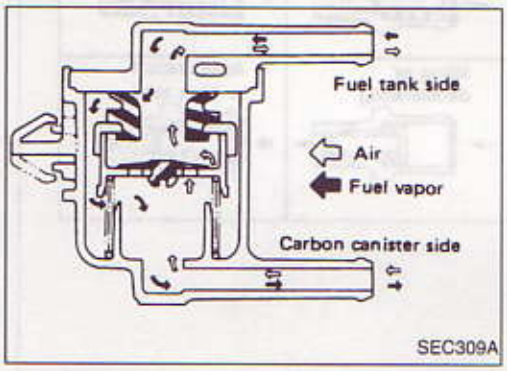
Ⓑ : Blow air and ensure that there is leakage.

Inspection (Cont'd)



FUEL TANK VACUUM RELIEF VALVE

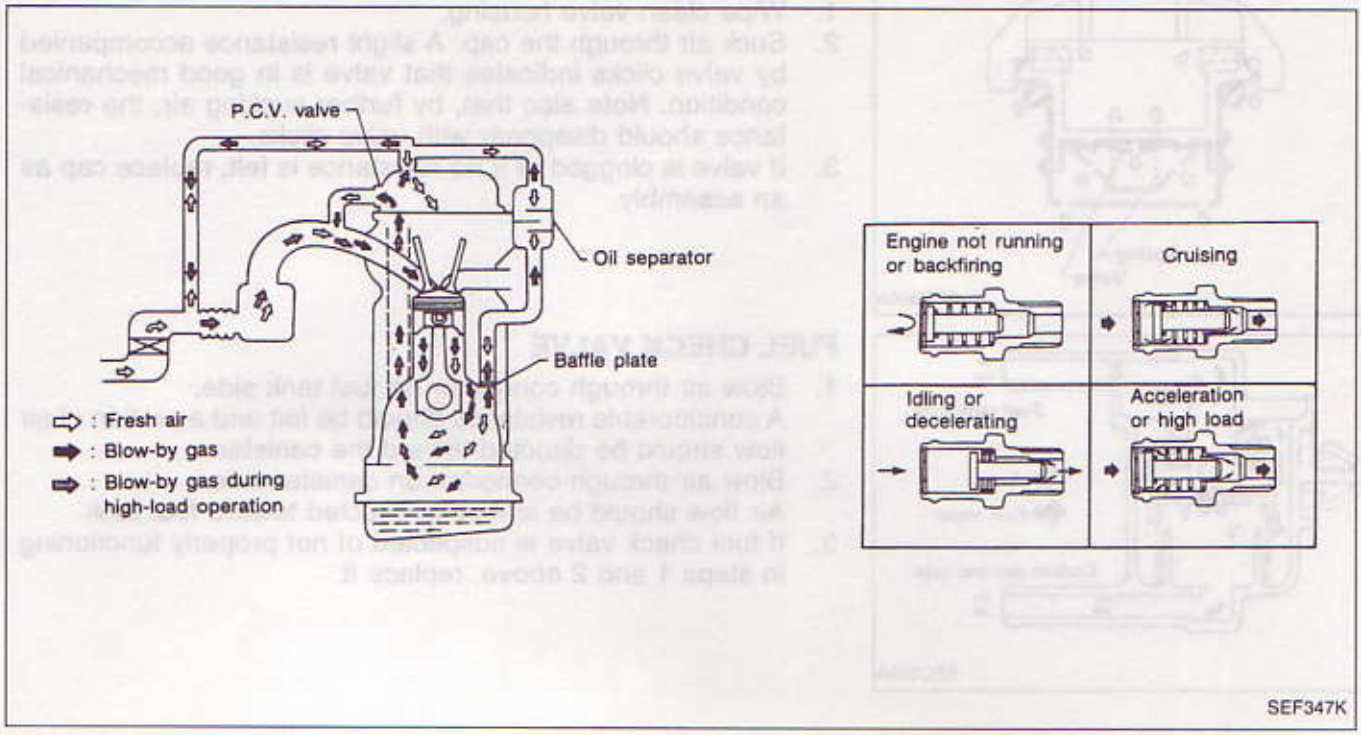
1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. If valve is clogged or if no resistance is felt, replace cap as an assembly.



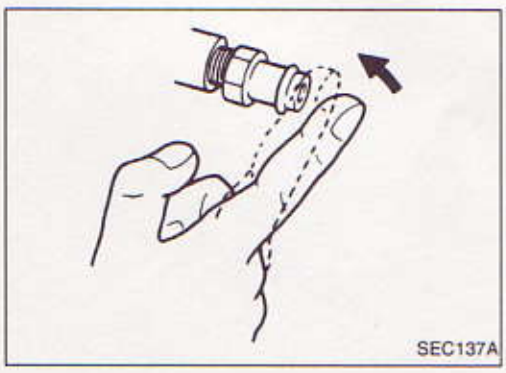
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.

Description



This system returns blow-by gas to both the intake manifold and air inlet tubes.
The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes, through the hose connecting air inlet tubes to rocker cover, into the crankcase.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air inlet tubes under all conditions.



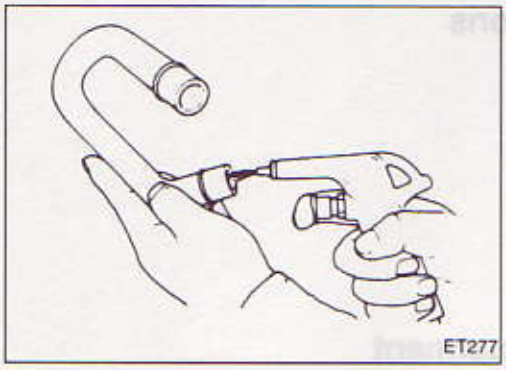
Inspection

P.C.V. (Positive Crankcase Ventilation)

With engine running at idle, remove P.C.V. valve from rocker cover; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

Inspection (Cont'd)

VENTILATION HOSE



1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

General Specifications

PRESSURE REGULATOR Fuel pressure kPa (bar, kg/cm^2, psi)	
At idling	Approximately 245 (2.45, 2.5, 36)
A few seconds after ignition switch is turned OFF to ON	Approximately 294 (2.94, 3.0, 43)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2 (in "N" position)		800 ± 50
Air conditioner: ON (in "N" position)		850 ± 50
Ignition timing		15° ± 2° B.T.D.C.
Throttle sensor idle position	V	0.45 - 0.55

*1: Feedback controlled and needs no adjustments
*2: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10.0

AIR FLOW METER

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	1.3 - 1.8*

*: Engine is warmed up sufficiently and idling under no-load.

ENGINE TEMPERATURE SENSOR

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

EXHAUST GAS SENSOR HEATER

Resistance	Ω	3 - 1,000

FUEL PUMP

Resistance	Ω	Approximately 0.5

A.A.C. VALVE

Resistance	Ω	Approximately 10.0

INJECTOR

Resistance	Ω	10 - 14

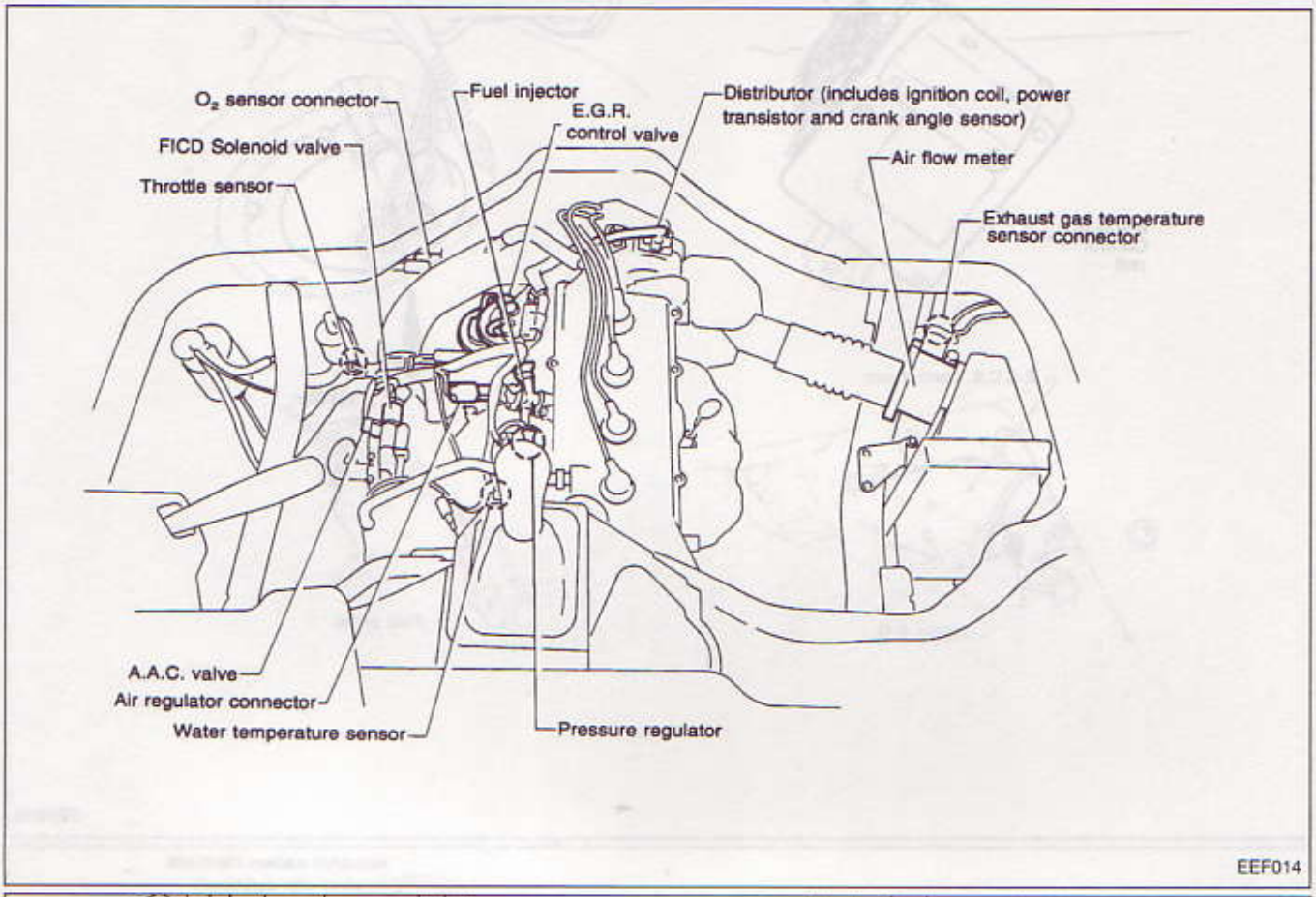
RESISTOR

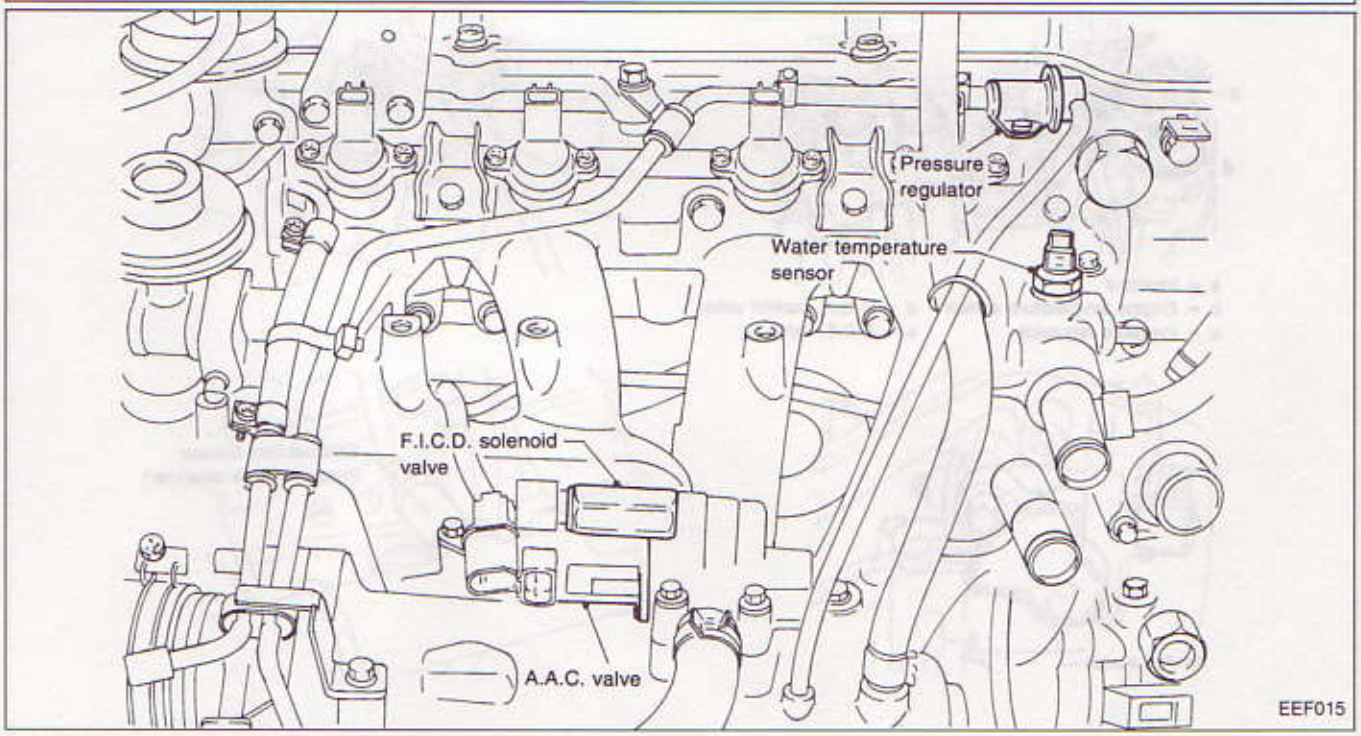
Resistance	kΩ	Approximately 2.2

THROTTLE SENSOR

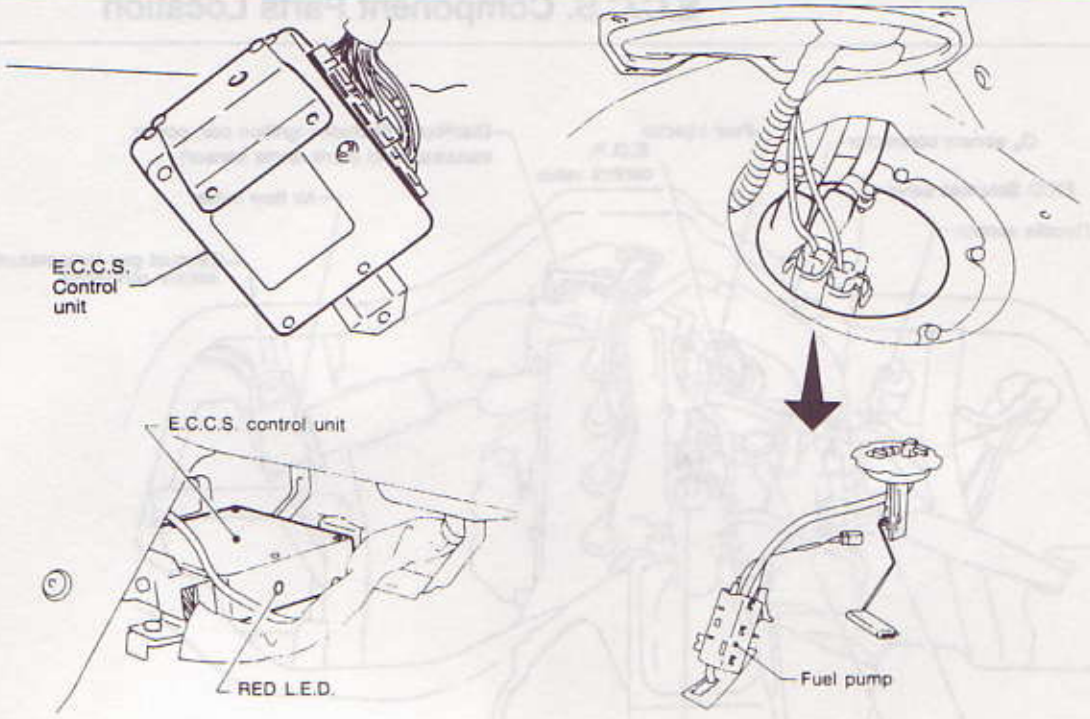
Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 2
Partially released	2 - 10
Completely depressed	Approximately 10

E.C.C.S. Component Parts Location

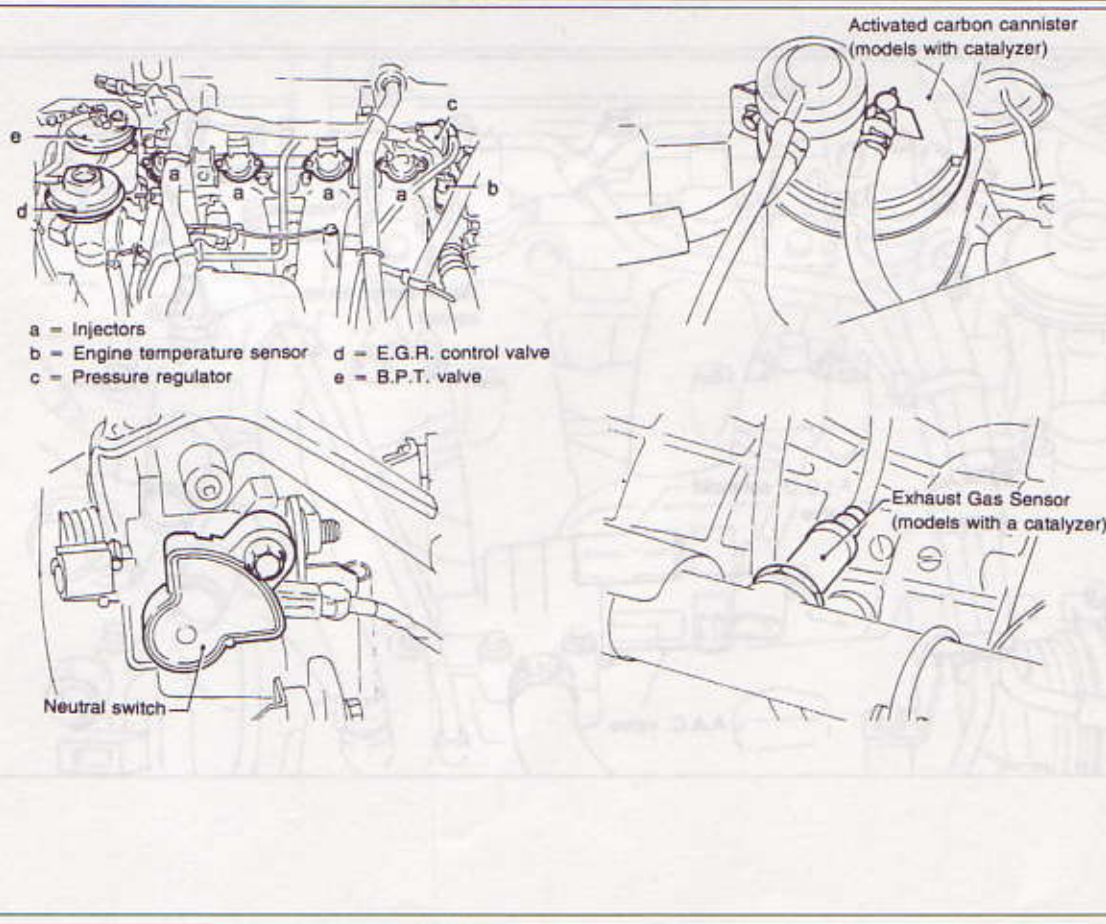




E.C.C.S. Component Parts Location (Cont'd)



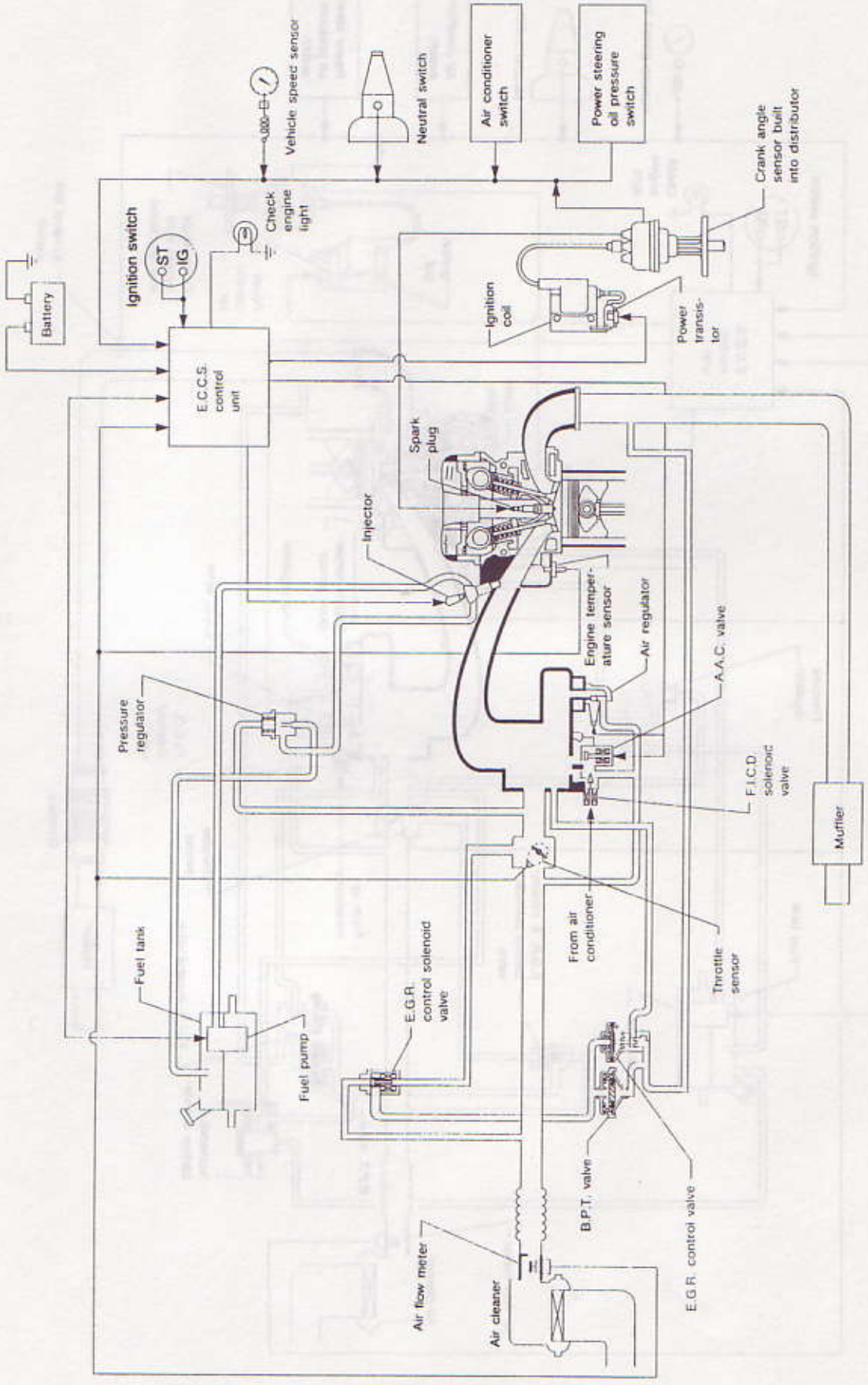
EEF016



EEF017

System Diagram

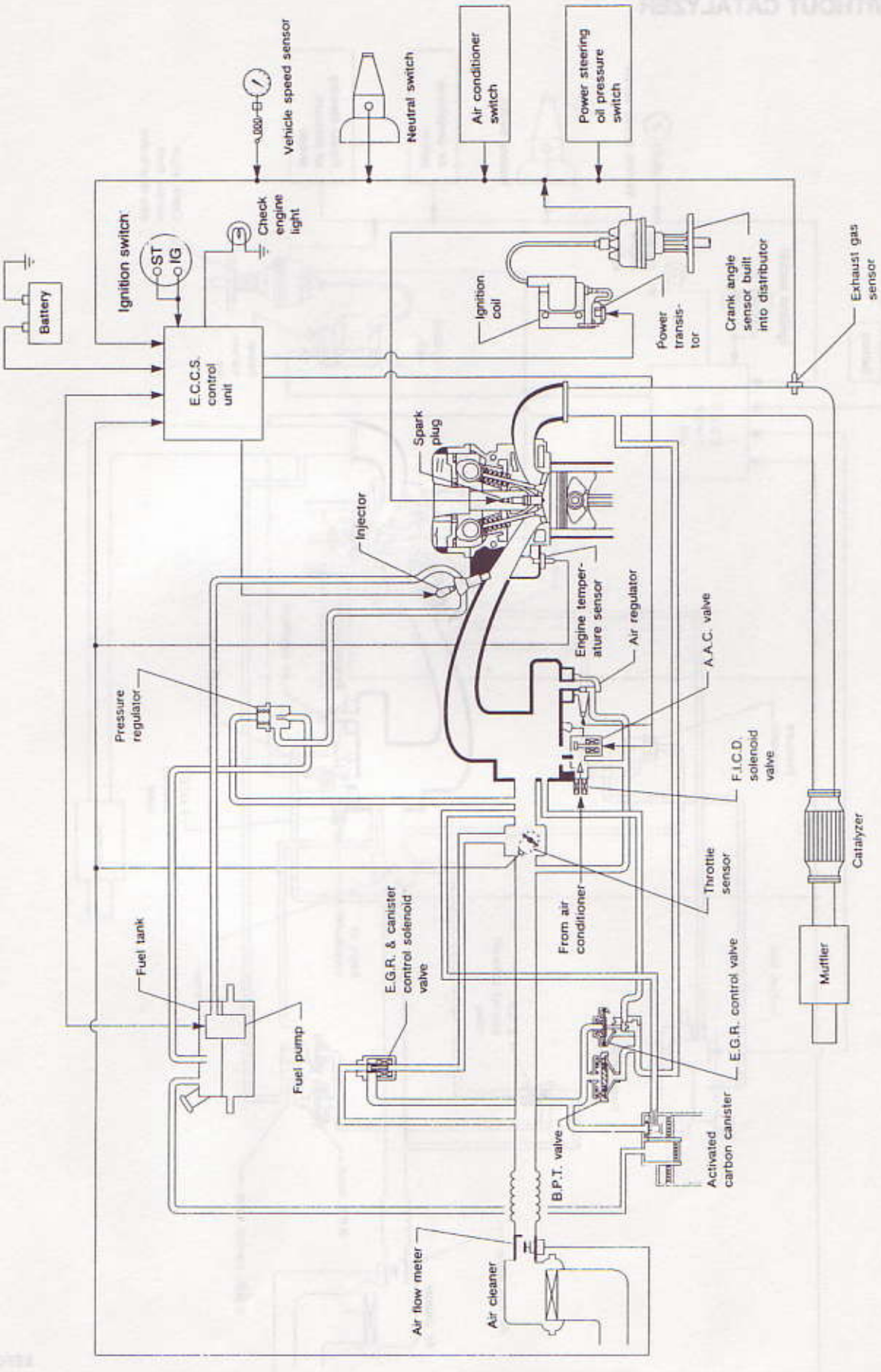
MODELS WITHOUT CATALYZER



EEF018

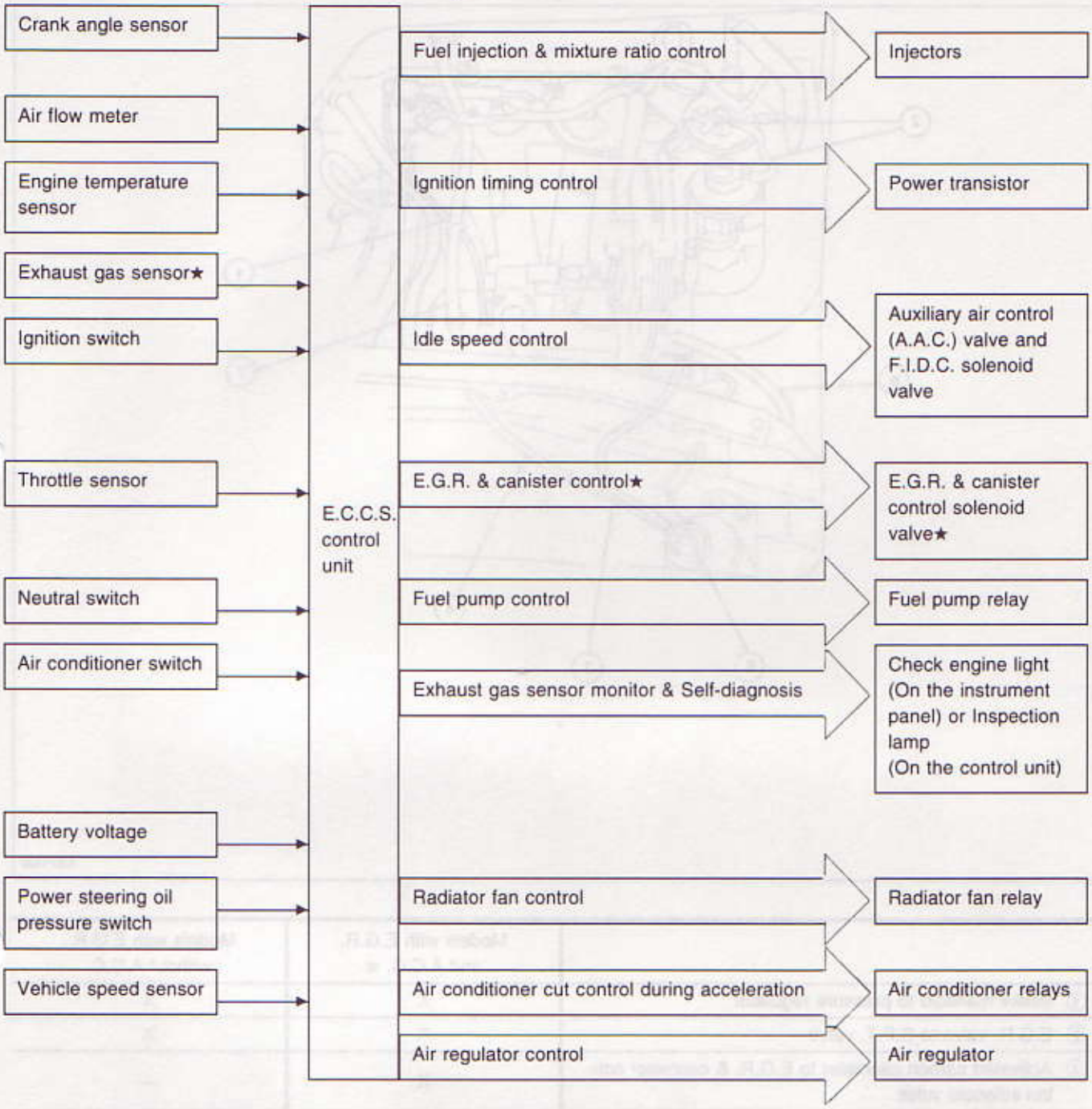
System Diagram (Cont'd)

MODELS WITH CATALYZER



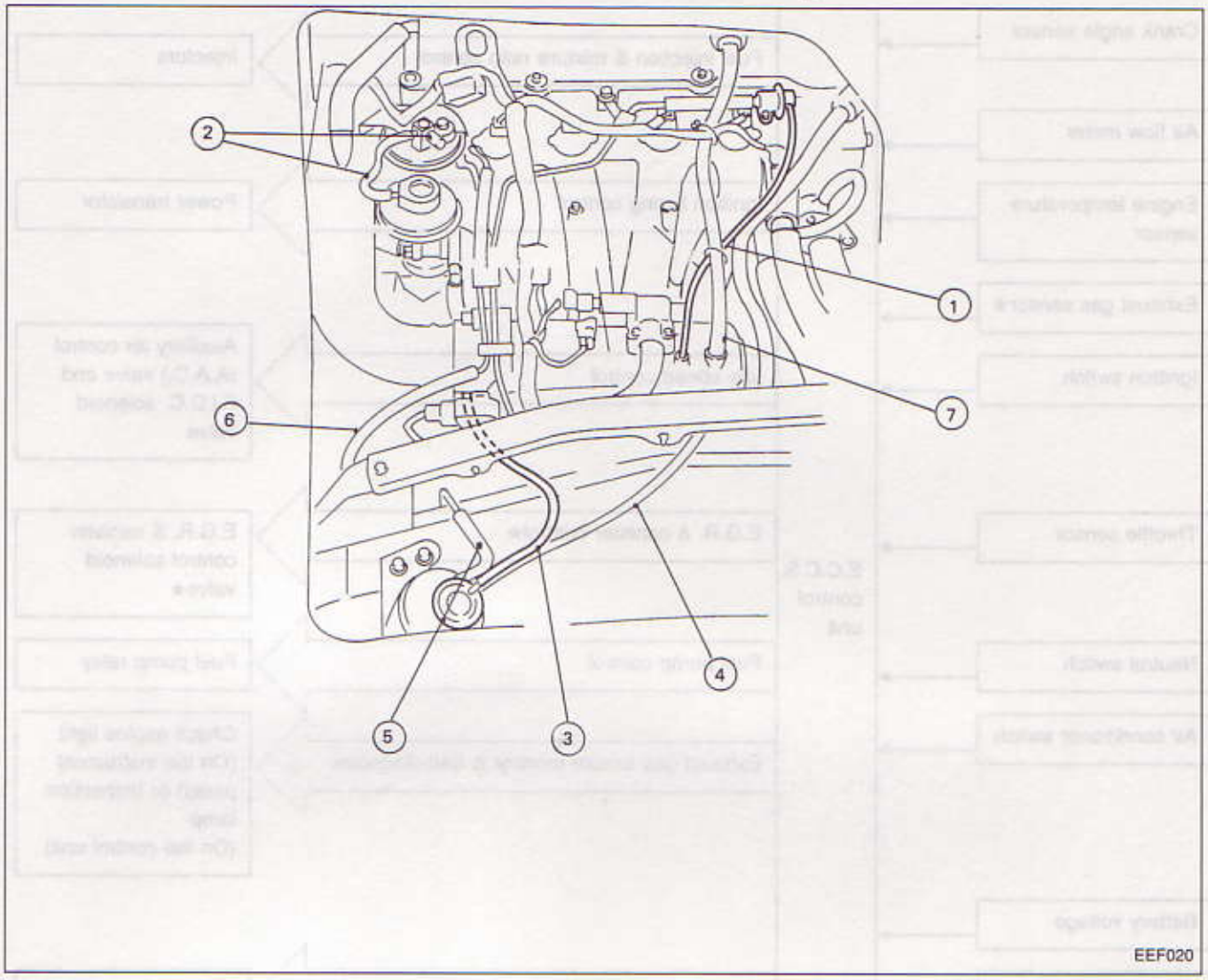
EEF019

System Chart



★ Models with catalyzer only.

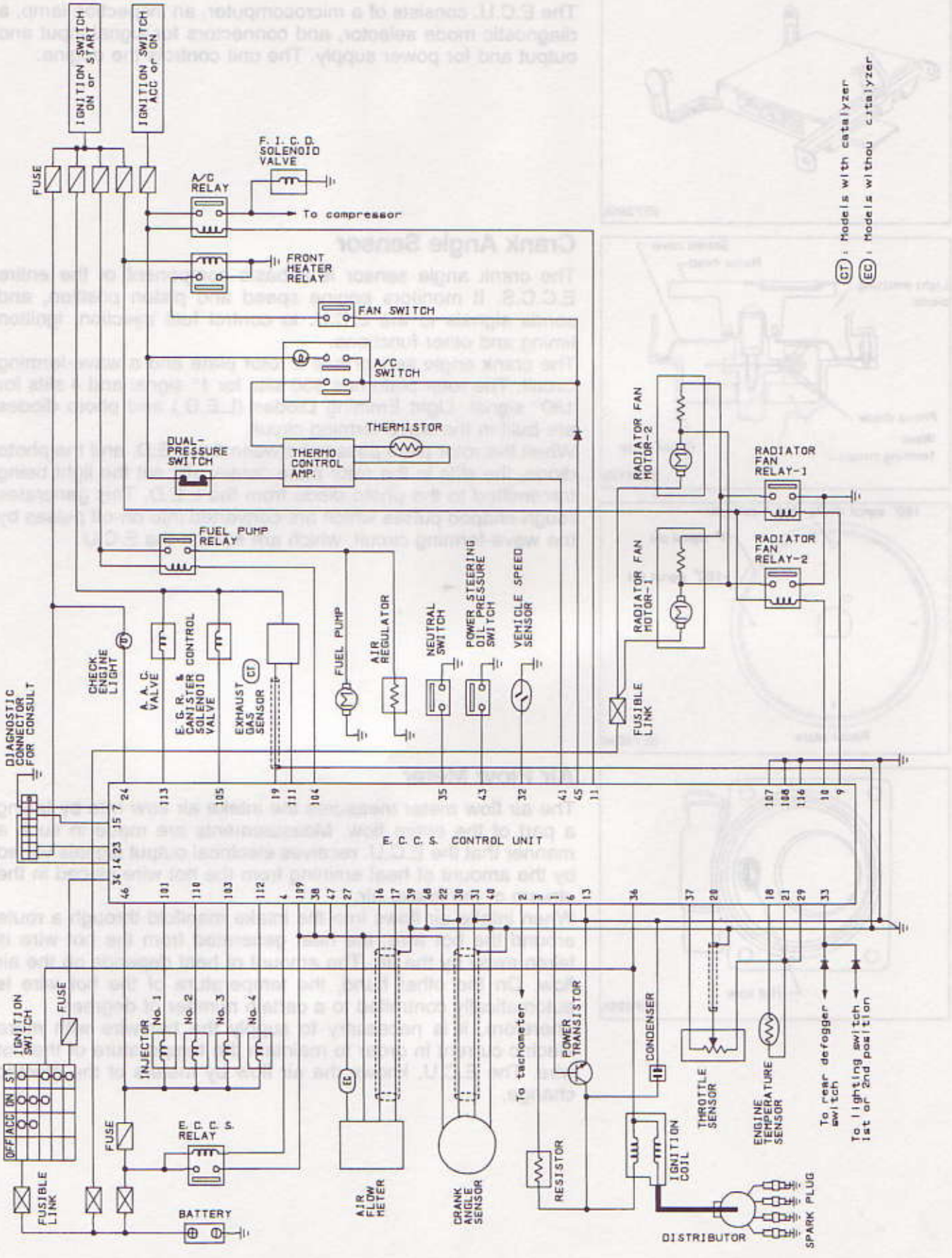
Vacuum Hose Drawing



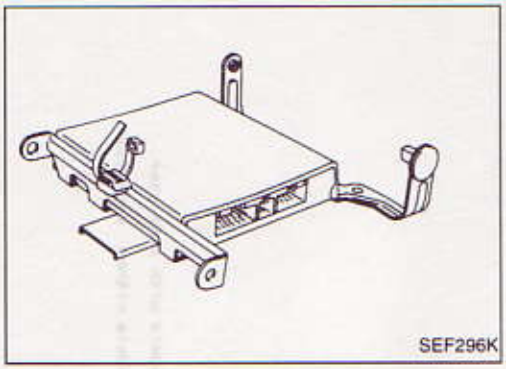
	Models with E.G.R. and A.C.C. ★	Models with E.G.R., without A.C.C.
① Intake manifold to pressure regulator	X	X
② E.G.R. valve to B.P.T. valve	X	X
③ Activated carbon cannister to E.G.R. & cannister control solenoid valve	X	—
④ Activated carbon cannister to intake manifold	X	—
⑤ Activated carbon cannister to fuel tank	X	—
⑥ E.G.R. & cannister control solenoid valve to throttle chamber	X	X
⑦ Intake manifold to rocker cover		

★ Catalyzer models only.

Circuit Diagram

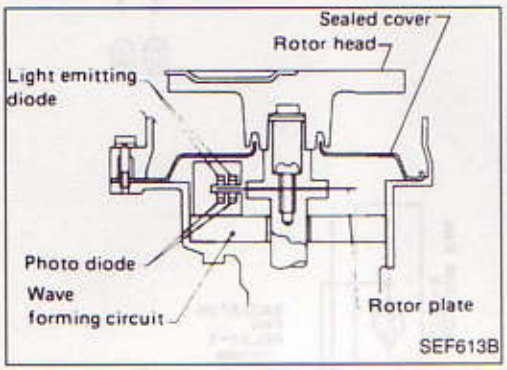


MEF786C


SEF296K

E.C.C.S. Control Unit (E.C.U.)

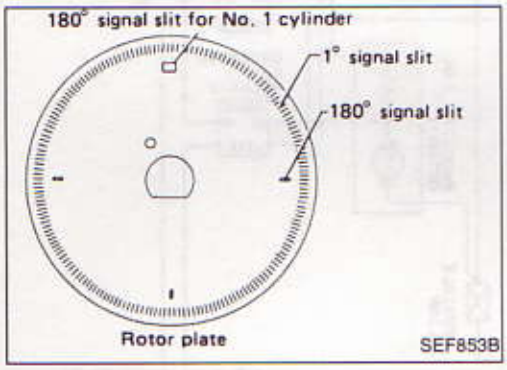
The E.C.U. consists of a microcomputer, an inspection lamp, a diagnostic mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.



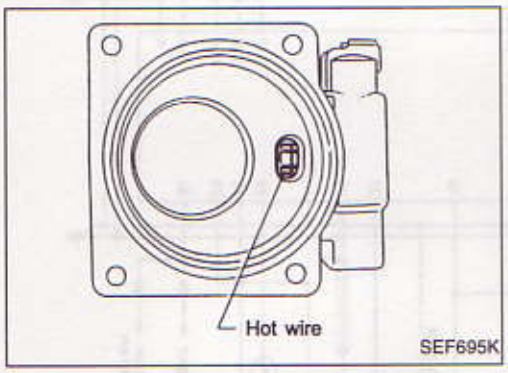
SEF613B

Crank Angle Sensor

The crank angle sensor is a basic component of the entire E.C.C.S. It monitors engine speed and piston position, and sends signals to the E.C.U. to control fuel injection, ignition timing and other functions.
The crank angle sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 4 slits for 180° signal. Light Emitting Diodes (L.E.D.) and photo diodes are built in the wave-forming circuit.
When the rotor plate passes between the L.E.D. and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the L.E.D. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the E.C.U.



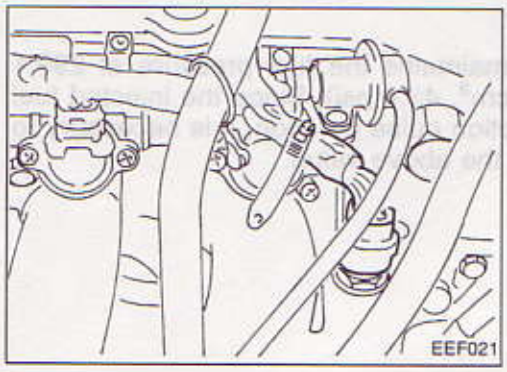
SEF853B



SEF695K

Air Flow Meter

The air flow meter measures the intake air flow rate by taking a part of the entire flow. Measurements are made in such a manner that the E.C.U. receives electrical output signals varied by the amount of heat emitting from the hot wire placed in the stream of the intake air.
When intake air flows into the intake manifold through a route around the hot wire, the heat generated from the hot wire is taken away by the air. The amount of heat depends on the air flow. On the other hand, the temperature of the hot wire is automatically controlled to a certain number of degrees.
Therefore, it is necessary to supply the hot wire with more electric current in order to maintain the temperature of the hot wire. The E.C.U. knows the air flow by means of the electric change.

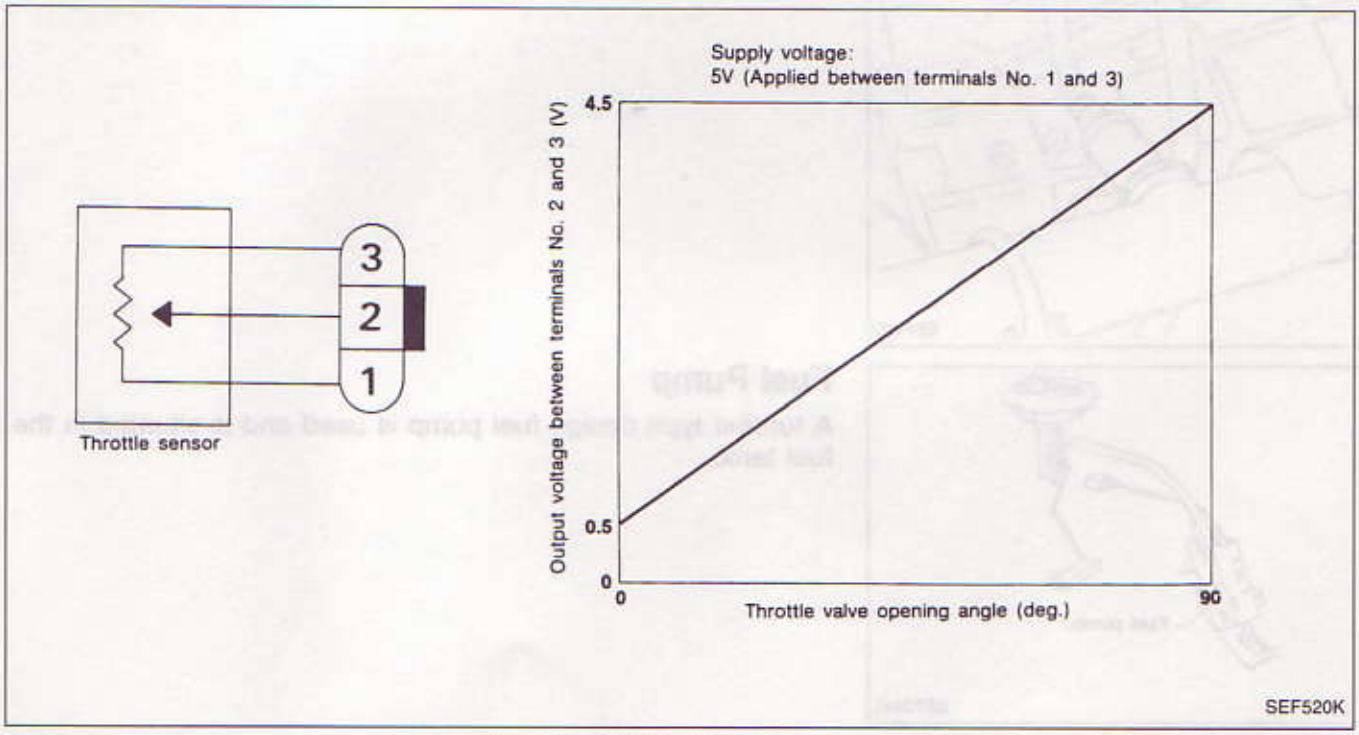


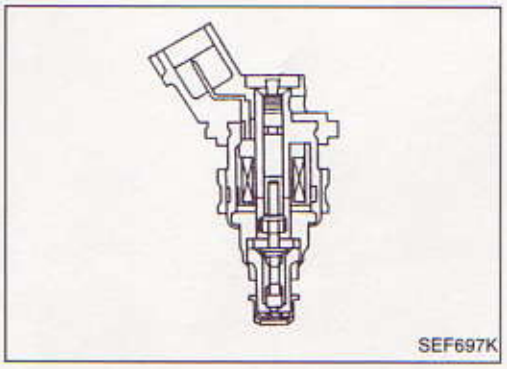
Engine Temperature Sensor

The engine temperature sensor, located on the intake manifold, detects engine coolant temperature and transmits a signal to the E.C.U.
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

Throtle Sensor & Soft Idle Switch

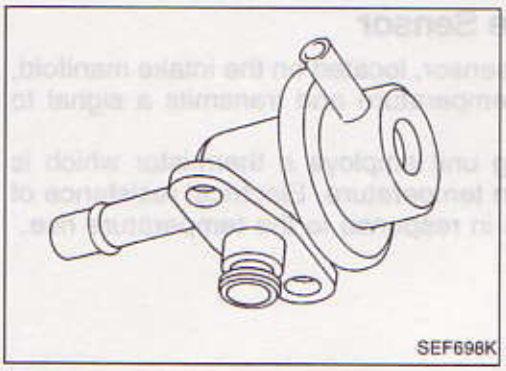
The throttle sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle valve position into output voltage, and emits the voltage signal to the E.C.U. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the E.C.U.
Idle position of the throttle valve is determined by the E.C.U. receiving the signal from the throttle sensor. This system is called "soft idle switch". This one controls engine operation such as fuel cut.





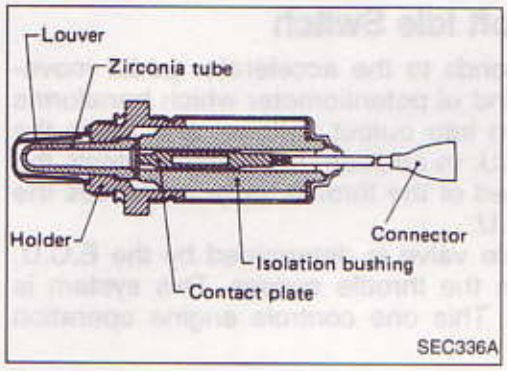
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the E.C.U. 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 E.C.U. in terms of injection pulse duration.


SEF698K

Pressure Regulator

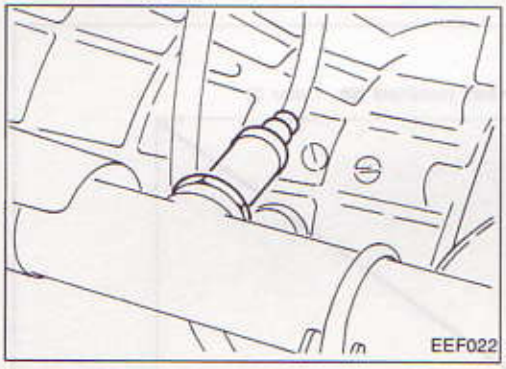
The pressure regulator maintains the fuel pressure at 299.1 kPa (2.991 bar, 3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.

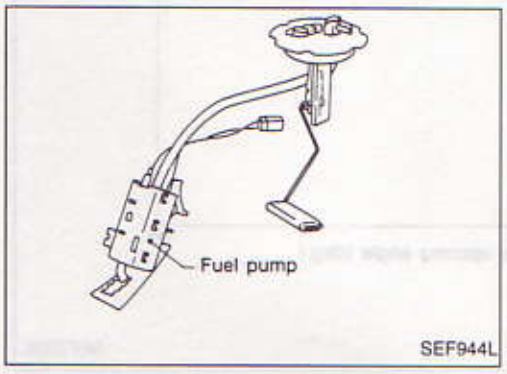


SEC336A

Exhaust Gas Sensor (Models with catalyzer only)

The exhaust gas sensor, which is built into the exhaust pipe, monitors the density of oxygen in the exhaust gas. It consists of a closed-end tube made of ceramic zirconia and other components. Porous platinum electrodes cover the tubes inner and outer surfaces. The closed-end of the tube is exposed to the exhaust gas in the exhaust manifold. The tube's outer surface contacts the exhaust gas while the inner surface contacts the air.

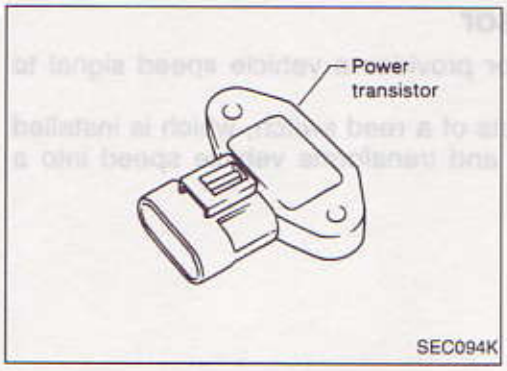

EEF022



SEF944L

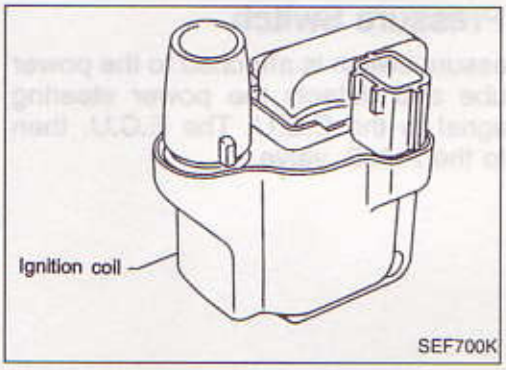
Fuel Pump

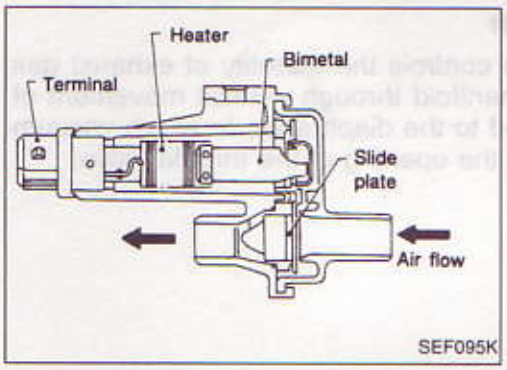
A turbine type design fuel pump is used and is situated in the fuel tank.



Power Transistor & Ignition Coil

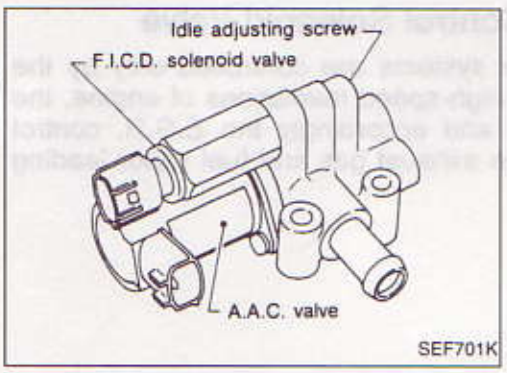
The ignition signal from the E.C.U. is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, semi-moulded type.





Air Regulator

The air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.
A bimetal, heater and rotary shutter are built into the air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.

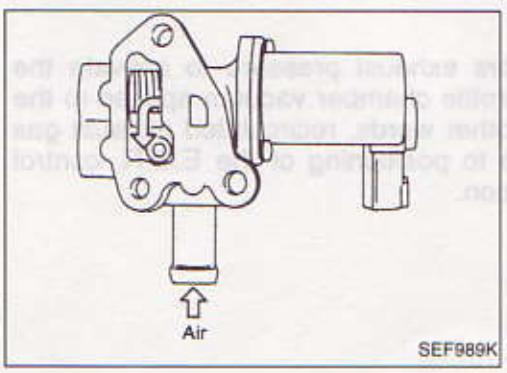


Idle Air Adjusting (I.A.A.) Unit

The I.A.A. unit is made up of the A.A.C. valve, F.I.C.D. solenoid valve and idle adjusting screw. It receives the signal from the E.C.U. and controls the idle speed at the preset value.

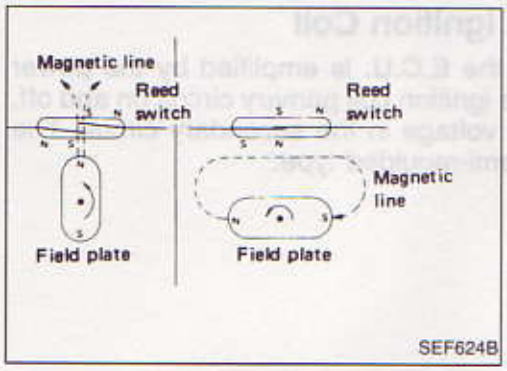
Fast Idle Control Device (F.I.C.D.) Solenoid Valve

The F.I.C.D. solenoid valve provides additional air when the air conditioner switch is turned on.



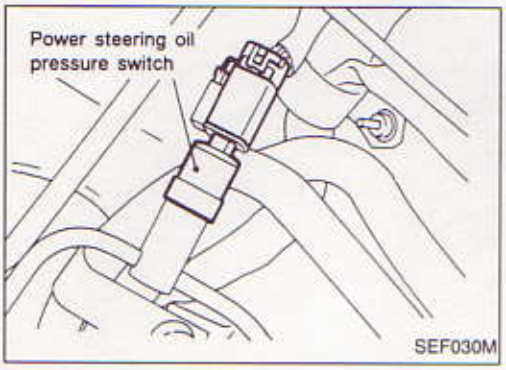
Auxiliary Air Control (A.A.C.) Valve

The E.C.U. actuates the A.A.C. valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the A.A.C. valve.



Vehicle Speed Sensor

The vehicle speed sensor provides a vehicle speed signal to the E.C.U.
The speed sensor consists of a reed switch, which is installed in the speedometer unit and transforms vehicle speed into a pulse signal.

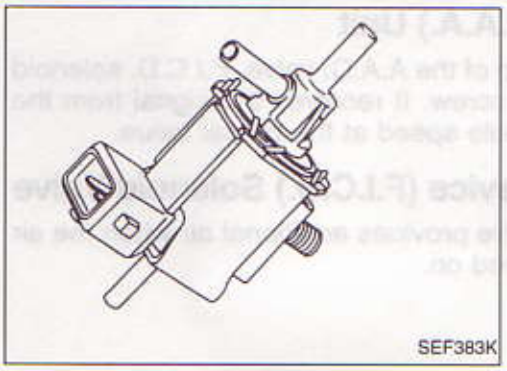


Power Steering Oil Pressure Switch

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects the power steering load, sending the load signal to the E.C.U. The E.C.U. then sends the idle-up signal to the A.A.C. valve.

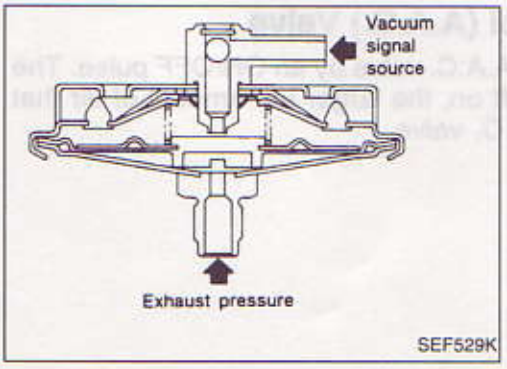
E.G.R. Control Valve

The E.G.R. control valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve.



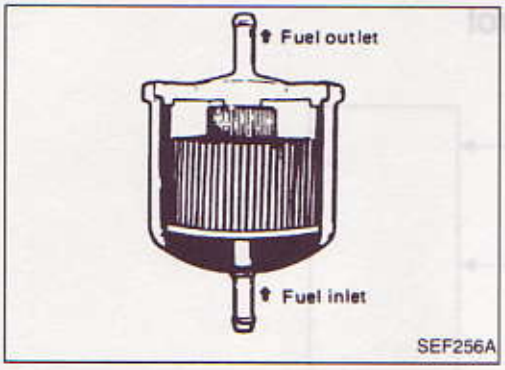
E.G.R. & Canister Control Solenoid Valve

The E.G.R. and canister systems are controlled only by the E.C.U. At both low- and high-speed revolutions of engine, the solenoid valve turns on and accordingly the E.G.R. control valve and canister cut the exhaust gas and fuel vapor leading to the intake manifold.



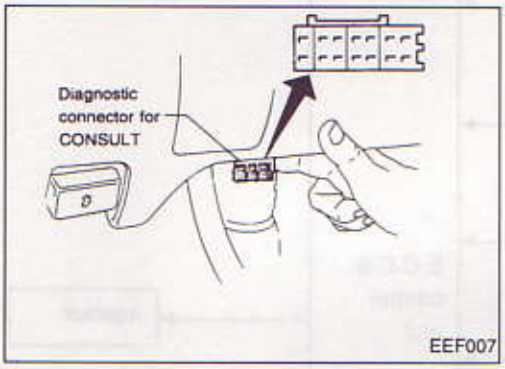
B.P.T. Valve

The B.P.T. valve monitors exhaust pressure to activate the diaphragm, controlling throttle chamber vacuum applied to the E.G.R. control valve. In other words, recirculated exhaust gas is controlled in response to positioning of the E.G.R. control valve or to engine operation.



Fuel Filter

The specially designed fuel filter has a metal case in order to withstand high fuel pressure.



Diagnostic Connector for CONSULT

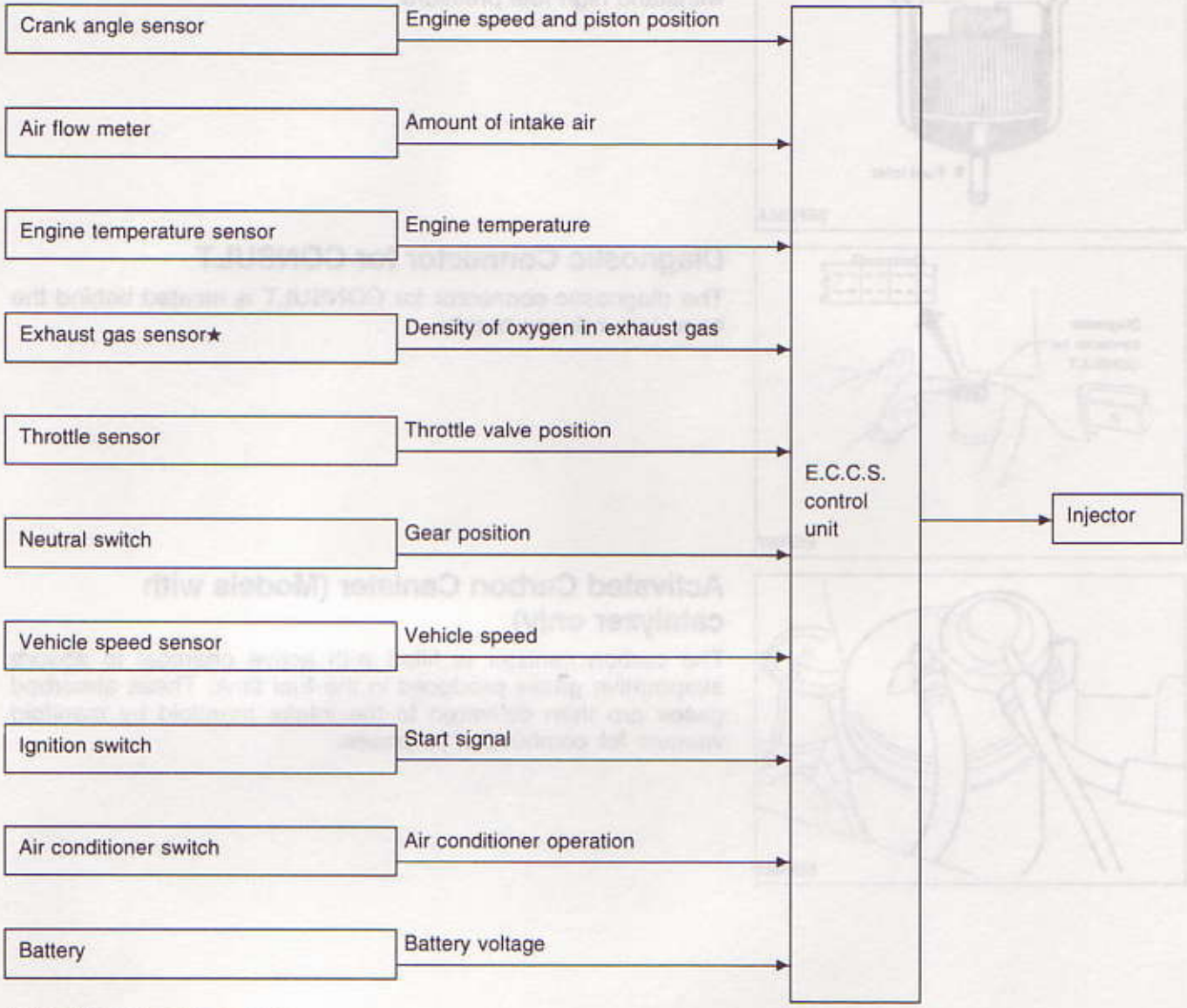
The diagnostic connector for CONSULT is located behind the hood lock release handle.

Activated Carbon Canister (Models with catalyzer only)

The carbon canister is filled with active charcoal to absorb evaporative gases produced in the fuel tank. These absorbed gases are then delivered to the intake manifold by manifold vacuum for combustion purposes.

Fuel Injection Control

INPUT/OUTPUT SIGNAL LINE



★: Models with catalyzer only

BASIC FUEL INJECTION CONTROL

The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the E.C.U. The basic amount of fuel injected is a program value mapped in the E.C.U. ROM memory. In other words, the program value is preset by engine operating conditions determined by input signals (for engine rpm and air intake) from both the crank angle sensor and the air flow meter.

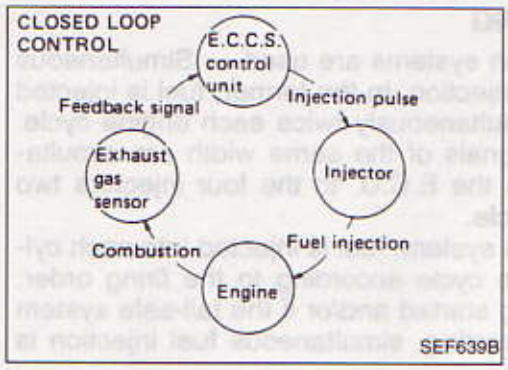
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>
1) When starting the engine
2) During warm-up
3) During acceleration
4) Hot-engine operation

<Fuel decrease>
1) During deceleration

Fuel Injection Control (Cont'd)



MIXTURE RATIO FEEDBACK CONTROL

Mixture ratio feedback system is designed to precisely control the mixture ratio to the stoichiometric point so that the three-way catalyst can reduce CO, HC and NOx emissions. This system uses an exhaust gas sensor in the exhaust manifold to check the air-fuel ratio. The control unit adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.

This stage refers to the closed-loop control condition. The open-loop condition refers to that under which the E.C.U. detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

1) Deceleration
2) High-load operation
3) Engine idling
4) Malfunction of exhaust gas sensor or its circuit
5) Insufficient activation of exhaust gas sensor at low engine temperature
6) Engine starting
7) When all of the following conditions are met:

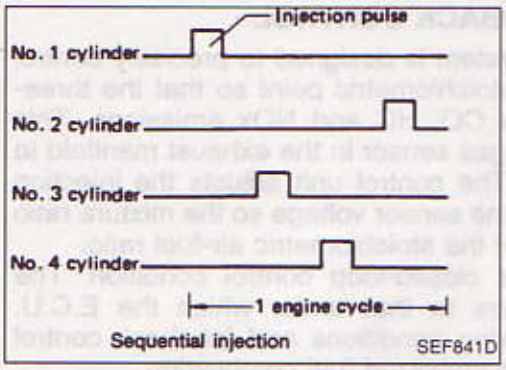
- Ignition switch "ON"
- Soft idle switch "ON"
- Neutral switch "OFF"
- Engine running at idle speed
- Vehicle running at slow speed

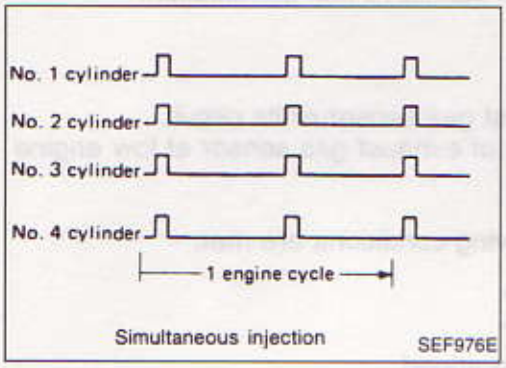
MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the exhaust gas sensor. This feedback signal is then sent to the E.C.U. to control the amount of fuel injection to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., air flow meter hot wire) and changed during operation (injector clogging, etc.) of E.C.C.S. parts which directly affect the mixture ratio.

Accordingly, a difference between the basic and theoretical mixture ratios is quantitatively monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.

Fuel Injection Control (Cont'd)





FUEL INJECTION TIMING

Two types of fuel injection systems are used — Simultaneous injection and sequential injection. In the former, fuel is injected into all four cylinders simultaneously twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the E.C.U. to the four injectors two times for each engine cycle.

In the sequential injection system, fuel is injected into each cylinder during each engine cycle according to the firing order. When the engine is being started and/or if the fail-safe system (C.P.U. of E.C.U.) is operating, simultaneous fuel injection is used.

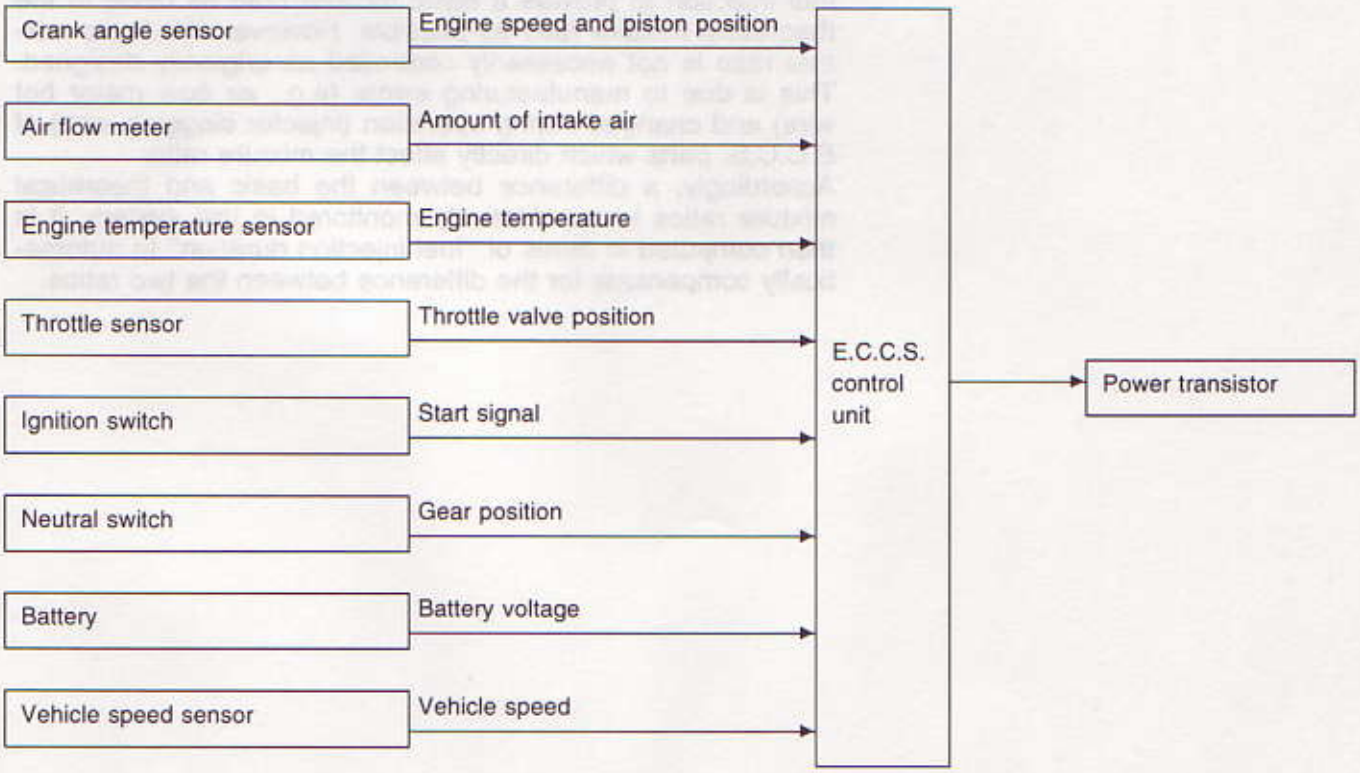
When the engine is running sequential fuel injection is used.

FUEL SHUT-OFF

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

Ignition Timing Control

INPUT/OUTPUT SIGNAL LINE



Ignition Timing Control (Cont'd)

SYSTEM DESCRIPTION

The ignition timing is controlled by the E.C.U. in order to maintain the best air-fuel ratio in response to every running condition of the engine. The ignition timing data is stored in the ROM located in the E.C.U., in the form of the map shown below.

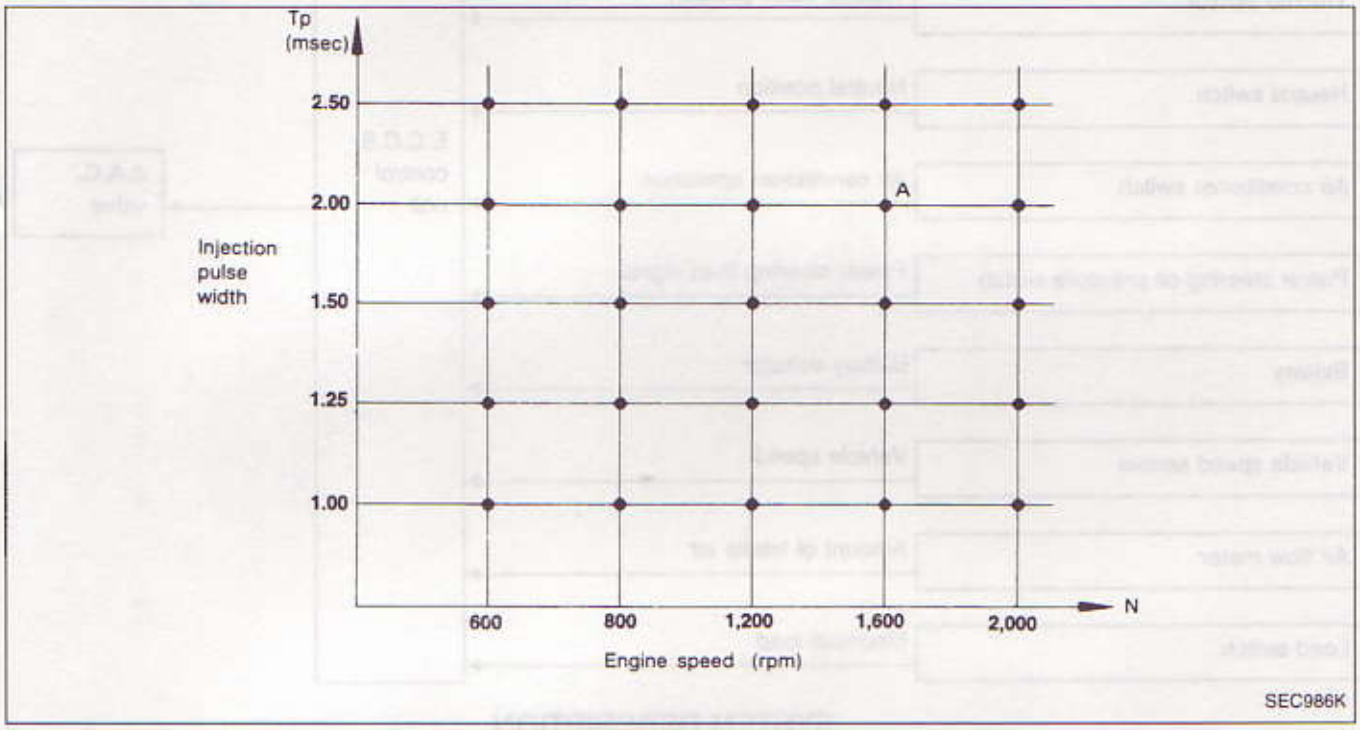
The E.C.U. detects information such as the injection pulse width and crank angle sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

e.g. N: 1,800 rpm, Tp: 1.50 msec
A °B.T.D.C.

In addition to this,

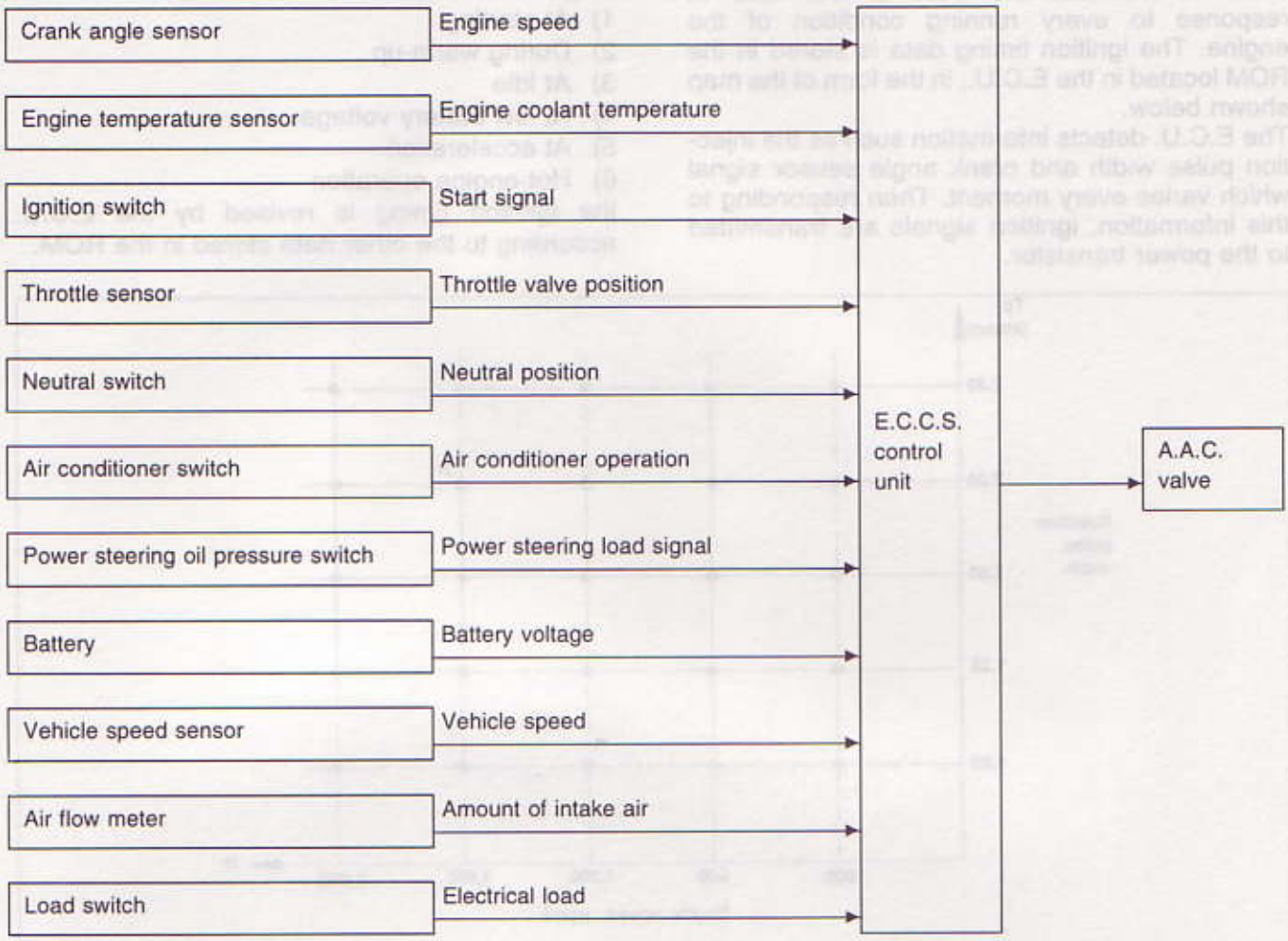
1) At starting
2) During warm-up
3) At idle
4) At low battery voltage
5) At acceleration
6) Hot-engine operation

the ignition timing is revised by the E.C.U. according to the other data stored in the ROM.



Idle Speed Control

INPUT/OUTPUT SIGNAL LINE

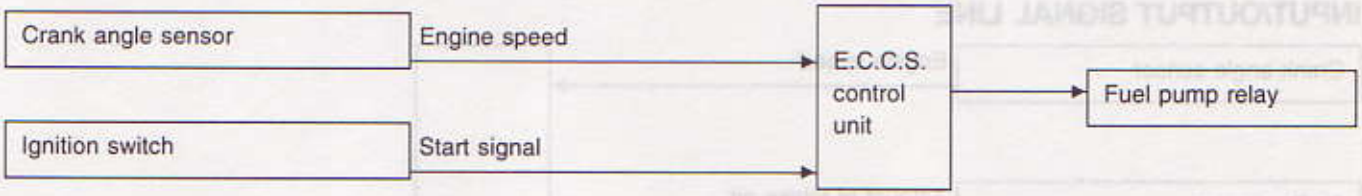


SYSTEM DESCRIPTION

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via A.A.C. valve. The A.A.C. valve repeats ON/OFF operation according to the signal sent from the E.C.U. The crank angle sensor detects the actual engine speed and sends a signal to the E.C.U. The E.C.U. then controls the ON/OFF time of the A.A.C. valve so that engine speed coincides with the target value memorized in ROM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ROM is determined by taking into consideration various engine conditions, such as warming up and during deceleration, fuel consumption, and engine load (air conditioner, electrical load).

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



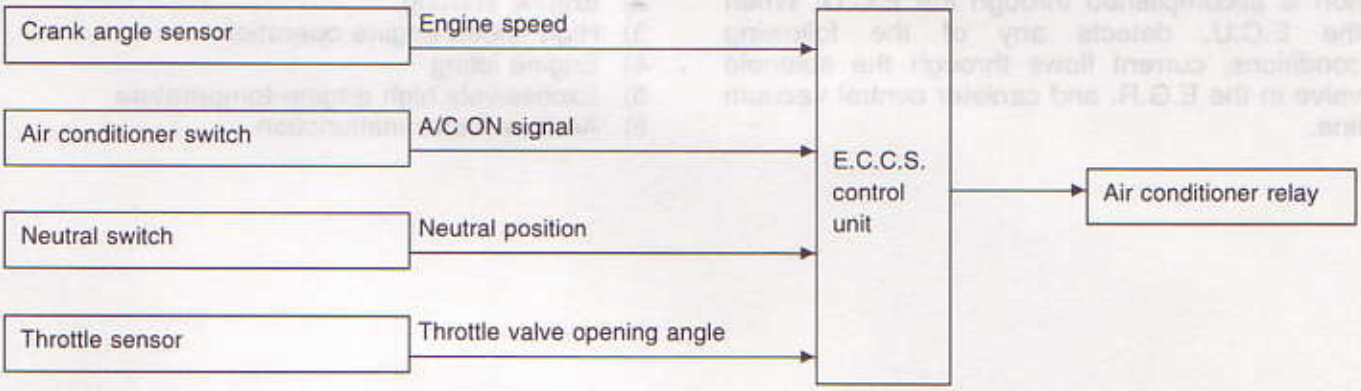
SYSTEM DESCRIPTION

The E.C.U. activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the E.C.U. receives a 180° signal from the crank angle sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The E.C.U. stops pump operation and prevents battery discharging, thereby improving safety. The E.C.U. does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE

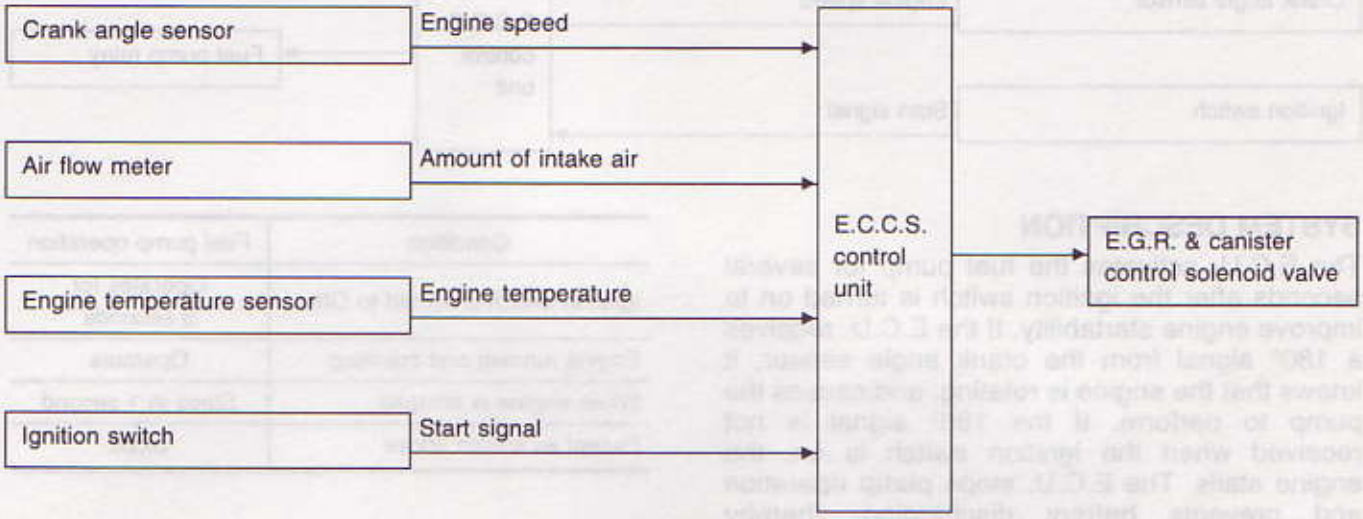


SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. This system improves acceleration when the air conditioner is used.

E.G.R. (Exhaust Gas Recirculation) & Canister Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

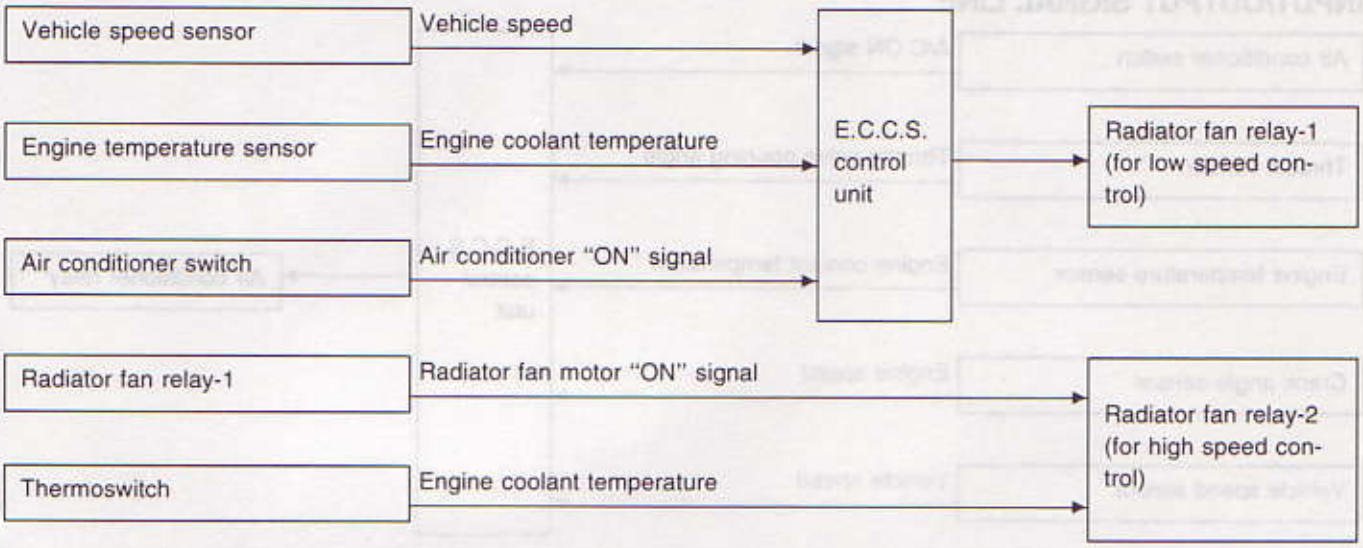
In addition, a system is provided which precisely cuts and controls port vacuum applied to the E.G.R. control valve and canister to suit engine operating conditions. This cut-and-control operation is accomplished through the E.C.U. When the E.C.U. detects any of the following conditions, current flows through the solenoid valve in the E.G.R. and canister control vacuum line.

This causes the port vacuum to be discharged into the atmosphere so that the E.G.R. control valve and canister remain closed.

1) Low engine temperature
2) Engine starting
3) High-speed engine operation
4) Engine idling
5) Excessively high engine temperature
6) Air flow meter malfunction

Radiator Fan Control

INPUT/OUTPUT SIGNAL LINE



The E.C.U. controls the radiator fan corresponding to the vehicle speed, engine temperature, and air conditioner ON signal. The control system for models for hot areas has 2-step controls [Low/High speed].

OPERATION

Air conditioner switch is "OFF"

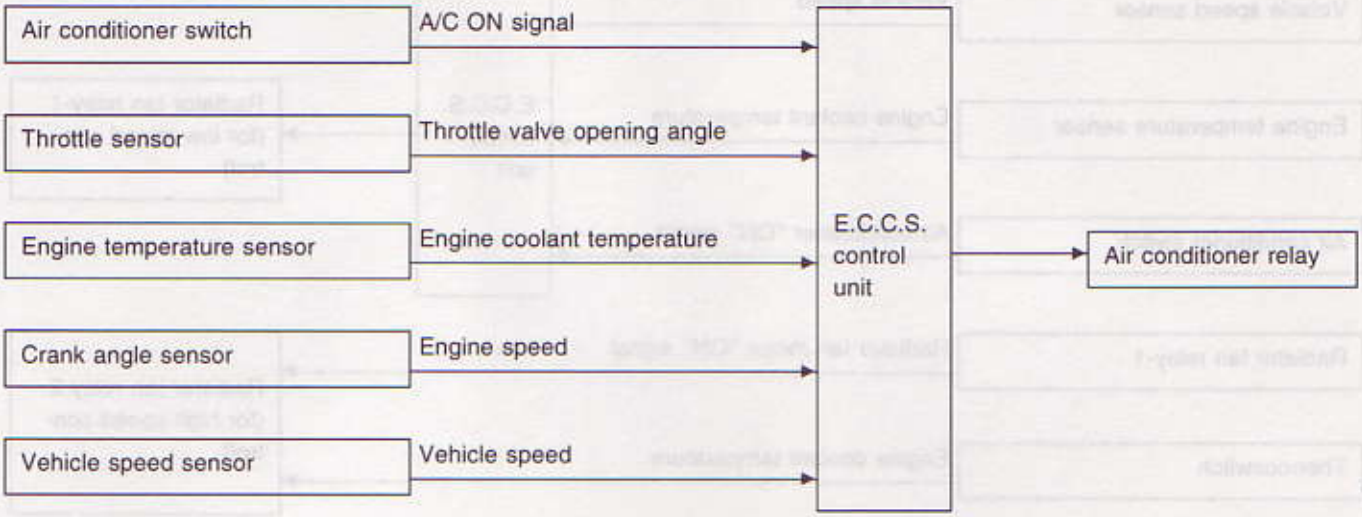
Engine coolant temperature °C (°F)	Radiator fans	Remarks
85 (185) or less	OFF	—
From 86 (187) until 90 (194)	Low speed	Vehicle speed is below 80 km/h (50 MPH)
	OFF	Vehicle speed is 80 km/h (50 MPH) or more
From 91 (196) until 95 (203)	Low speed	Vehicle speed is below 20 km/h (12 MPH)
	High speed	Vehicle speed is 20 km/h (12 MPH) or more
96 (205) or more	High speed	—

Air conditioner switch is "ON"

Engine coolant temperature °C (°F)	Radiator fans	Remarks
90 (194) or less	Low speed	Vehicle speed is below 80 km/h (50 MPH)
	OFF	Vehicle speed is 80 km/h (50 MPH) or more
From 91 (196) until 95 (203)	Low speed	Vehicle speed is below 20 km/h (12 MPH)
	High speed	Vehicle speed is 20 km/h (12 MPH) or more
96 (205) or more	High speed	—

Air Conditioner Cut Control During Acceleration

INPUT/OUTPUT SIGNAL LINE

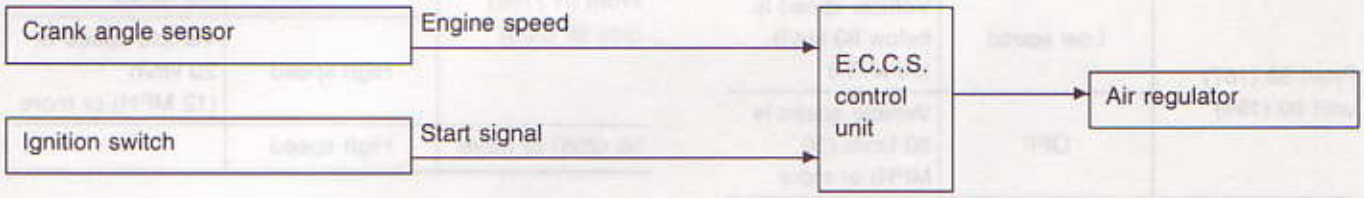


SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed or engine temperature is extremely high, the air conditioner is turned off for a few seconds.
This system improves acceleration when the air conditioner is used.

Air Regulator Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The air regulator is controlled by the E.C.U. at the same time as fuel pump ON-OFF control.

Condition	Air regulator operation
Ignition switch is turned to ON	Operates for 5 seconds
While engine is running and cranking	Operates
When engine is stopped	OFF in 1 second
Except as shown above	OFF

Fail-safe System

C.P.U. MALFUNCTION OF E.C.U.

Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the E.C.U.'s C.P.U. circuit. In former models, engine starting was difficult under the conditions mentioned above. But with the provisions provided in this fail-safe system, it is possible to start the engine.

Fail-safe system activating condition when E.C.U. is malfunctioning

The computing function of the E.C.U. was judged to be malfunctioning.
When the fail-safe system activates, i.e. if the E.C.U. detects a malfunction condition in the C.P.U. of E.C.U., the CHECK ENGINE LIGHT on the instrument panel lights to warn the driver.

Engine control, with fail-safe system, operates when E.C.U. is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, A.A.C. valve operation and radiator fan operation are controlled under certain limitations.

Operation

	Operation
Fuel injection	Simultaneous injection
Ignition timing	Ignition timing is fixed at the preset value.
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.
A.A.C. valve	Full open
Radiator fans	Radiator fan relay "ON"

Cancellation of fail-safe system when E.C.U. is malfunctioning

Activation of the fail-safe system is canceled each time the ignition switch is turned OFF. The system is reactivated if all of the above-mentioned activating conditions are satisfied after turning the ignition switch from OFF to ON.

Fail-safe System (Cont'd)

AIR FLOW METER MALFUNCTION

If the air flow meter output voltage is above or below the specified value, the E.C.U. senses an air flow meter malfunction. In case of a malfunction, the throttle sensor substitutes for the air flow meter.

Though air flow meter is malfunctioning, it is possible to drive the vehicle and start the engine. But engine speed will not rise more than 2,400 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON	Operates	Engine will be started by a pre-determined injection pulse on E.C.U.
Running	OFF		Engine speed will not rise above 2,400 rpm

ENGINE TEMPERATURE SENSOR MALFUNCTION

When engine temperature sensor output voltage is below or above the specified value, water temperature is fixed at the preset value as follows:

Operation

Condition	Engine temperature decided
Just as ignition switch is turned ON or Start	40°C (104°F)
More than 4 minutes after ignition ON or Start	80°C (176°F)
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

THROTTLE SENSOR MALFUNCTION

Description

When the output signal of throttle sensor is abnormal the E.C.U. judges it as a malfunctioning of throttle sensor.
The E.C.U. does not use the throttle sensor signal, but judges the idle position by the amount of fuel injected and the engine rpm.

Operation

	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

PREPARATION

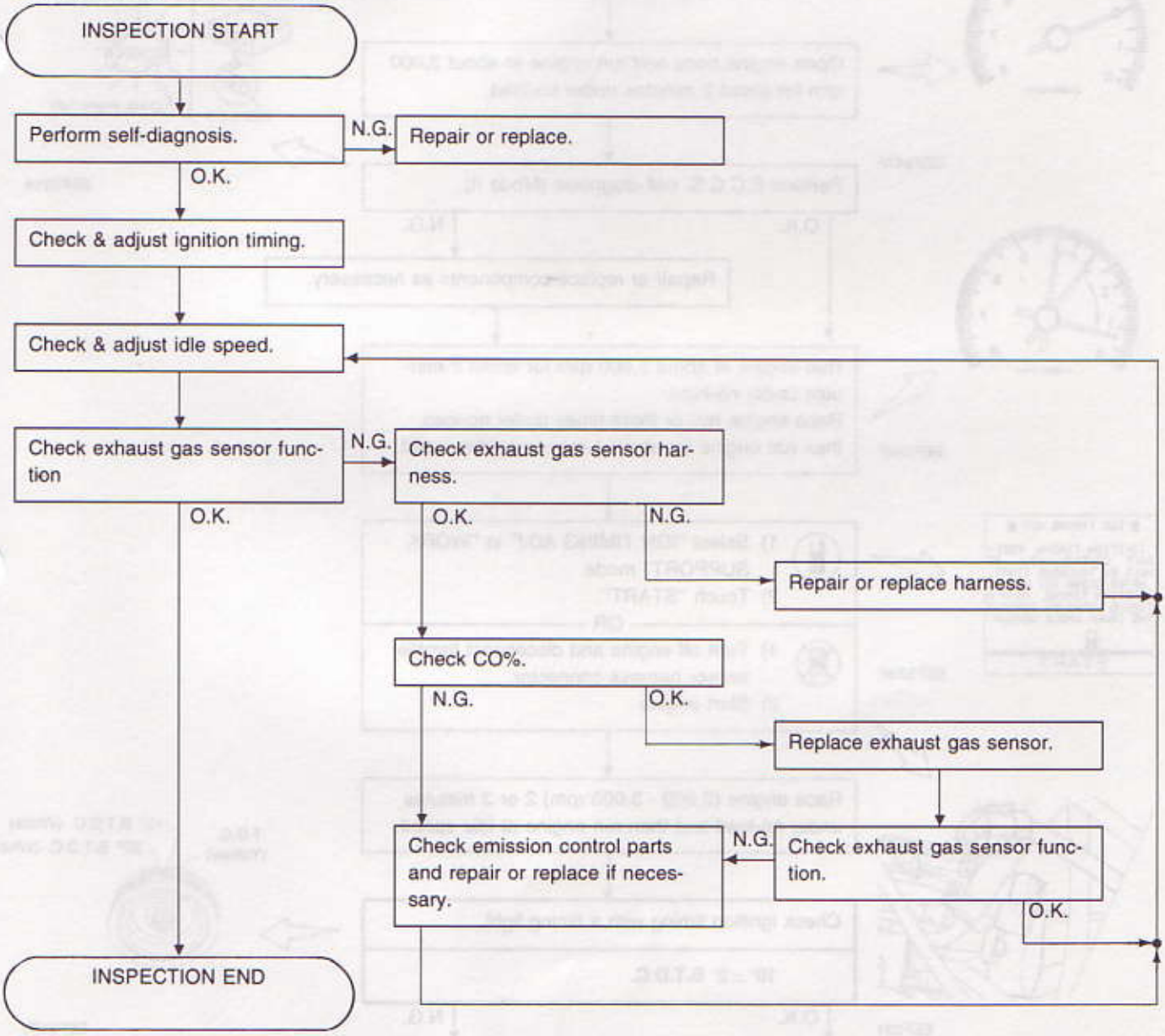
1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- E.C.U. harness connector
- Vacuum hoses
- Air intake system (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- E.G.R. control valve operation
- Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.★
4. Turn off headlamps, heater blower, rear defogger.
5. Keep front wheels pointed straight ahead.
6. Make the check after the radiator fan has stopped.

★ (For models without catalyzer)

FOR MODELS WITH CATALYZER

Overall inspection sequence

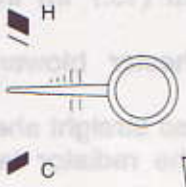


IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

Idle check and procedure

START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- E.G.R. valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle sensor operation



EEF008

Start engine and warm it up until water temperature indicator points to the middle of gauge.
Ensure engine stays below 1,000 rpm.

Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.

SEF247F

SEF621K

Perform E.C.C.S. self-diagnosis (Mode II).

O.K. — N.G.

Repair or replace components as necessary.

Run engine at about 2,000 rpm for about 2 minutes under no-load.
Race engine two or three times under no-load, then run engine for about 1 minute at idle speed.

SEF248F

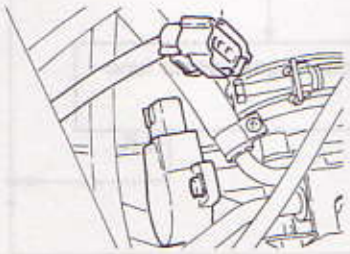
SEF579K

1) Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
2) Touch "START".

— OR —

1) Turn off engine and disconnect throttle sensor harness connector.
2) Start engine

Race engine (2,000 - 3,000 rpm) 2 or 3 minutes under no-load and then run engine at idle speed.



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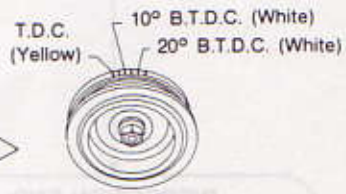
Check ignition timing with a timing light.

10° ± 2° B.T.D.C.



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