ENGINE CONTROL SYSTEM

SECTION EC

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NAEC0001

ALPHABETICAL INDEX FOR DTC

NAEC0001S01

Items (CONSULT screen terms)	DTC*6		Reference page
	ECM*1	CONSULT GST*2	
Unable to access ECM	—	—	EC-117
ABSL PRES SEN/CIRC	0803	P0105	EC-156
AIR TEMP SEN/CIRC	0401	P0110	EC-168
A/T 1ST GR FNCTN	1103	P0731	AT-120
A/T 2ND GR FNCTN	1104	P0732	AT-126
A/T 3RD GR FNCTN	1105	P0733	AT-132
A/T 4TH GR FNCTN	1106	P0734	AT-138
A/T COMM LINE	—	P0600	EC-431
A/T DIAG COMM LINE	0804	P1605	EC-540
A/T TCC S/V FNCTN	1107	P0744	AT-153
ATF TEMP SEN/CIRC	1208	P0710	AT-105
CAM POS SEN/CIRC	0101	P0340	EC-339
CLOSED LOOP-B1	0307	P1148	EC-452
CLOSED LOOP-B2	0308	P1168	EC-452
CLOSED TP SW/CIRC	0203	P0510	EC-424
COOLANT T SEN/CIRC*3	0103	P0115	EC-175
*COOLANT T SEN/CIRC	0908	P0125	EC-194
CPS/CIRC (OBD) COG	0905	P1336	EC-461
CPS/CIRCUIT (OBD)	0802	P0335	EC-333
CYL 1 MISFIRE	0608	P0301	EC-320
CYL 2 MISFIRE	0607	P0302	EC-320
CYL 3 MISFIRE	0606	P0303	EC-320
CYL 4 MISFIRE	0605	P0304	EC-320
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CYL 6 MISFIRE	0603	P0306	EC-320
ECM	0301	P0605	EC-436
EGR SYSTEM	0302	P0400	EC-347
EGR SYSTEM	0514	P1402	EC-478
EGR TEMP SEN/CIRC	0305	P1401	EC-472
EGRC SOLENOID/V	1005	P1400	EC-467
EGRC-BPT VALVE	0306	P0402	EC-358
ENGINE SPEED SIG*4	1207	P0725	AT-115
EVAP GROSS LEAK	0715	P0455	EC-401
EVAP PURG FLOW/MON	0111	P1447	EC-510

Items (CONSULT screen terms)	DTC*6		Reference page
	ECM*1	CONSULT GST*2	
EVAP SYS PRES SEN	0704	P0450	EC-391
EVAP SMALL LEAK	0705	P0440	EC-367
EVAP SMALL LEAK	0213	P1440	EC-486
FR O2 SE HEATER-B1	0901	P0135	EC-244
FR O2 SE HEATER-B2	1001	P0155	EC-244
FRONT O2 SENSOR-B1	0503	P0130	EC-200
FRONT O2 SENSOR-B1	0415	P0131	EC-209
FRONT O2 SENSOR-B1	0414	P0132	EC-216
FRONT O2 SENSOR-B1	0413	P0133	EC-224
FRONT O2 SENSOR-B1	0509	P0134	EC-235
FRONT O2 SENSOR-B2	0303	P0150	EC-200
FRONT O2 SENSOR-B2	0411	P0151	EC-209
FRONT O2 SENSOR-B2	0410	P0152	EC-216
FRONT O2 SENSOR-B2	0409	P0153	EC-224
FRONT O2 SENSOR-B2	0412	P0154	EC-235
FUEL SYS LEAN/BK1	0115	P0171	EC-297
FUEL SYS LEAN/BK2	0210	P0174	EC-297
FUEL SYS RICH/BK1	0114	P0172	EC-306
FUEL SYS RICH/BK2	0209	P0175	EC-306
FUEL TEMP SEN/CIRC	0402	P0180	EC-314
IACV/AAC VLV/CIRC	0205	P0505	EC-416
IGN SIGNAL-PRIMARY	0201	P1320	EC-454
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L/PRES SOL/CIRC	1205	P0745	AT-162
MAP/BARO SW SOL/CIRC	1302	P1105	EC-438
MAF SEN/CIRCUIT*3	0102	P0100	EC-146
MULTI CYL MISFIRE	0701	P0300	EC-320
NATS MALFUNCTION	—	—	EC-74 or EL-282
NO SELF DIAGNOSTIC FAILURE INDICATED	**0505**	**P0000**	**—**
NO SELF DIAGNOSTIC FAILURE INDICATED	Flashing*5	No DTC	EC-71
OVER HEAT	0208	—	LC-17
O/L CLTCH S/CIRC	1203	P1760	AT-188
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PNP SW/CIRC	1101	P0705	AT-99
PURG VOLUME CONT/V	1008	P0443	EC-377
PURG VOLUME CONT/V	0214	P1444	EC-496

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Items (CONSULT screen terms)	DTC*6		Reference page
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REAR O2 SENSOR-B1	0510	P0138	EC-261
REAR O2 SENSOR-B1	0707	P0139	EC-271
REAR O2 SENSOR-B1	0512	P0140	EC-281
REAR O2 SENSOR-B2	0314	P0157	EC-251
REAR O2 SENSOR-B2	0313	P0158	EC-261
REAR O2 SENSOR-B2	0708	P0159	EC-271
REAR O2 SENSOR-B2	0315	P0160	EC-281
RR O2 SE HEATER-B1	0902	P0141	EC-290
RR O2 SE HEATER-B2	1002	P0161	EC-290
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SFT SOL B/CIRC*3	1201	P0755	AT-174
TCC SOLENOID/CIRC	1204	P0740	AT-148
TP SEN/CIRC A/T*3	1206	P1705	AT-179
TRTL POS SEN/CIRC*3	0403	P0120	EC-181
TW CATALYST SYS-B1	0702	P0420	EC-363
TW CATALYST SYS-B2	0703	P0430	EC-363
VC CUT/V BYPASS/V	0311	P1491	EC-532
VC/V BYPASS/V	0801	P1490	EC-525
VEH SPEED SEN/CIRC	0104	P0500	EC-411
VEH SPD SEN/CIRC*4	1102	P0720	AT-110
VENT CONTROL VALVE	0903	P0446	EC-384
VENT CONTROL VALVE	0215	P1446	EC-504
VENT CONTROL VALVE	0309	P1448	EC-518

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*5: While engine is running.

*6: 1st trip DTC No. is the same as DTC No.

NOTE:

Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

P NO. INDEX FOR DTC

NAEC0001S02

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—	—	Unable to access ECM	EC-117
—	—	NATS MALFUNCTION	EC-74 or EL-282

DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
No DTC	Flashing*5	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-71
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	—
P0100	0102	MAF SEN/CIRCUIT*3	EC-146
P0105	0803	ABSL PRES SEN/CIRC	EC-156
P0110	0401	AIR TEMP SEN/CIRC	EC-168
P0115	0103	COOLANT T SEN/CIRC*3	EC-175
P0120	0403	THRTL POS SEN/CIRC*3	EC-181
P0125	0908	*COOLANT T SEN/CIRC	EC-194
P0130	0503	FRONT O2 SENSOR-B1	EC-200
P0131	0415	FRONT O2 SENSOR-B1	EC-209
P0132	0414	FRONT O2 SENSOR-B1	EC-216
P0133	0413	FRONT O2 SENSOR-B1	EC-224
P0134	0509	FRONT O2 SENSOR-B1	EC-235
P0135	0901	FR O2 SE HEATER-B1	EC-244
P0137	0511	REAR O2 SENSOR-B1	EC-251
P0138	0510	REAR O2 SENSOR-B1	EC-261
P0139	0707	REAR O2 SENSOR-B1	EC-271
P0140	0512	REAR O2 SENSOR-B1	EC-281
P0141	0902	RR O2 SE HEATER-B1	EC-290
P0150	0303	FRONT O2 SENSOR-B2	EC-200
P0151	0411	FRONT O2 SENSOR-B2	EC-209
P0152	0410	FRONT O2 SENSOR-B2	EC-216
P0153	0409	FRONT O2 SENSOR-B2	EC-224
P0154	0412	FRONT O2 SENSOR-B2	EC-235
P0155	1001	FR O2 SE HEATER-B2	EC-244
P0157	0314	REAR O2 SENSOR-B2	EC-251
P0158	0313	REAR O2 SENSOR-B2	EC-261
P0159	0708	REAR O2 SENSOR-B2	EC-271
P0160	0315	REAR O2 SENSOR-B2	EC-281
P0161	1002	RR O2 SE HEATER-B2	EC-290
P0171	0115	FUEL SYS LEAN/BK1	EC-297
P0172	0114	FUEL SYS RICH/BK1	EC-306
P0174	0210	FUEL SYS LEAN/BK2	EC-297
P0175	0209	FUEL SYS RICH/BK2	EC-306
P0180	0402	FUEL TEMP SEN/CIRC	EC-314
P0300	0701	MULTI CYL MISFIRE	EC-320

Alphabetical & P No. Index for DTC (Cont'd)

DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
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P0302	0607	CYL 2 MISFIRE	EC-320
P0303	0606	CYL 3 MISFIRE	EC-320
P0304	0605	CYL 4 MISFIRE	EC-320
P0305	0604	CYL 5 MISFIRE	EC-320
P0306	0603	CYL 6 MISFIRE	EC-320
P0325	0304	KNOCK SENSOR	EC-327
P0335	0802	CPS/CIRCUIT (OBD)	EC-333
P0340	0101	CAM POS SEN/CIRC	EC-339
P0400	0302	EGR SYSTEM	EC-347
P0402	0306	EGRC-BPT VALVE	EC-358
P0420	0702	TW CATALYST SYS-B1	EC-363
P0430	0703	TW CATALYST SYS-B2	EC-363
P0440	0705	EVAP SMALL LEAK	EC-367
P0443	1008	PURG VOLUME CONT/V	EC-377
P0446	0903	VENT CONTROL VALVE	EC-384
P0450	0704	EVAP SYS PRES SEN	EC-391
P0455	0715	EVAP GROSS LEAK	EC-401
P0500	0104	VEH SPEED SEN/CIRC	EC-411
P0505	0205	IACV/AAC VLV/CIRC	EC-416
P0510	0203	CLOSED TP SW/CIRC	EC-424
P0600	—	A/T COMM LINE	EC-431
P0605	0301	ECM	EC-436
P0705	1101	PNP SW/CIRC	AT-99
P0710	1208	ATF TEMP SEN/CIRC	AT-105
P0720	1102	VEH SPD SEN/CIRC A/T*4	AT-110
P0725	1207	ENGINE SPEED SIG*4	AT-115
P0731	1103	A/T 1ST GR FNCTN	AT-120
P0732	1104	A/T 2ND GR FNCTN	AT-126
P0733	1105	A/T 3RD GR FNCTN	AT-132
P0734	1106	A/T 4TH GR FNCTN	AT-138
P0740	1204	TCC SOLENOID/CIRC	AT-148
P0744	1107	A/T TCC S/V FNCTN	AT-153
P0745	1205	L/PRESS SOL/CIRC	AT-162
P0750	1108	SFT SOL A/CIRC*3	AT-169
P0755	1201	SFT SOL B/CIRC*3	AT-174

DTC*6		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	ECM*1		
P1105	1302	MAP/BARO SW SOL/CIRC	EC-438
P1148	0307	CLOSED LOOP-B1	EC-452
P1168	0308	CLOSED LOOP-B2	EC-452
P1320	0201	IGN SIGNAL-PRIMARY	EC-454
P1336	0905	CPS/CIRC (OBD) COG	EC-461
P1400	1005	EGRC SOLENOID/V	EC-467
P1401	0305	EGR TEMP SEN/CIRC	EC-472
P1402	0514	EGR SYSTEM	EC-478
P1440	0213	EVAP SMALL LEAK	EC-486
P1444	0214	PURG VOLUME CONT/V	EC-496
P1446	0215	VENT CONTROL VALVE	EC-504
P1447	0111	EVAP PURG FLOW/MON	EC-510
P1448	0309	VENT CONTROL VALVE	EC-518
P1490	0801	VC/V BYPASS/V	EC-525
P1491	0311	VC CUT/V BYPASS/V	EC-532
P1605	0804	A/T DIAG COMM LINE	EC-540
P1705	1206	TP SEN/CIRC A/T*3	AT-179
P1706	1003	P-N POS SW/CIRCUIT	EC-545
P1760	1203	O/R CLUTCH SOL/CIRC	AT-188
—	0208	OVER HEAT	LC-17

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
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*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.
*5: While engine is running.
*6: 1st trip DTC No. is the same as DTC No.

NOTE:
Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

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

NAEC0002

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, refer to RS-18.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

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

NAEC0003

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- **Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

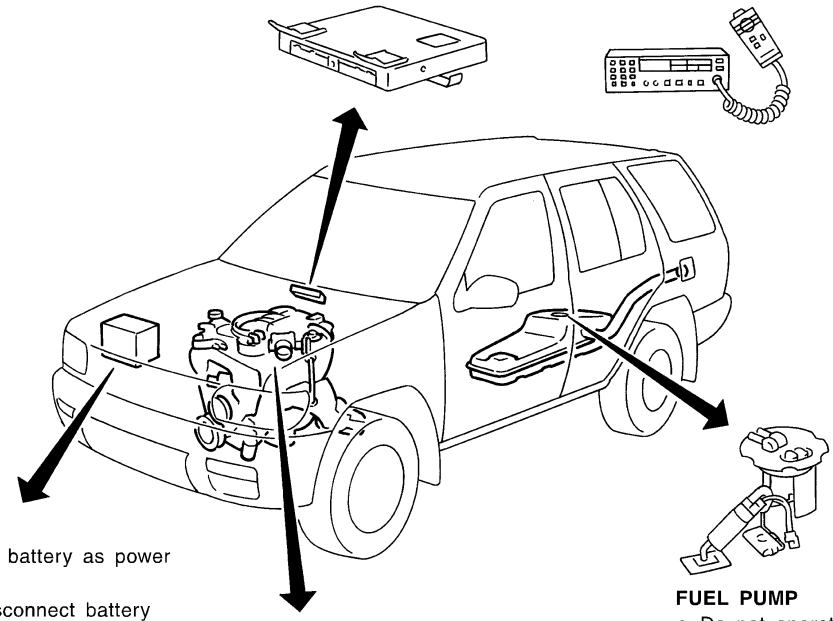
Engine Fuel & Emission Control System

NAEC0004

ECM
- Do not disassemble ECM.
- Do not turn diagnosis test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT
- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

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

ECM PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).

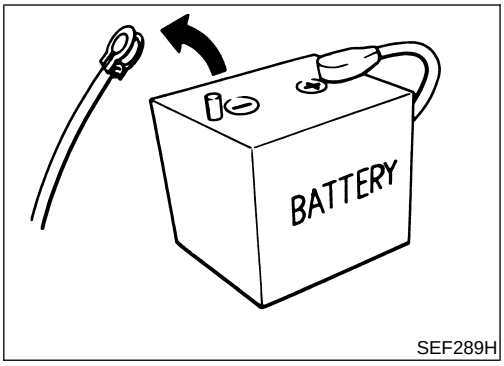
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF952RE

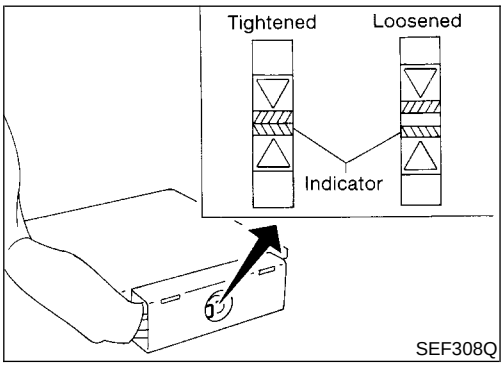
Precautions

NAEC0005



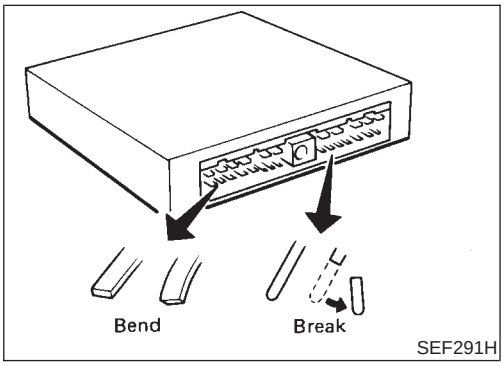
SEF289H

- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**



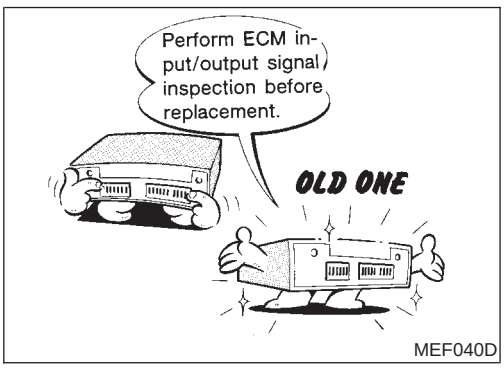
SEF308Q

- **When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.**
  : 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



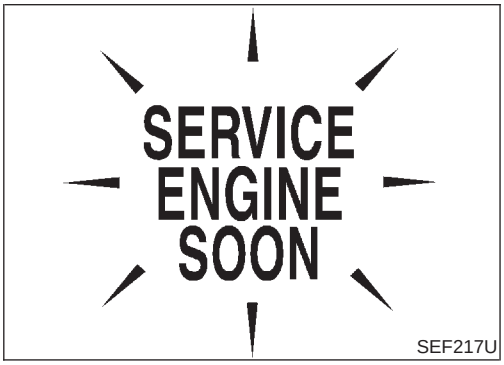
SEF291H

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.



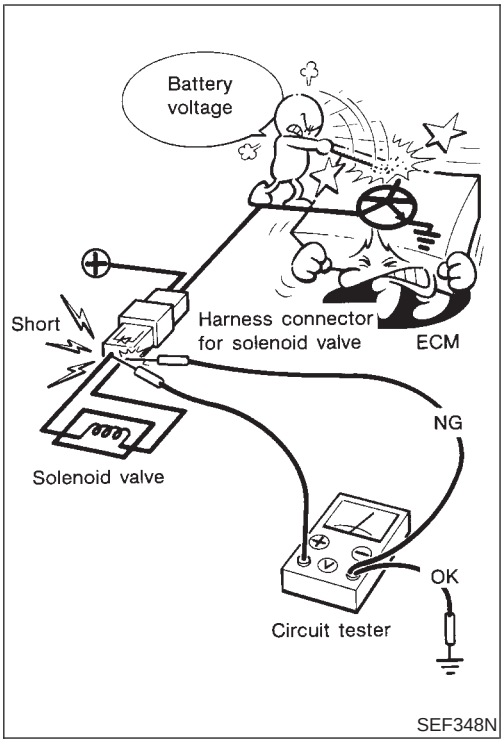
MEF040D

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-127.**

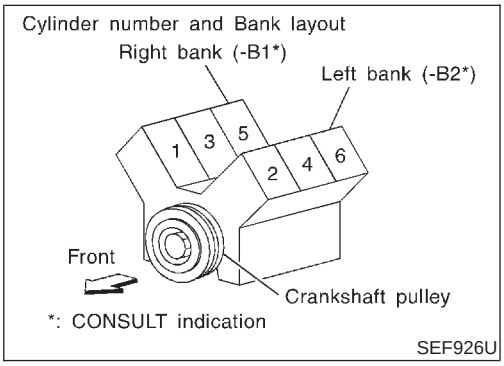


SEF217U

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



- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



- **Regarding model R50, "-B1" indicates the right bank and "-B2" indicates the left bank as shown in the figure.**

Wiring Diagrams and Trouble Diagnosis

NAEC0006

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING" for power distribution circuit

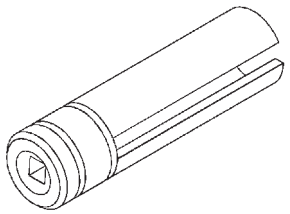
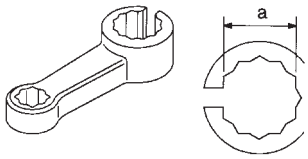
When you perform trouble diagnosis, refer to the following:

- GI-33, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-23, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

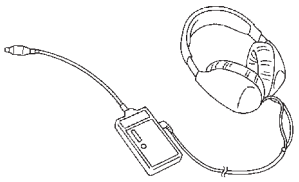
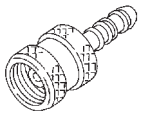
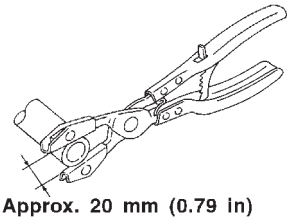
NAEC0007

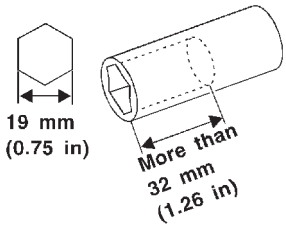
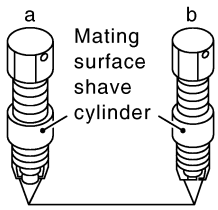
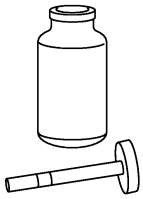
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**

Commercial Service Tools

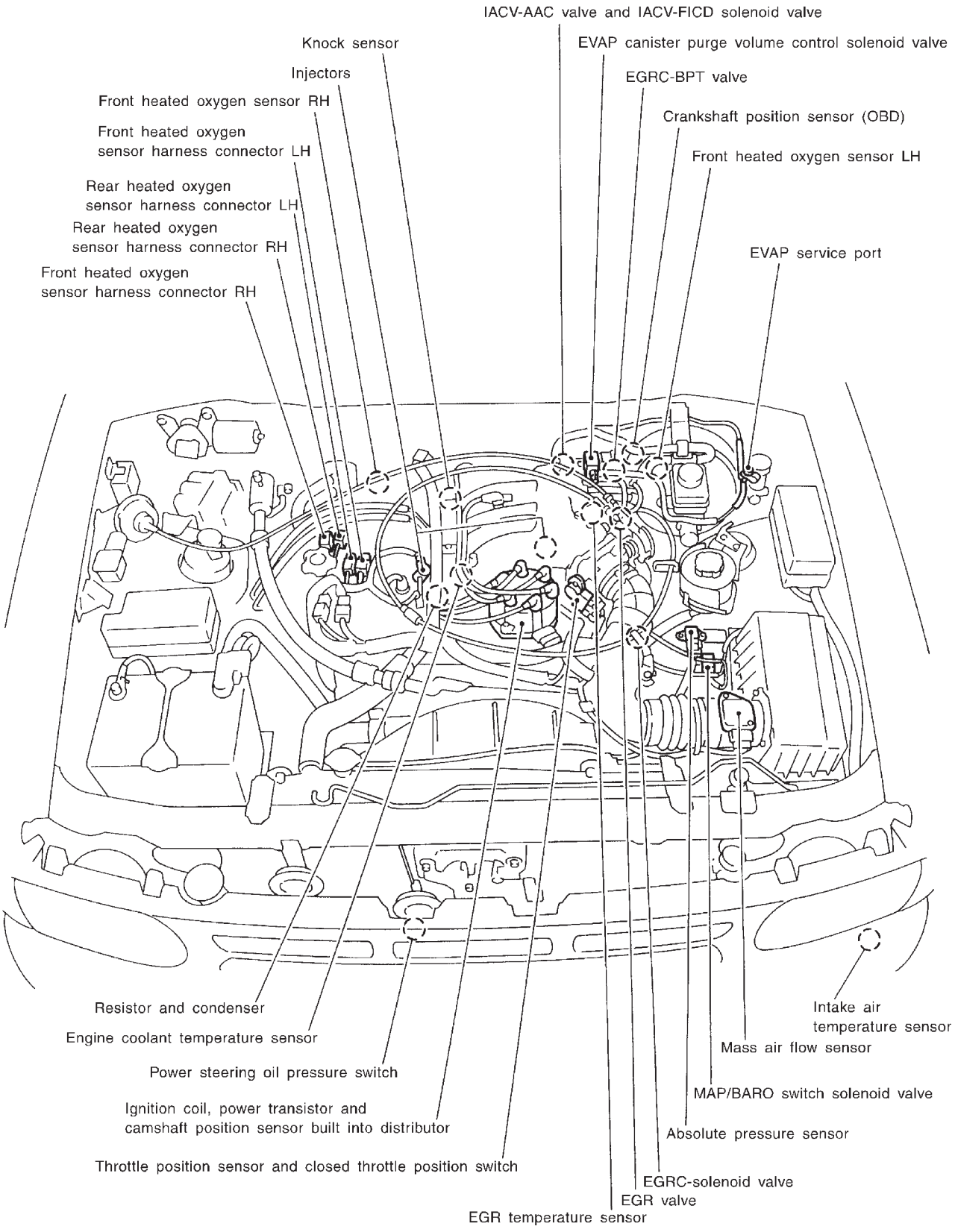
NAEC0008

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak.
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port.
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)].

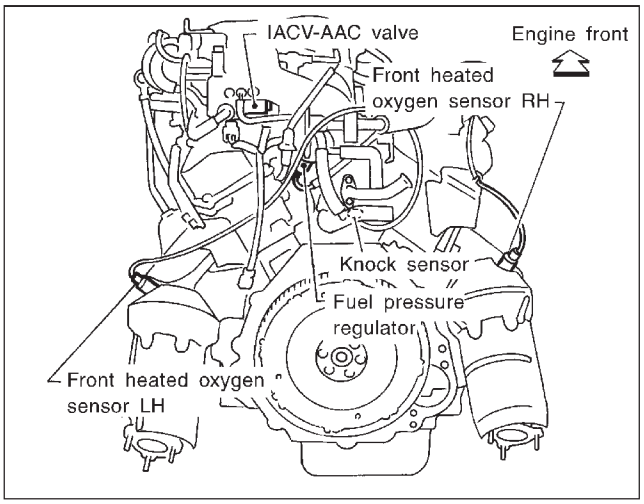
Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

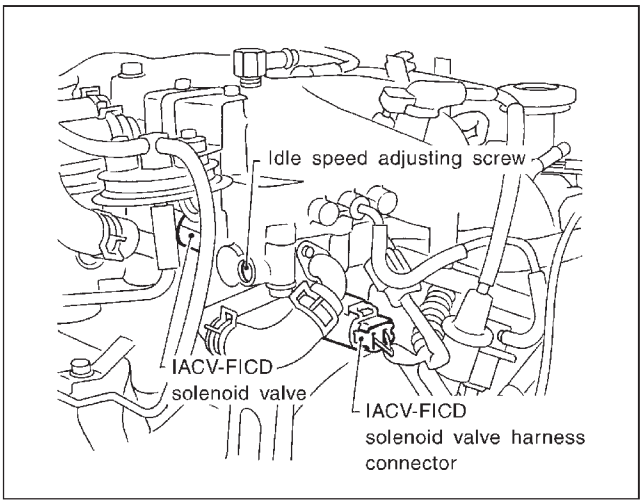
Engine Control Component Parts Location

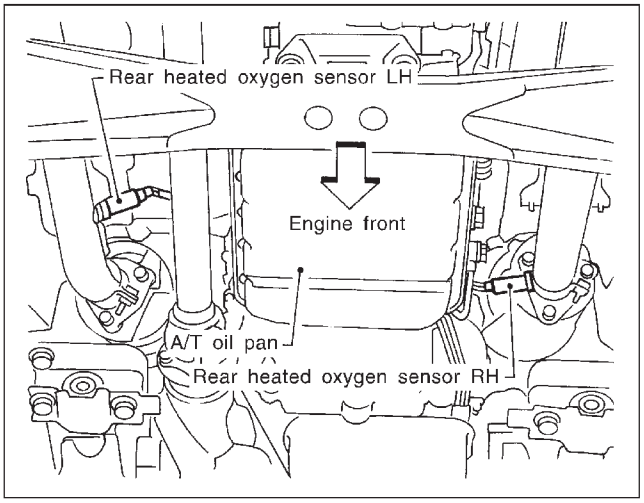
NAEC0009

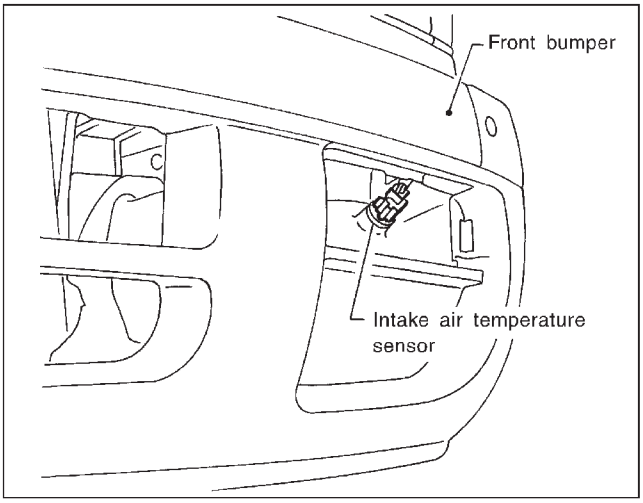


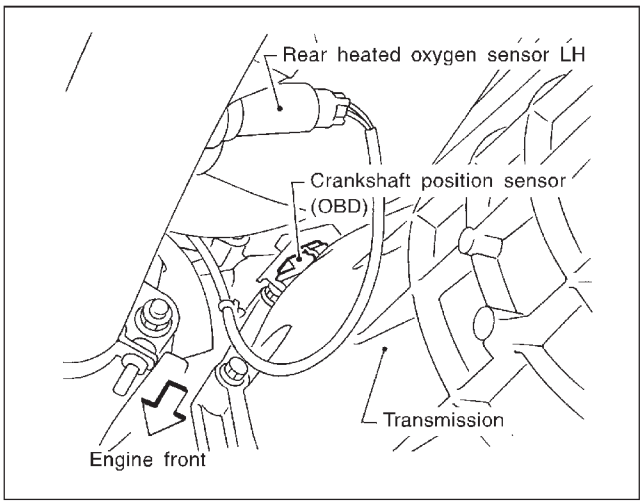
SEF790U

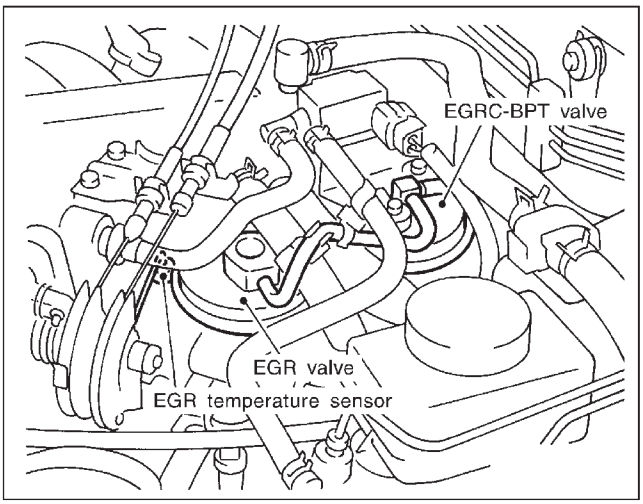

IACV-AAC valve
Engine front
Front heated oxygen sensor RH
Knock sensor
Fuel pressure regulator
Front heated oxygen sensor LH


Idle speed adjusting screw
IACV-FICD solenoid valve
IACV-FICD solenoid valve harness connector


Rear heated oxygen sensor LH
Engine front
A/T oil pan
Rear heated oxygen sensor RH


Front bumper
Intake air temperature sensor

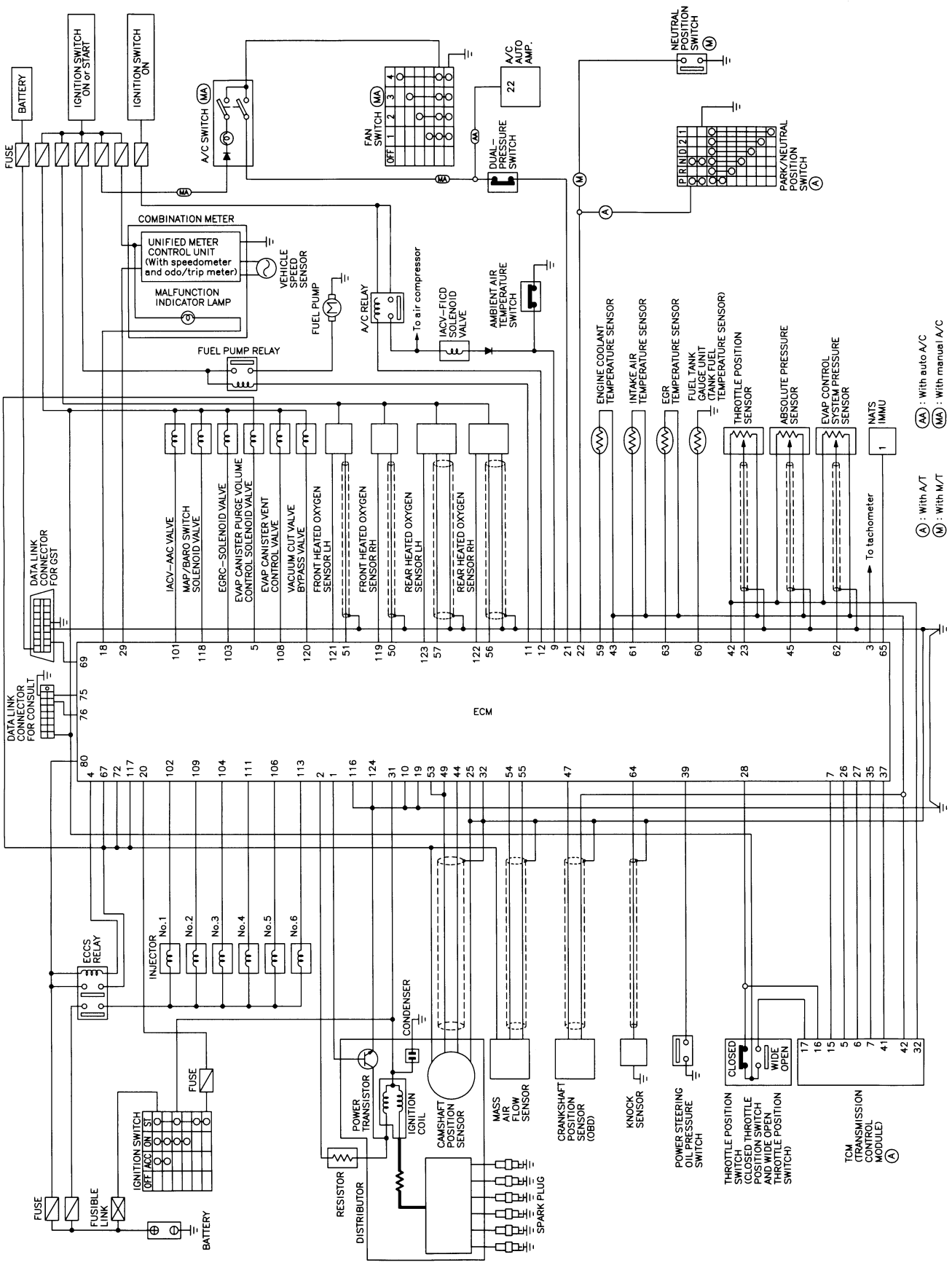

Rear heated oxygen sensor LH
Crankshaft position sensor (OBD)
Transmission
Engine front


EGRC-BPT valve
EGR valve
EGR temperature sensor

SEF791U

Circuit Diagram

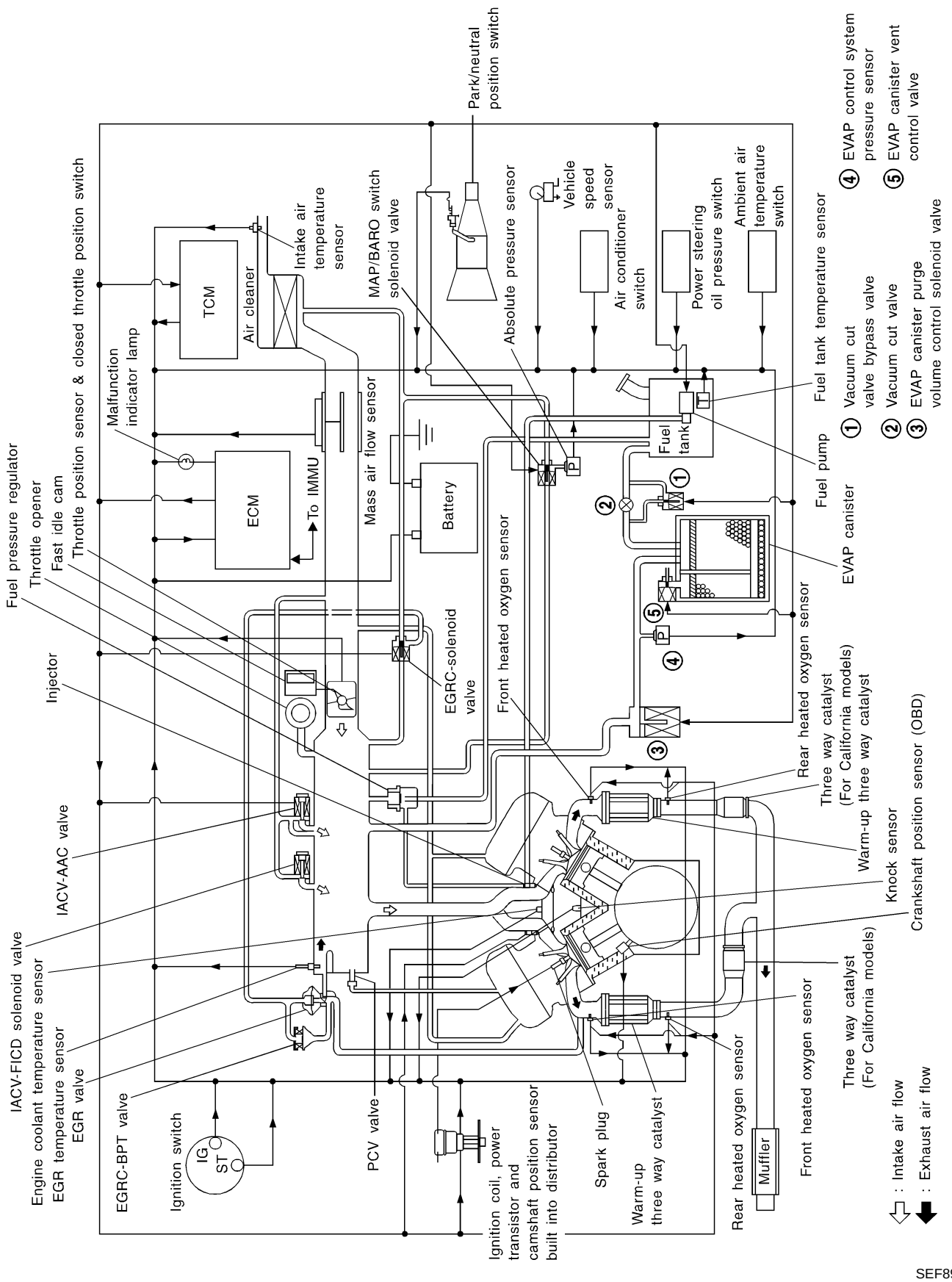
NAEC0010



MEC881C

System Diagram

NAEC0011

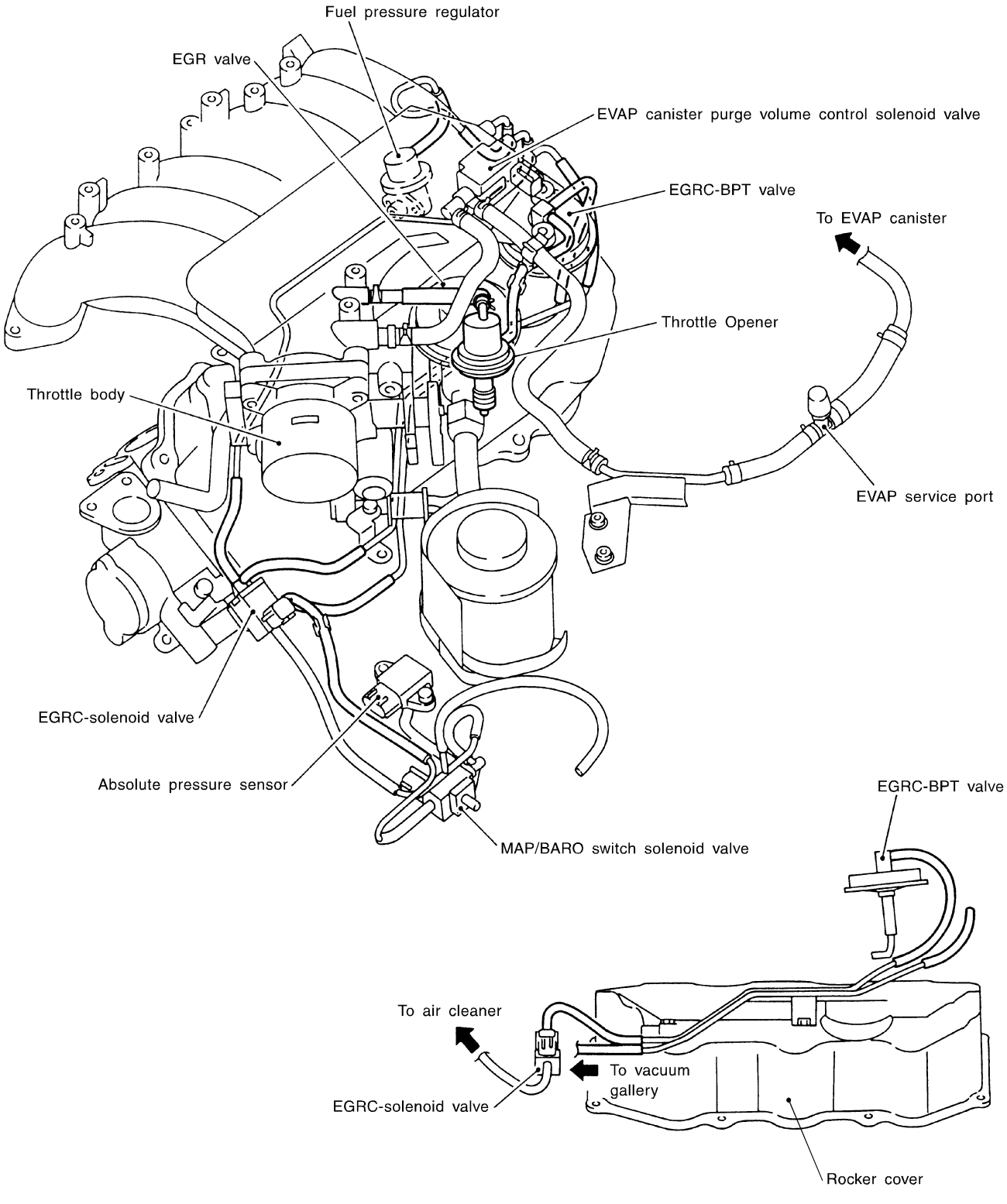


SEF895WA

Vacuum Hose Drawing

NAEC0012

Refer to “System Diagram”, EC-23 for Vacuum Control System.



SEF855W

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

System Chart

NAEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Front heated oxygen sensor • Ignition switch • Throttle position sensor • Closed throttle position switch *4 • Park/Neutral position (PNP) switch • Air conditioner switch • Knock sensor • EGR temperature sensor *1 • Intake air temperature sensor • Absolute pressure sensor • EVAP control system pressure sensor *1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor *1 • Crankshaft position sensor (OBD) *1 • Rear heated oxygen sensor *3 • TCM (Transmission control module) *2 • Electrical load • Ambient air temperature switch	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	Front heated oxygen sensor monitor & on board diagnostic system	MIL (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Front heated oxygen sensor heater control	Front heated oxygen sensor heater
	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve • MAP/BARO switch solenoid valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: This sensor is not used to control the engine system under normal conditions.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Line

NAEC0014

NAEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection control	Injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Front heated oxygen sensor	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/Neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Manifold absolute pressure Ambient barometic pressure		
Power steering oil pressure switch	Power steering operation		
Rear heated oxygen sensor*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NAEC0014S02

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

Various Fuel Injection Increase/Decrease Compensation

NAEC0014S03

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

<Fuel increase>

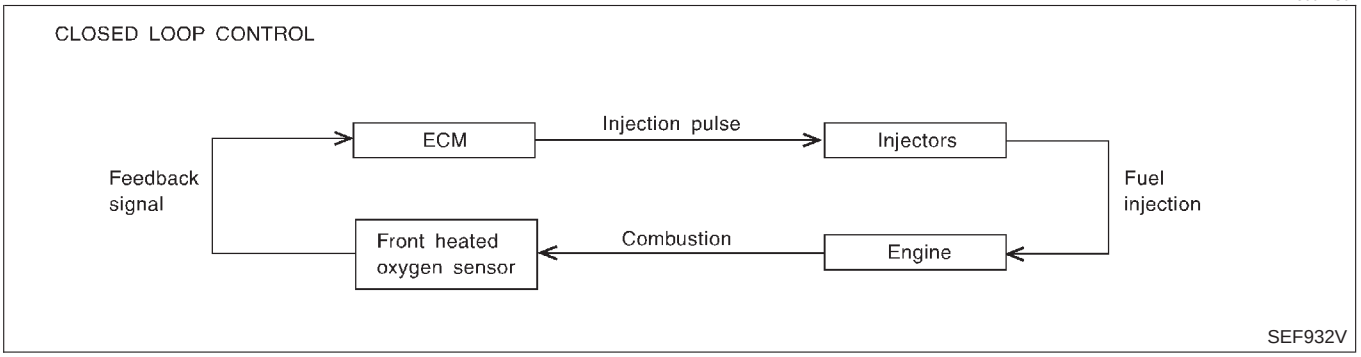
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NAEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the front heated oxygen sensor, refer to EC-200. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

Open Loop Control

NAEC0014S05

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

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

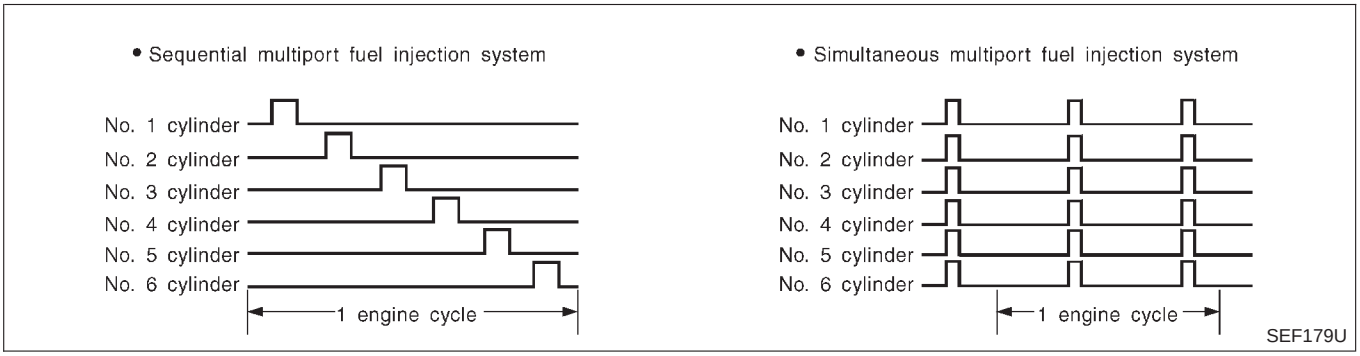
Mixture Ratio Self-learning Control

NAEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the front heated oxygen sensor. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

Fuel Injection Timing

NAEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NAEC0014S0701

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

NAEC0014S0702

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NAEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

NAEC0015

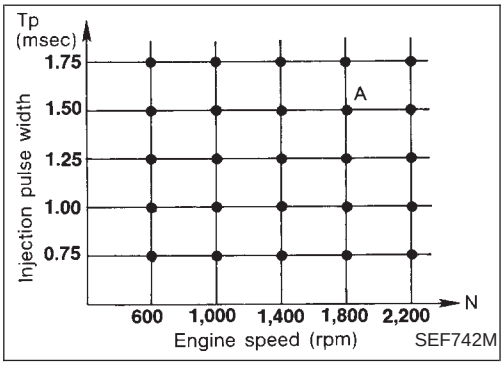
Input/Output Signal Line

NAEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/Neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

System Description

NAEC0015S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Line

NAEC0016

NAEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NAEC0016S02

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

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

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

NAEC0017

Input/Output Signal Line

NAEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/Neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

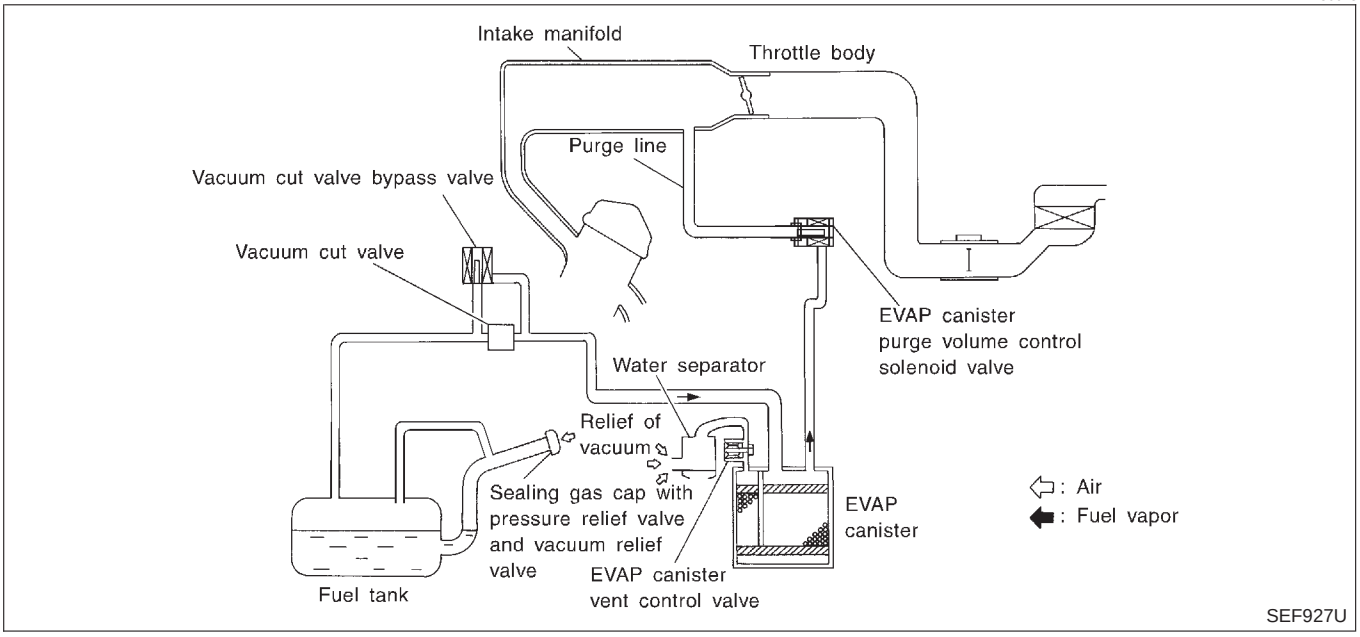
If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-26.

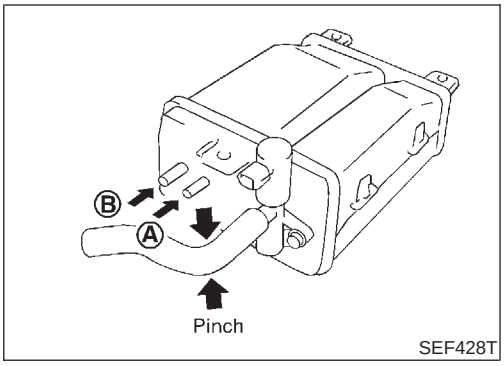
Evaporative Emission System

DESCRIPTION

NAEC0018



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



SEF428T

INSPECTION

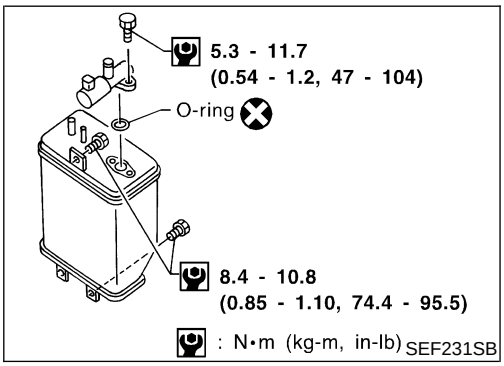
NAEC0019

EVAP Canister

NAEC0019S01

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.



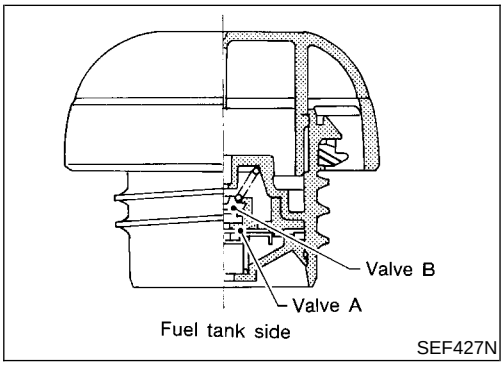
SEF231SB

Tightening Torque

NAEC0019S02

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



SEF427N

Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

NAEC0019S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)

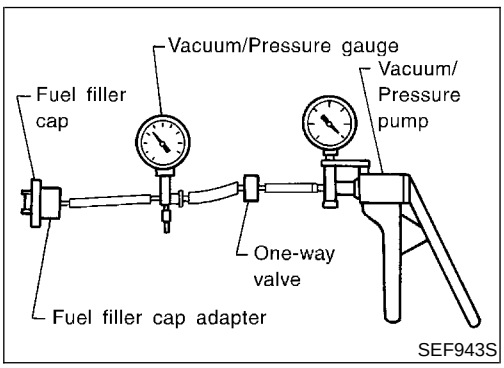
Vacuum:

−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NAEC0019S05

Refer to EC-525.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

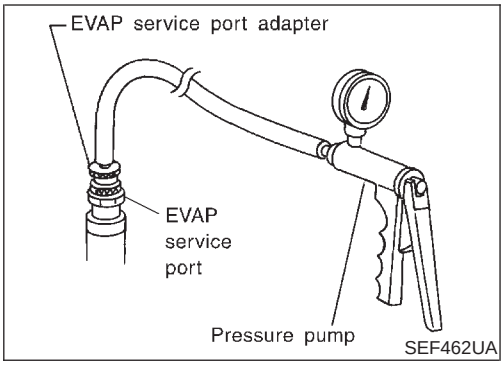
NAEC0019S06

Refer to EC-377.

Tank Fuel Temperature Sensor

NAEC0019S08

Refer to EC-314.

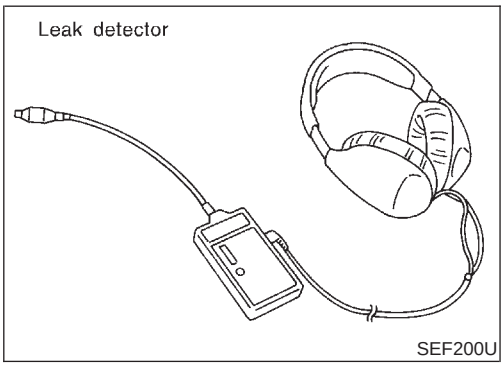


SEF462UA

Evap Service Port

NAEC0019S09

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



SEF200U

How to Detect Fuel Vapor Leakage

NAEC0019S10

CAUTION:

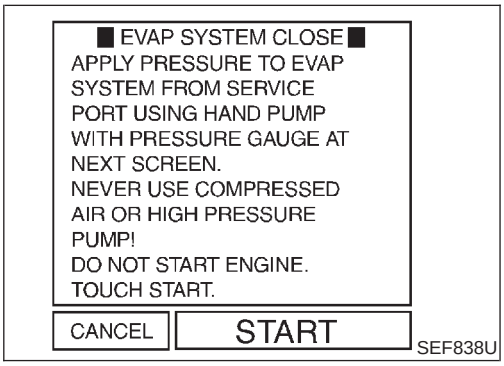
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

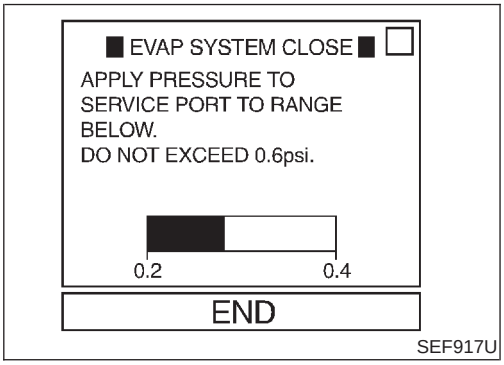
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT

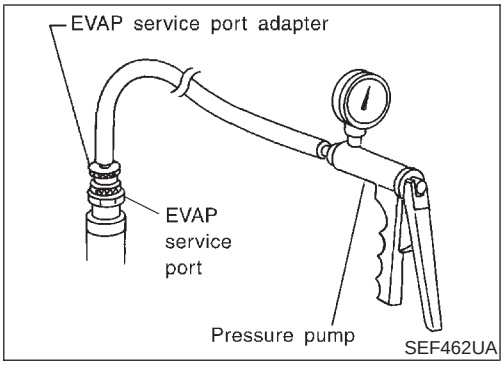
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.

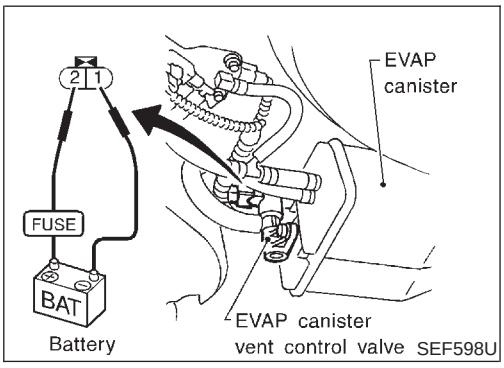


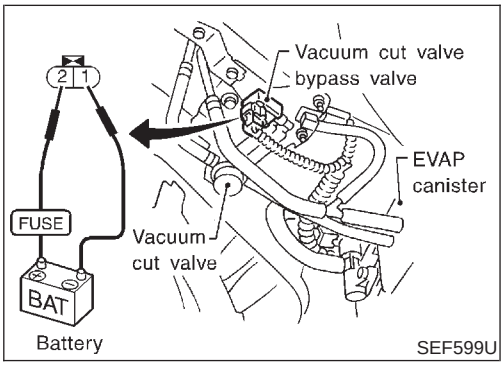
SEF838U



SEF917U





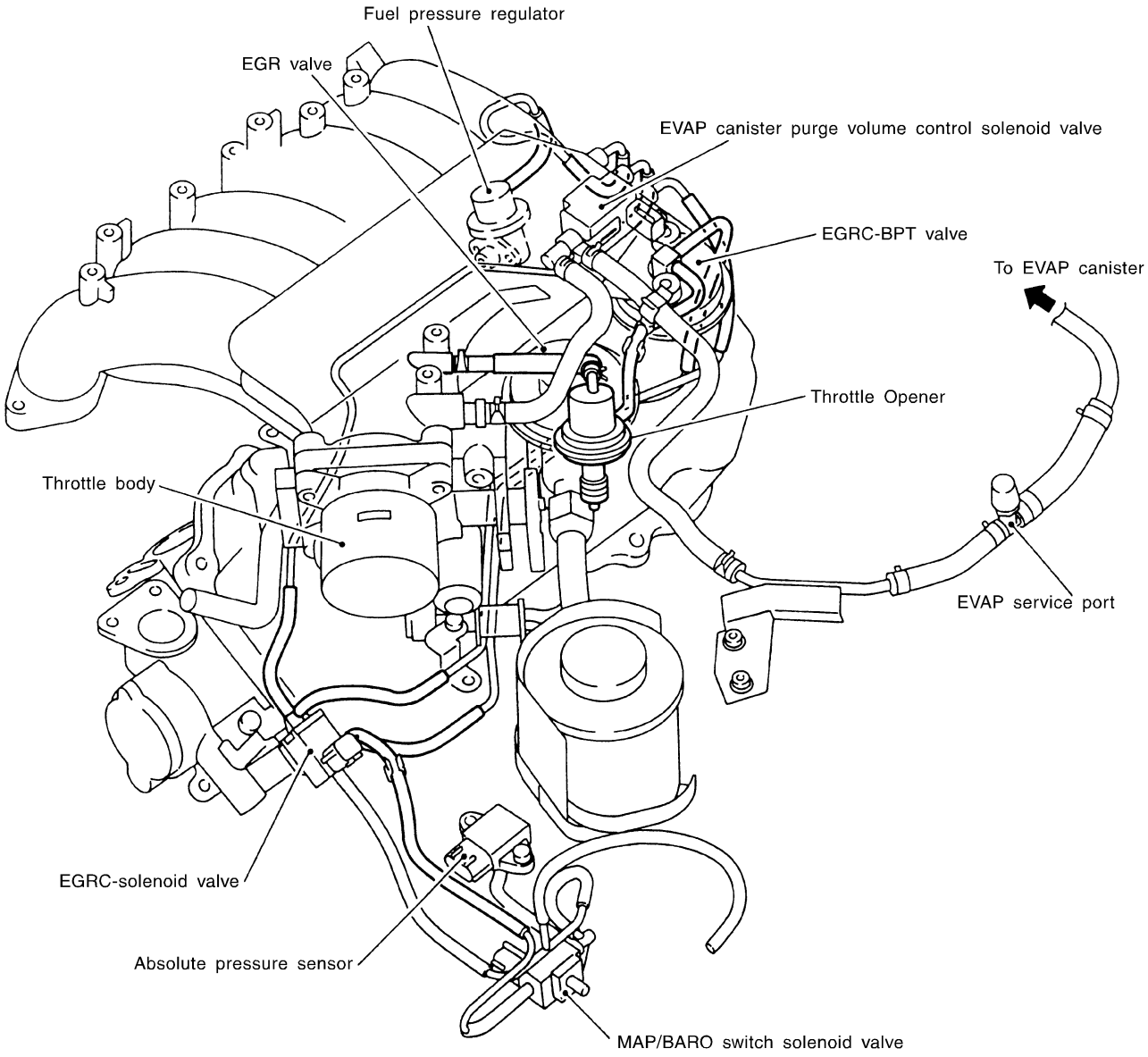


Without CONSULT

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5) Remove EVAP service port adapter and hose with pressure pump.
6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.

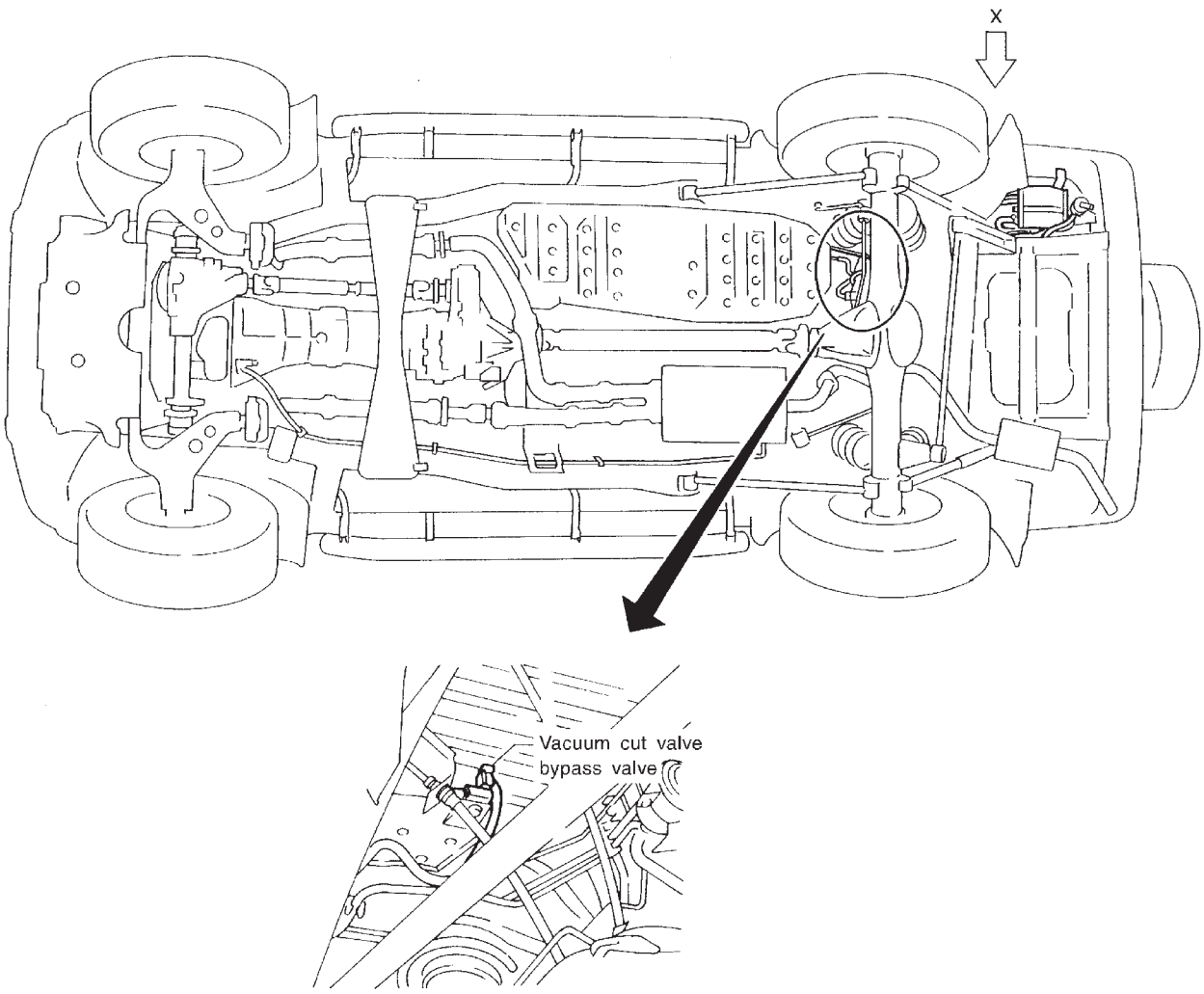
EVAPORATIVE EMISSION LINE DRAWING

NAEC0020



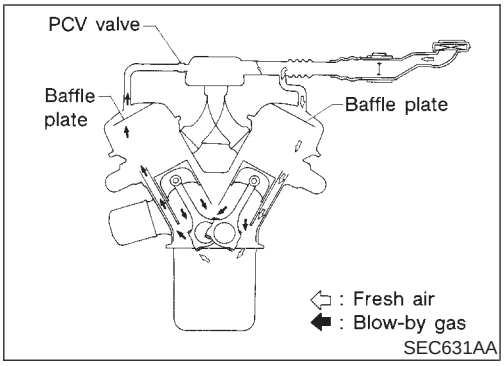
SEF865W

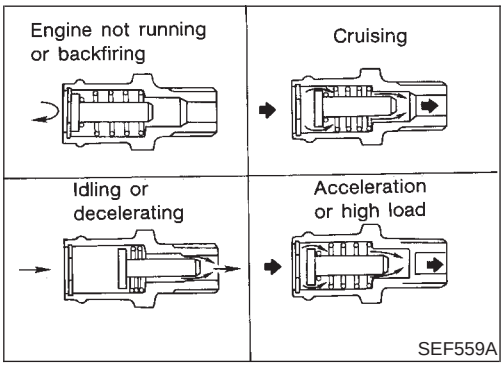
NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

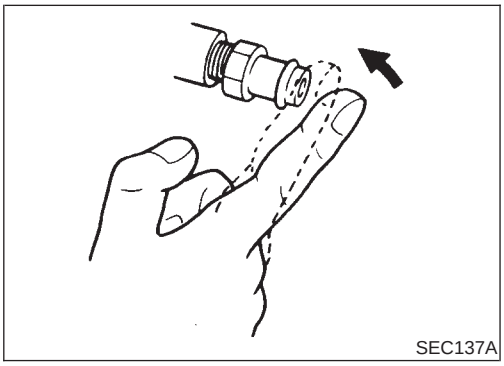


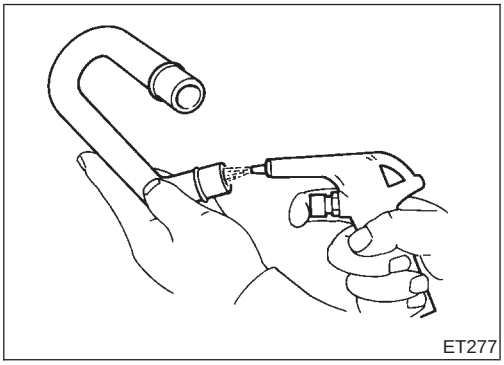
View X

SEF870T









Positive Crankcase Ventilation

DESCRIPTION

NAEC0021

This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

INSPECTION

NAEC0022

PCV (Positive Crankcase Ventilation) Valve

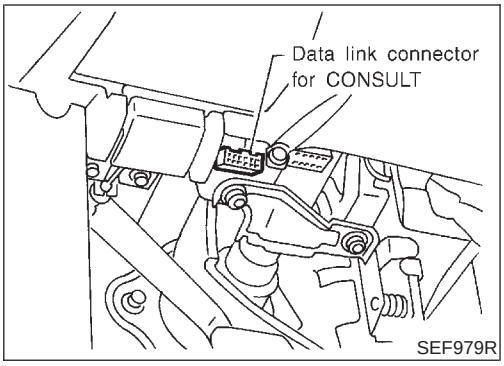
NAEC0022S01

With engine running at idle, remove PCV valve ventilation hose from PCV valve; 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.

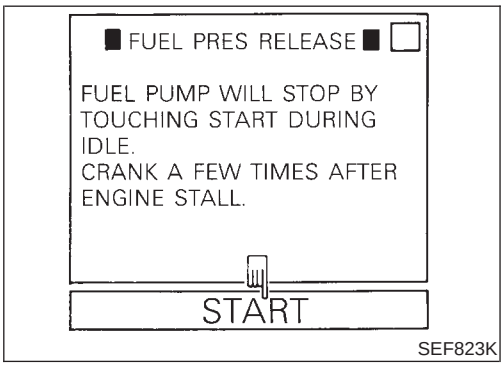
PCV Valve Ventilation Hose

NAEC0022S02

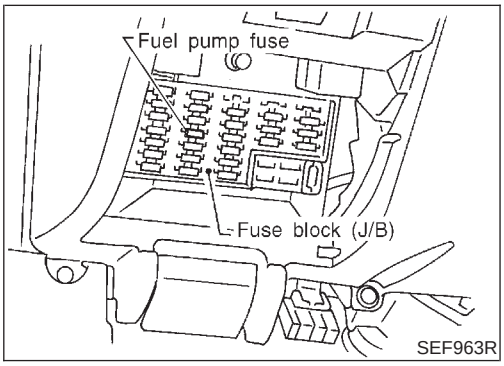
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



SEF979R



SEF823K



SEF963R

Fuel Pressure Release

NAEC0023

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

WITH CONSULT

NAEC0023S01

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”.

WITHOUT CONSULT

NAEC0023S02

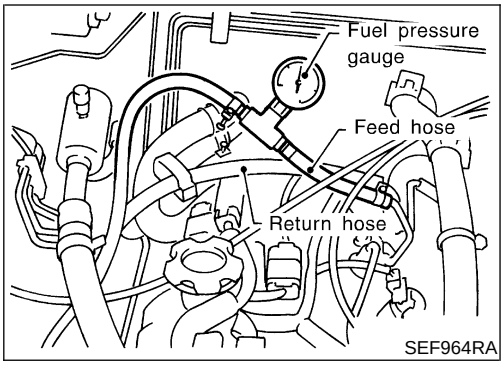
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch “OFF”.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

NAEC0024

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false 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.
5. Read the indication of fuel pressure gauge.

At idling:

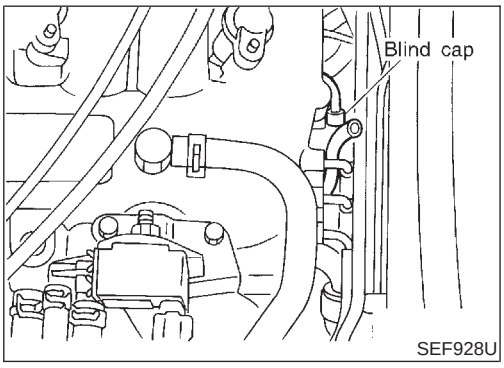
With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

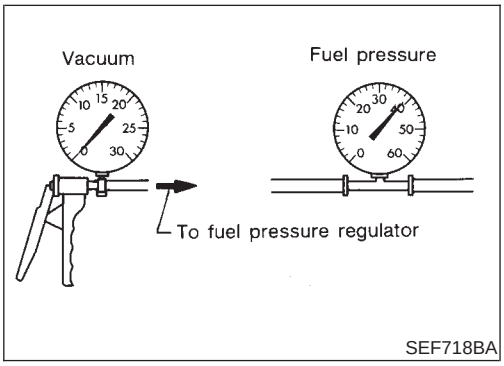
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

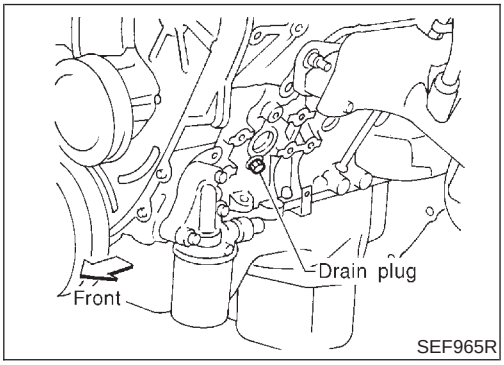
NAEC0387

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. 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

NAEC0025

1. Release fuel pressure to zero. Refer to EC-37.
2. Drain coolant by removing drain plugs from both sides of cylinder block.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine.
   The following parts should be disconnected or removed.

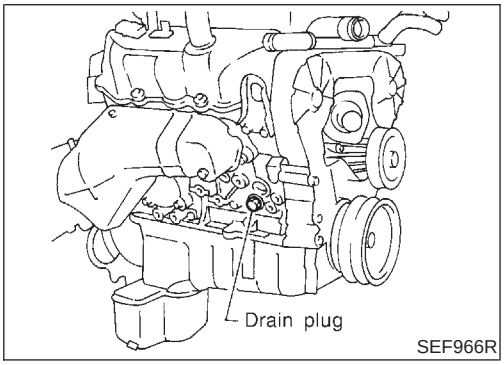
a. Harness connectors for

- IACV-AAC valve
- IACV-FICD solenoid valve
- Throttle position sensor and closed throttle position switch assembly
- EGRC-solenoid valve
- EGR temperature sensor
- Ground harness

b. PCV valve ventilation hoses

c. Vacuum hoses for

- Brake booster
- EGRC-solenoid valve



- Fuel pressure regulator
- EVAP canister
- EGRC-BPT valve

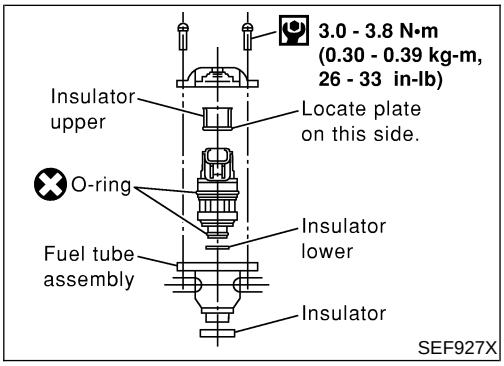
d. Air hoses from
- Air duct
- IACV-AAC valve

e. Water hoses for
- Throttle body
- Air relief plug

f. EVAP canister purge hose

g. EGR flare tube

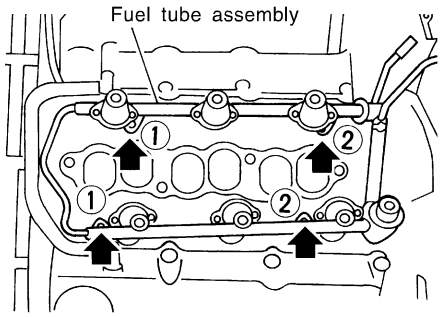
5. Remove injector fuel tube assembly.
   The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**



SEF927X

6. Push out any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.
- **Always replace O-rings with new ones.**
- **Lubricate O-rings with engine oil.**

8. Install injector to injector fuel tube assembly.



SEF867W

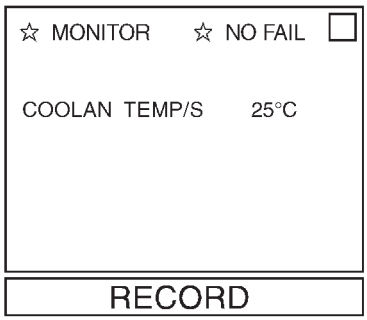
9. Install injectors with fuel tube assembly to intake manifold.
   Tighten in numerical order shown in the figure.

a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg-m, 3.6 to 4.4 ft-lb).

b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg-m, 8 to 11 ft-lb).

10. Reinstall any part removed in reverse order of removal.

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



SEF052R

Fast Idle Cam (FIC)

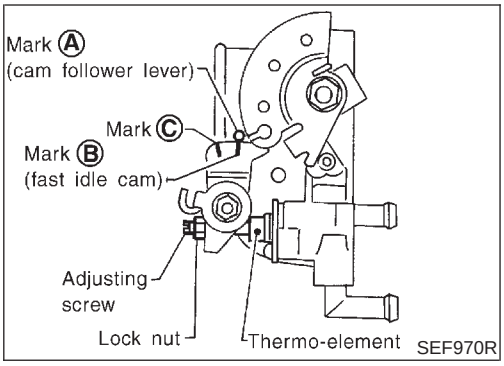
INSPECTION AND ADJUSTMENT

NAEC0026

With CONSULT

NAEC0026S01

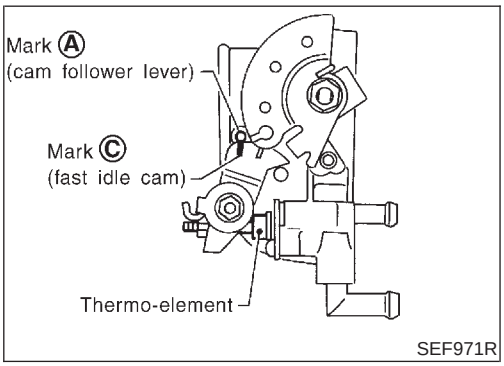
1. Turn ignition switch "ON".
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

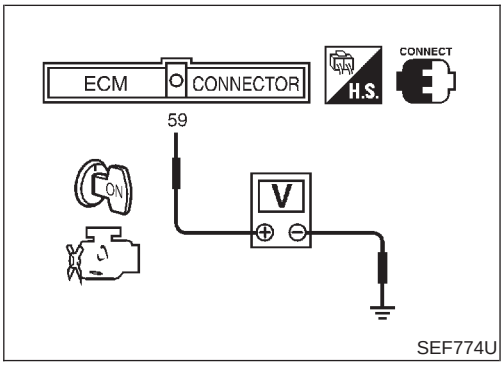
  Lock nut:

  : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

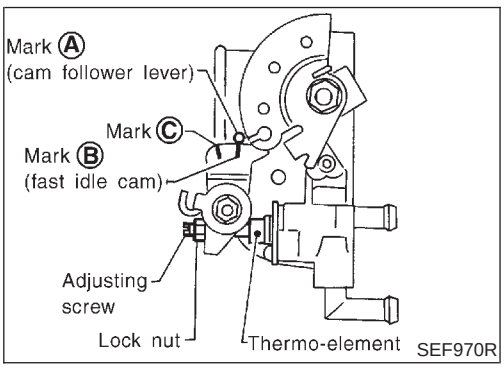
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.



Without CONSULT

NAEC0026S02

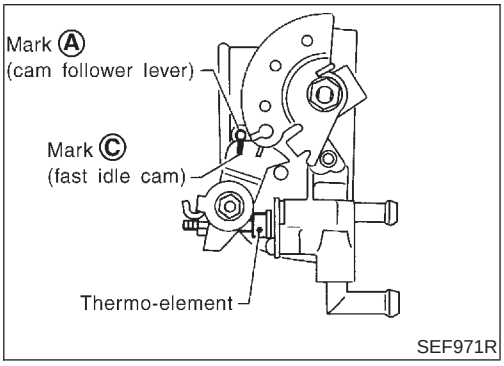
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

  Lock nut:

  : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NAEC0027

NAEC0027S01

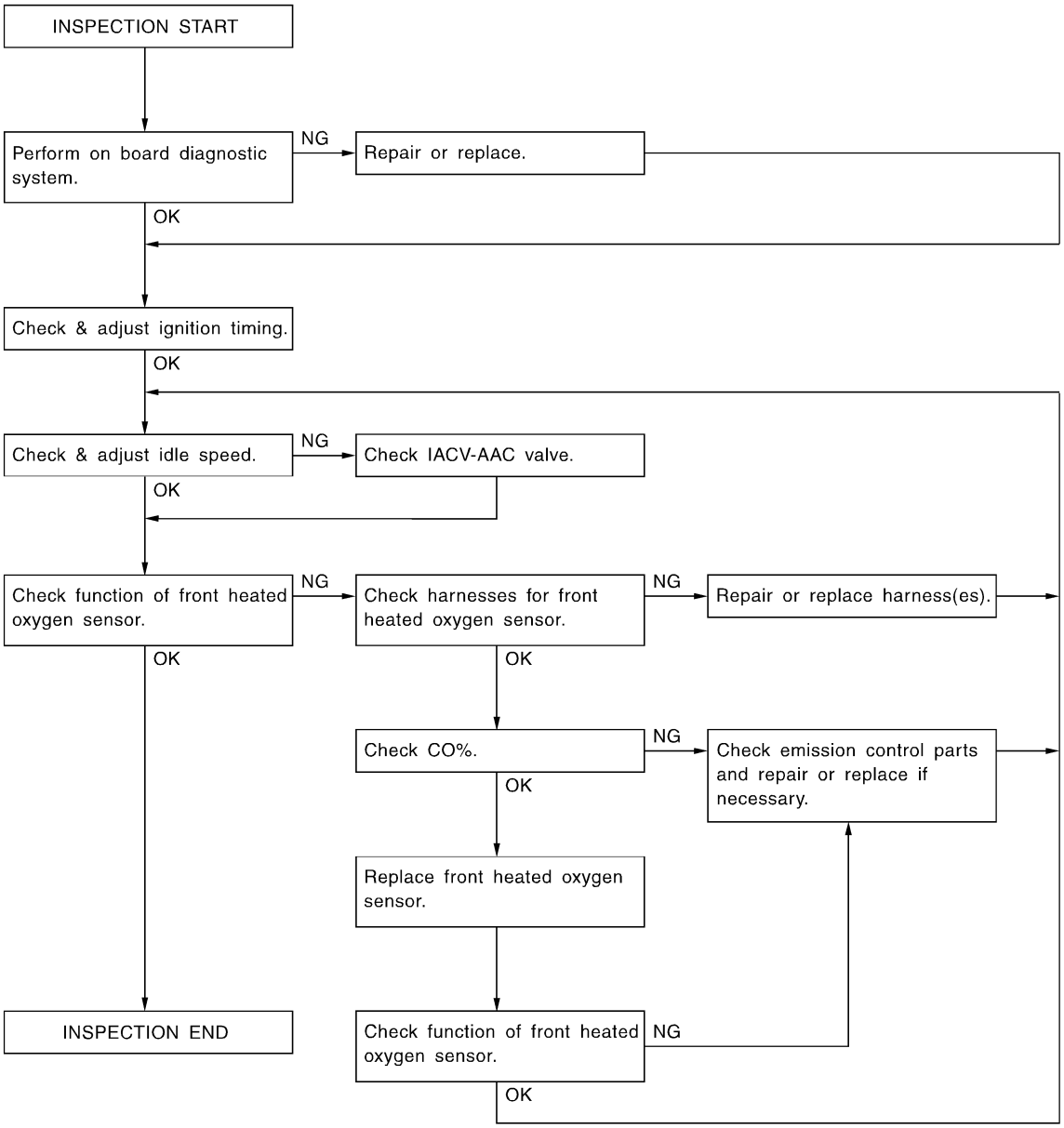
PREPARATION

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

2) On air conditioner equipped models, checks should be carried out while the air conditioner is “OFF”.
3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in “N” position.
4) When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5) Turn off headlamps, heater blower, rear defogger.
6) Keep front wheels pointed straight ahead.
7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NAEC0027S0101



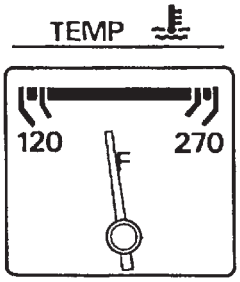
SEF304Y

NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

1	INSPECTION START

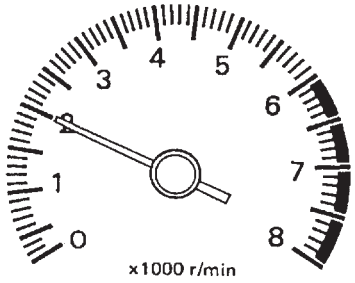
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

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



SEF976U

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



SEF977U

4. Perform diagnostic test mode II (Self-diagnostic results). Refer to EC-72.

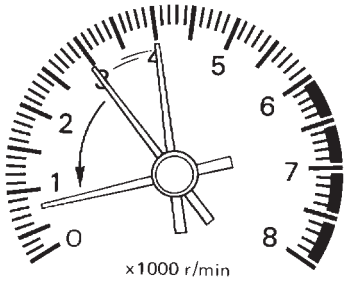
SEF217U

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Repair or replace components as necessary. 2. GO TO 2.

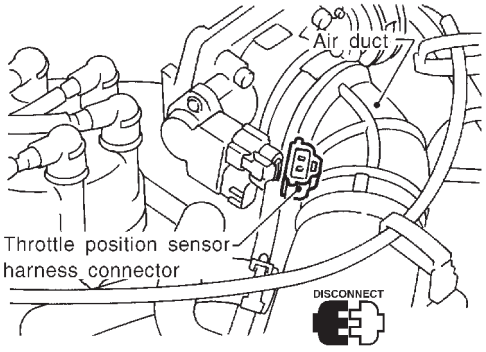
2	CHECK IGNITION TIMING

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 - 3,000 rpm) two or three times under no-load, then run engine at idle speed.



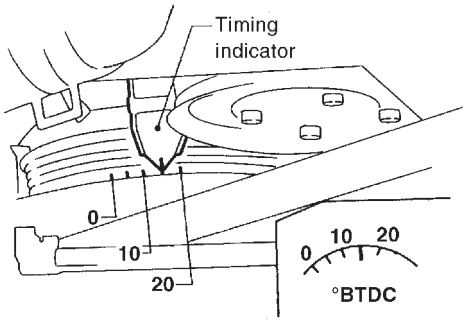
SEF978U

3. Turn off engine and disconnect throttle position sensor harness connector.



SEF975R

4. Start and rev engine (2,000 - 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



SEF371S

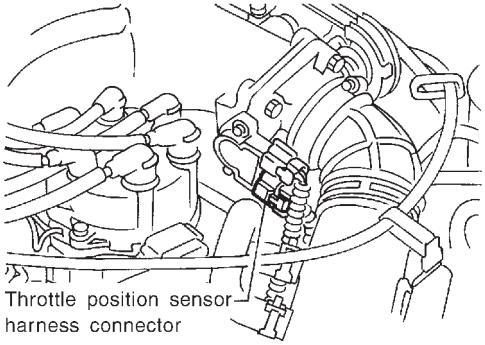
15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



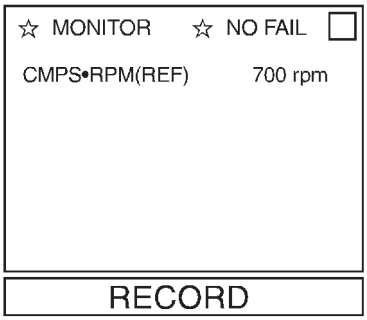
SEF972R

▶ GO TO 2.

4	CHECK BASE IDLE SPEED

With CONSULT

1. Read idle speed in "DATA MONITOR" mode with CONSULT.



SEF356V

700±50 rpm (in "P" or "N" position)

Without CONSULT

1. Check idle speed.

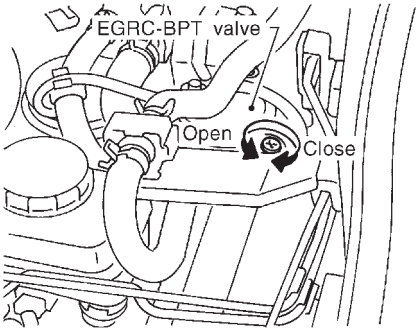
700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED

1. Rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed.
2. Adjust idle speed by turning idle speed adjusting screw.



SEF973R

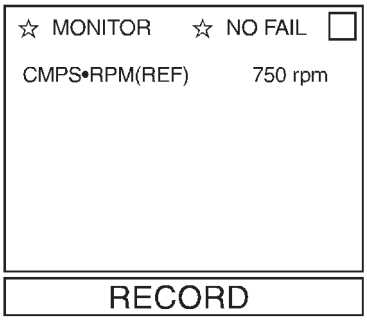
700±50 rpm (in "P" or "N" position)

▶	GO TO 6.

6	CHECK TARGET IDLE SPEED

With CONSULT

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Read idle speed in "DATA MONITOR" mode with CONSULT.



SEF357V

750±50 rpm (in "P" or "N" position)

Without CONSULT

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 - 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Check idle speed.

750±50 rpm (in "P" or "N" position)

OK or NG

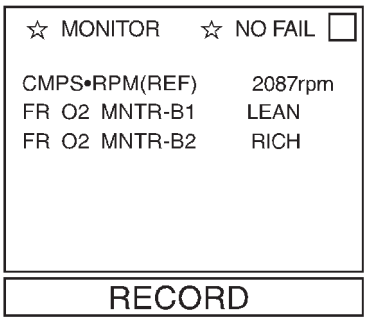
OK (With CONSULT)	▶	GO TO 8.
OK (Without CONSULT)	▶	GO TO 9.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. 1. Check IACV-AAC valve and replace if necessary. Refer to EC-416. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-416. 3. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)	
With CONSULT ▶	GO TO 8.
Without CONSULT ▶	GO TO 9.

8	CHECK FRONT HEATED OXYGEN SENSOR LH SIGNAL

With CONSULT

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.



SEF358V

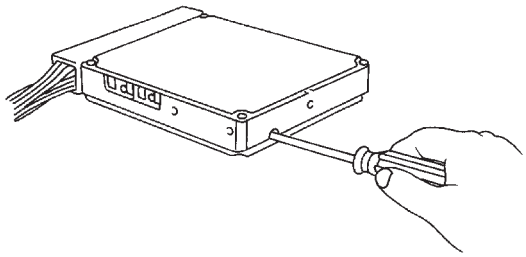
1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK ▶	GO TO 12.
NG (Monitor does not fluctuate.) ▶	GO TO 17.
NG (Monitor fluctuates less than 5 times.) ▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.

9	CHECK FRONT HEATED OXYGEN SENSOR LH SIGNAL

Without CONSULT
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-72.



SEF979U

3. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

SEF217U

OK or NG

OK	▶	GO TO 12.
NG (MIL does not blink.)	▶	GO TO 17.
NG (MIL blinks less than 5 times.)	▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.

10	CHECK FRONT HEATED OXYGEN SENSOR LH SIGNAL

With CONSULT
1. Warm up engine to normal operating temperature.
2. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
3. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
4. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

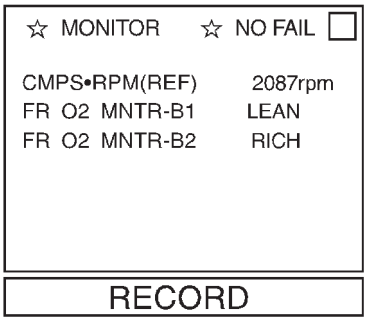
Without CONSULT
1. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-72.
2. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

OK or NG

OK (With CONSULT)	▶	GO TO 12.
OK (Without CONSULT)	▶	GO TO 13.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART
Check the following. 1. Check fuel pressure regulator. Refer to EC-38. 2. Check mass air flow sensor and its circuit. Refer to EC-146. 3. Check injector and its circuit. Refer to EC-553. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-194. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)	
▶	GO TO 2.

12	CHECK FRONT HEATED OXYGEN SENSOR RH SIGNAL
With CONSULT 1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode. 2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.	



SEF358V

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

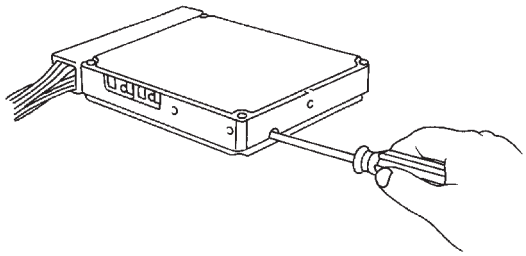
OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 16.
NG (Monitor fluctuates less than 5 times.)	▶	1. Replace front heated oxygen sensor RH. 2. GO TO 14.

13	CHECK FRONT HEATED OXYGEN SENSOR RH SIGNAL

Without CONSULT

1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-72.



SEF979U

2. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

SEF217U

OK or NG

OK	▶	**INSPECTION END**
NG (MIL does not blink.)	▶	GO TO 16.
NG (MIL blinks less than 5 times.)	▶	1. Replace front heated oxygen sensor RH. 2. GO TO 14.

14	CHECK FRONT HEATED OXYGEN SENSOR RH SIGNAL

With CONSULT

1. Warm up engine to normal operating temperature.
2. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
3. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
4. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

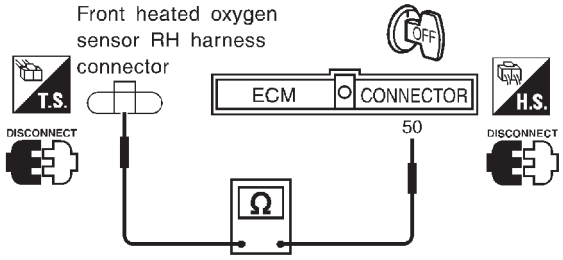
Without CONSULT

1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-72.
2. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

OK or NG

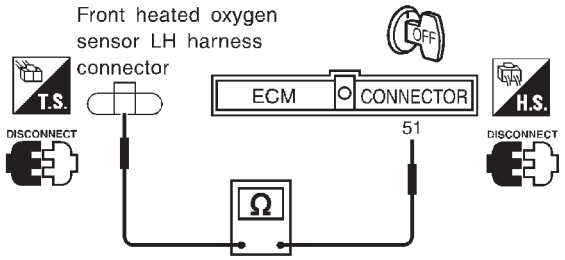
OK	▶	**INSPECTION END**
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART
Check the following. 1. Check fuel pressure regulator. Refer to EC-38. 2. Check mass air flow sensor and its circuit. Refer to EC-146. 3. Check injector and its circuit. Refer to EC-553. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-194. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)	
▶	GO TO 2.

16	CHECK FRONT HEATED OXYGEN SENSOR RH HARNESS
1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect front heated oxygen sensor RH harness connector. 4. Check harness continuity between ECM terminal 50 and front heated oxygen sensor RH harness connector.  SEF980U **Continuity should exist.**	
OK or NG	
OK ▶	1. Connect ECM harness connector. 2. GO TO 18.
NG ▶	1. Repair or replace harness. 2. GO TO 8. (With CONSULT) GO TO 9. (Without CONSULT)

17	CHECK FRONT HEATED OXYGEN SENSOR LH HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect front heated oxygen sensor LH harness connector.
4. Check harness continuity between ECM terminal 51 and front heated oxygen sensor LH harness connector.



SEF981U

Continuity should exist.

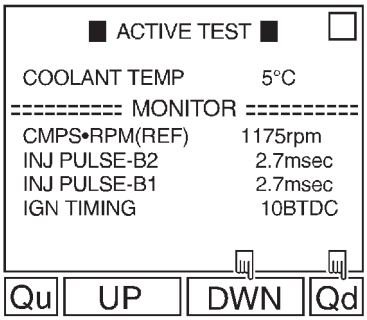
OK or NG

OK	▶	1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	1. Repair or replace harness. 2. GO TO 8. (With CONSULT) GO TO 9. (Without CONSULT)

18	PREPARATION FOR "CO" % CHECK

With CONSULT

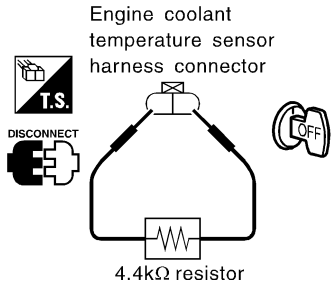
1. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".



SEF359V

Without CONSULT

1. Disconnect engine coolant temperature sensor harness connector.
2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.

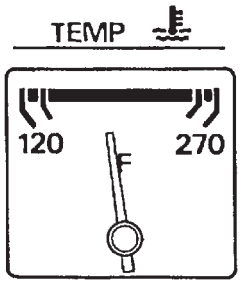


SEF982UA

	▶	GO TO 19.

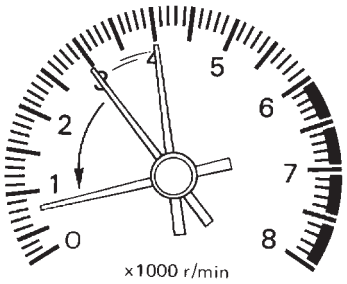
19	CHECK "CO" %

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



SEF976U

2. Rev engine (2,000 - 3,000 rpm) two or three times under no-load, then run engine at idle speed.



SEF978U

3. Check "CO" %.
   Idle CO: 1.5 - 9.5%
4. (Ⓧ) **Without CONSULT**
   After checking CO%,

a. Disconnect the resistor from terminals of engine coolant temperature sensor.
b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK	▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
1. Connect front heated oxygen sensor harness connectors to front heated oxygen sensor.
2. Check fuel pressure regulator. Refer to EC-38.
3. Check mass air flow sensor and its circuit. Refer to EC-146.
4. Check injector and its circuit. Refer to EC-553.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-194.
6. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 2.

Introduction

NAEC0028

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

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

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

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
Diagnostic test mode II (Self-diagnostic results)	X	X*1	—	—	—	—
CONSULT	X	X	X	X	X	—
GST	X	X*2	X	—	X	X

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-117.)

Two Trip Detection Logic

NAEC0029

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not Exit

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 — 0608) is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 — 0608) is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148 (0307), P1168 (0308)	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-117.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except "ECM"

Emission-related Diagnostic Information

NAEC0030

DTC AND 1ST TRIP DTC

NAEC0030S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-68.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-66. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-97. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NAEC0030S0101

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

1) (NO TOOLS) **No Tools**
   The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
   These DTCs are controlled by NISSAN.

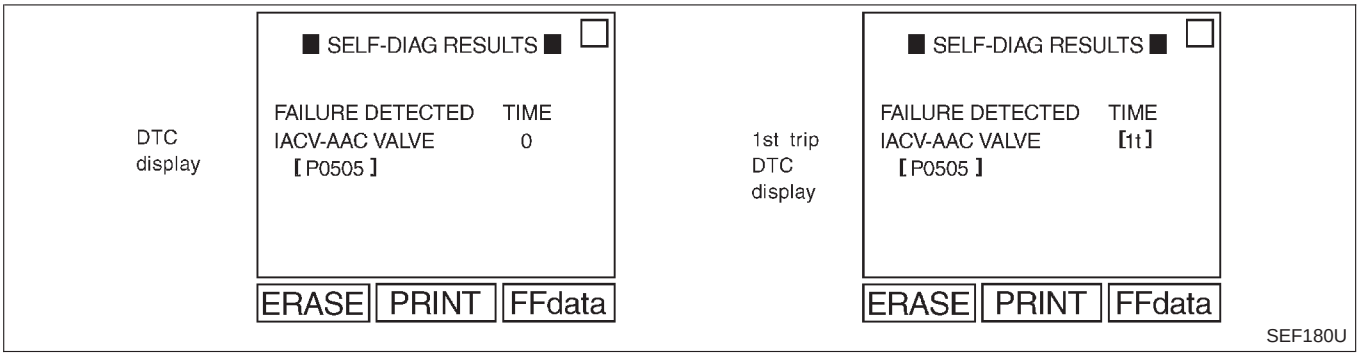
2) **With CONSULT**
   With GST
   CONSULT or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
   These DTCs are prescribed by SAE J2012.
   (CONSULT also displays the malfunctioning component or system.)

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

A sample of CONSULT display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

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

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



FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NAEC0030S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For details, see EC-83.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 (0701, 0603 - 0608) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114), P0174 (0210), P0175 (0209)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-68.

SYSTEM READINESS TEST (SRT) CODE

NAEC0030S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

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

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

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

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

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

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

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

SRT Item

=NAEC0030S0307

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

SRT item (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	—	EVAP control system (small leak) (positive pressure)	P1440*1
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Front heated oxygen sensor (circuit)	P0130, P0150
		Front heated oxygen sensor (lean shift monitoring)	P0131, P0151
		Front heated oxygen sensor (rich shift monitoring)	P0132, P0152
		Front heated oxygen sensor (response monitoring)	P0133, P0153
		Front heated oxygen sensor (high voltage)	P0134, P0154
		Rear heated oxygen sensor (min. voltage monitoring)	P0137, P0157
		Rear heated oxygen sensor (max. voltage monitoring)	P0138, P0158
		Rear heated oxygen sensor (response monitoring)	P0139, P0159
		Rear heated oxygen sensor (high voltage)	P0140, P0160
O2 SEN HEATER	3	Front heated oxygen sensor heater	P0135, P0155
		Rear heated oxygen sensor heater	P0141, P0161
EGR SYSTEM	3	EGR function (close)	P0400
		EGRC-BPT valve function	P0402
	1	EGR function (open)	P1402

*1: P1440 [EVAP control system (small leak) (positive pressure) diagnosis] is one type of SRT related diagnosis. This diagnosis, however, does not contribute to setting the SRT as "CMPLT", when no malfunction exists in the EVAP system. Therefore, P0440 must be used instead of P1440.

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

SRT Set Timing

=NAEC0030S0308

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

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

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) for the following reasons:

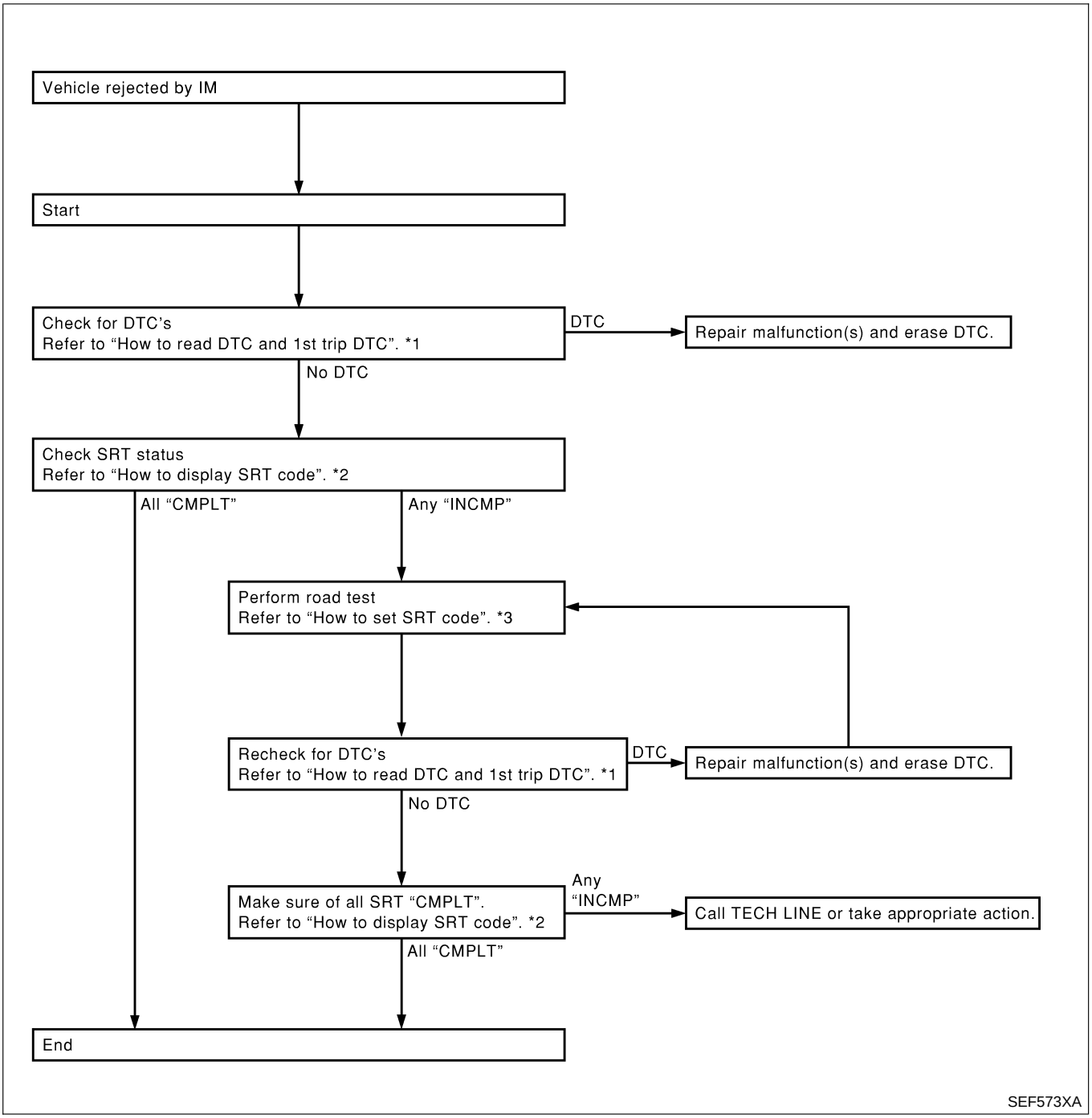
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory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

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

SRT Service Procedure

NAEC0030S0309

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



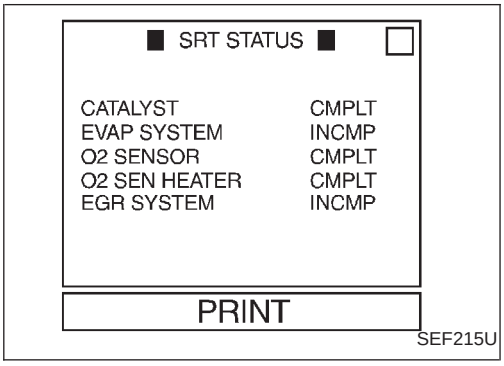
*1 EC-55 *2 EC-60 *3 EC-61

How to Display SRT Code

NAEC0030S0301

1. **With CONSULT**
   Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT.
   For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
2. **With GST**
   Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT display for SRT code is shown on next page.
"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.



How to Set SRT Code

NAEC0030S0302

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-58.

Without CONSULT

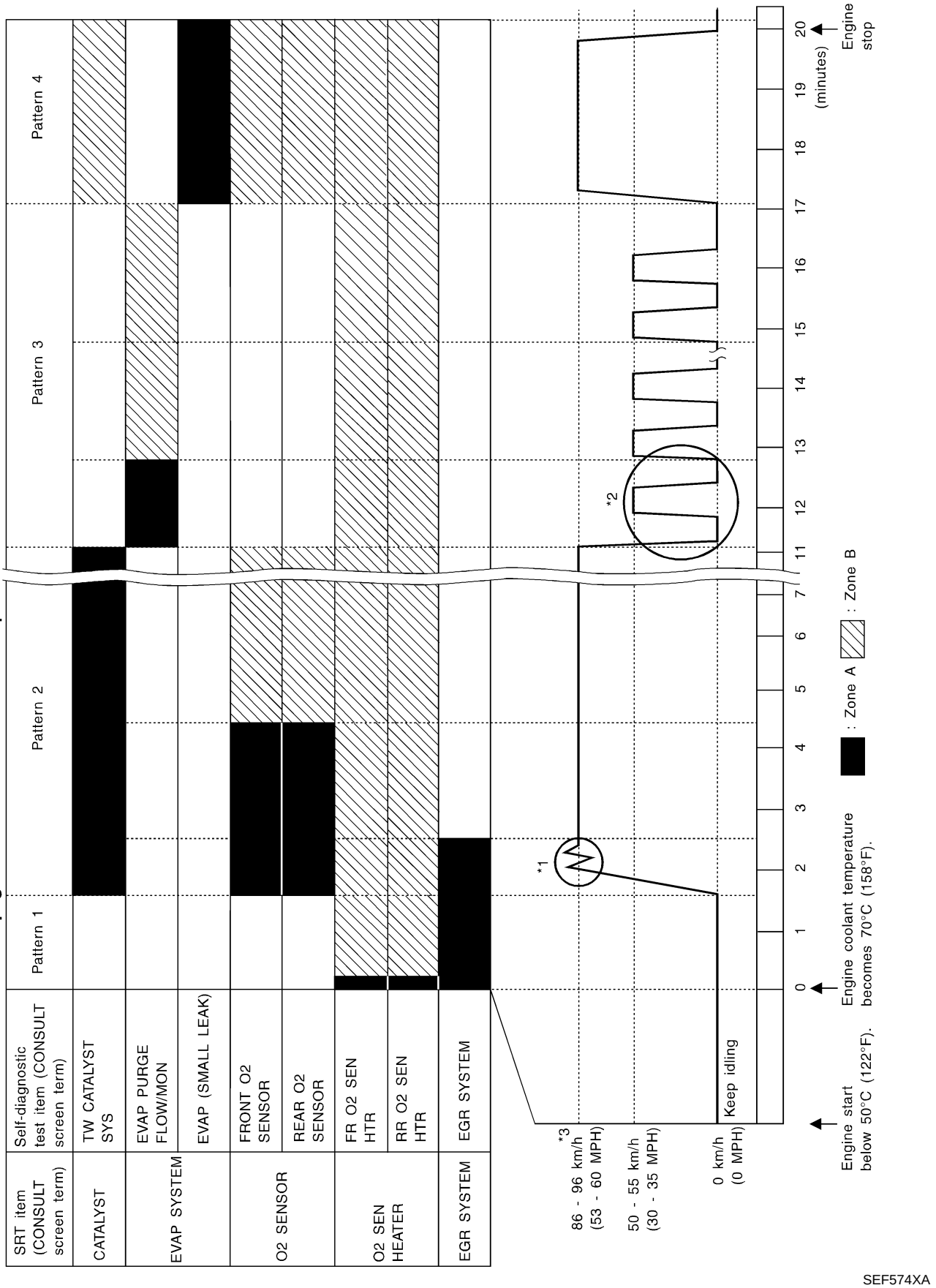
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NAEC0030S0303

Driving pattern

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.
Refer to next page for more information and explanation of chart.



SEF574XA

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

− Sea level
− Flat road
− Ambient air temperature: 20 - 30°C (68 - 86°F)
− Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals 59 and 43 is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals 59 and 43 is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.
  On M/T models, shift gears following "suggested upshift speeds" schedule below.

Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

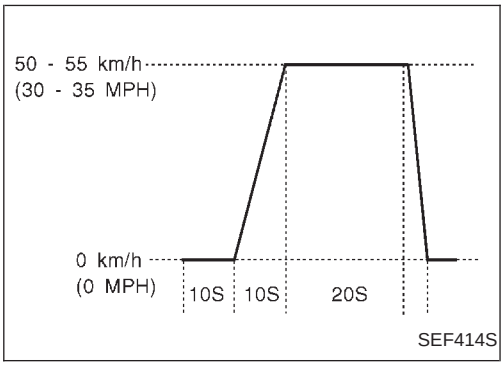
*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2) Repeat driving pattern shown below at least 10 times.

- **During acceleration, hold the accelerator pedal as steady as possible.**

3) Repeat steps 1 and 2 until the EGR system SRT is set.



*3: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

NAEC0030S0304

Set the selector lever in the "D" position with the overdrive switch turned ON.

Suggested upshift speeds for M/T models

NAEC0030S0306

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

Suggested Maximum Speed in Each Gear

NAEC0030S0305

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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

NAEC0030S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Front heated oxygen sensor (Right bank)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Front heated oxygen sensor (Left bank)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Rear heated oxygen sensor (Right bank)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Rear heated oxygen sensor (Left bank)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
O2 SENSOR HEATER	Front heated oxygen sensor heater (Right bank)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Front heated oxygen sensor heater (Left bank)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Rear heated oxygen sensor heater (Right bank)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Rear heated oxygen sensor heater (Left bank)	2FH	0BH	Max.	X
		30H	8BH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NAEC0030S05

X: Applicable —: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MAF SEN/CIRCUIT	P0100	0102	—	—	X	EC-146
ABSL PRES SEN/CIRC	P0105	0803	—	—	X	EC-156
AIR TEMP SEN/CIRC	P0110	0401	—	—	X	EC-168
COOLANT T SEN/CIRC	P0115	0103	—	—	X	EC-175
THRTL POS SEN/CIRC	P0120	0403	—	—	X	EC-181
*COOLAN T SEN/CIRC	P0125	0908	—	—	X	EC-194
FRONT O2 SENSOR-B1	P0130	0503	X	X	X*3	EC-200
FRONT O2 SENSOR-B1	P0131	0415	X	X	X*3	EC-209
FRONT O2 SENSOR-B1	P0132	0414	X	X	X*3	EC-216
FRONT O2 SENSOR-B1	P0133	0413	X	X	X*3	EC-224
FRONT O2 SENSOR-B1	P0134	0509	X	X	X*3	EC-235
FR O2 SE HEATER-B1	P0135	0901	X	X	X*3	EC-244
REAR O2 SENSOR-B1	P0137	0511	X	X	X*3	EC-251
REAR O2 SENSOR-B1	P0138	0510	X	X	X*3	EC-261
REAR O2 SENSOR-B1	P0139	0707	X	X	X*3	EC-271
REAR O2 SENSOR-B1	P0140	0512	X	X	X*3	EC-281
RR O2 SE HEATER-B1	P0141	0902	X	X	X*3	EC-290
FRONT O2 SENSOR-B2	P0150	0303	X	X	X*3	EC-200
FRONT O2 SENSOR-B2	P0151	0411	X	X	X*3	EC-209
FRONT O2 SENSOR-B2	P0152	0410	X	X	X*3	EC-216
FRONT O2 SENSOR-B2	P0153	0409	X	X	X*3	EC-224
FRONT O2 SENSOR-B2	P0154	0412	X	X	X*3	EC-235
FR O2 SE HEATER-B2	P0155	1001	X	X	X*3	EC-244
REAR O2 SENSOR-B2	P0157	0314	X	X	X*3	EC-251
REAR O2 SENSOR-B2	P0158	0313	X	X	X*3	EC-261
REAR O2 SENSOR-B2	P0159	0708	X	X	X*3	EC-271
REAR O2 SENSOR-B2	P0160	0315	X	X	X*3	EC-281
RR O2 SE HEATER-B2	P0161	1002	X	X	X*3	EC-290
FUEL SYS LEAN/BK1	P0171	0115	—	—	X	EC-297
FUEL SYS RICH/BK1	P0172	0114	—	—	X	EC-306
FUEL SYS LEAN/BK2	P0174	0210	—	—	X	EC-297
FUEL SYS RICH/BK2	P0175	0209	—	—	X	EC-306
FUEL TEMP SEN/CIRC	P0180	0402	—	—	X	EC-314

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-320
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-320
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-320
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-320
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-320
CYL 5 MISFIRE	P0305	0604	—	—	X	EC-320
CYL 6 MISFIRE	P0306	0603	—	—	X	EC-320
KNOCK SEN/CIRC	P0325	0304	—	—	—	EC-327
CPS/CIRCUIT (OBD)	P0335	0802	—	—	X	EC-333
CAM POS SEN/CIRC	P0340	0101	—	—	X	EC-339
EGR SYSTEM	P0400	0302	X	X	X*3	EC-347
EGRC-BPT VALVE	P0402	0306	X	X	X*3	EC-358
TW CATALYST SYS-B1	P0420	0702	X	X	X*3	EC-363
TW CATALYST SYS-B2	P0430	0703	X	X	X*3	EC-363
EVAP SMALL LEAK	P0440	0705	X	X	X*3	EC-367
PURG VOLUME CONT/V	P0443	1008	—	—	X	EC-377
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-384
EVAPO SYS PRES SEN	P0450	0704	—	—	X	EC-391
VEH SPEED SEN/CIRC	P0500	0104	—	—	X	EC-411
IACV/AAC VLV/CIRC	P0505	0205	—	—	X	EC-416
CLOSED TP SW/CIRC	P0510	0203	—	—	X	EC-424
A/T COMM LINE	P0600	—	—	—	—	EC-431
ECM	P0605	0301	—	—	X	EC-436
PNP SW/CIRC	P0705	1101	—	—	X	AT-99
ATF TEMP SEN/CIRC	P0710	1208	—	—	X	AT-105
VEH SPD SEN/CIR AT	P0720	1102	—	—	X	AT-110
ENGINE SPEED SIG	P0725	1207	—	—	X	AT-115
A/T 1ST GR FNCTN	P0731	1103	—	—	X	AT-120
A/T 2ND GR FNCTN	P0732	1104	—	—	X	AT-126
A/T 3RD GR FNCTN	P0733	1105	—	—	X	AT-132
A/T 4TH GR FNCTN	P0734	1106	—	—	X	AT-138
TCC SOLENOID/CIRC	P0740	1204	—	—	X	AT-148
A/T TCC S/V FNCTN	P0744	1107	—	—	X	AT-153
L/PRESS SOL/CIRC	P0745	1205	—	—	X	AT-162
SFT SOL A/CIRC	P0750	1108	—	—	X	AT-169
SFT SOL B/CIRC	P0755	1201	—	—	X	AT-174

Items (CONSULT screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT GST*2	ECM*1				
EVAP GROSS LEAK	P0455	0715	—	X	X*3	EC-401
MAP/BARO SW SOL/CIR	P1105	1302	—	—	X	EC-438
CLOSED LOOP-B1	P1148	0307	—	—	X	EC-452
CLOSED LOOP-B2	P1168	0308	—	—	X	EC-452
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-454
CPS/CIRC (OBD) COG	P1336	0905	—	—	X	EC-461
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-467
EGR TEMP SEN/CIRC	P1401	0305	—	—	X	EC-472
EGR SYSTEM	P1402	0514	X	X	X*3	EC-478
EVAP SMALL LEAK	P1440	0213	X	X	X*3	EC-486
PURG VOLUME CONT/V	P1444	0214	—	—	X	EC-496
VENT CONTROL VALVE	P1446	0215	—	—	X	EC-504
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-510
VENT CONTROL VALVE	P1448	0309	—	—	X	EC-518
VC/V BYPASS/V	P1490	0801	—	—	X	EC-525
VC CUT/V BYPASS/V	P1491	0311	—	—	X	EC-532
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-540
TP SEN/CIRC A/T	P1705	1206	—	—	X	AT-179
P-N POS SW/CIRCUIT	P1706	1003	—	—	X	EC-545
O/R CLTCH SOL/CIRC	P1760	1203	—	—	X	AT-188

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: These are not displayed with GST.
*4: 1st trip DTC No. is the same as DTC No.

NOTE:
Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NAEC0030S06

How to Erase DTC (With CONSULT)

NAEC0030S0601

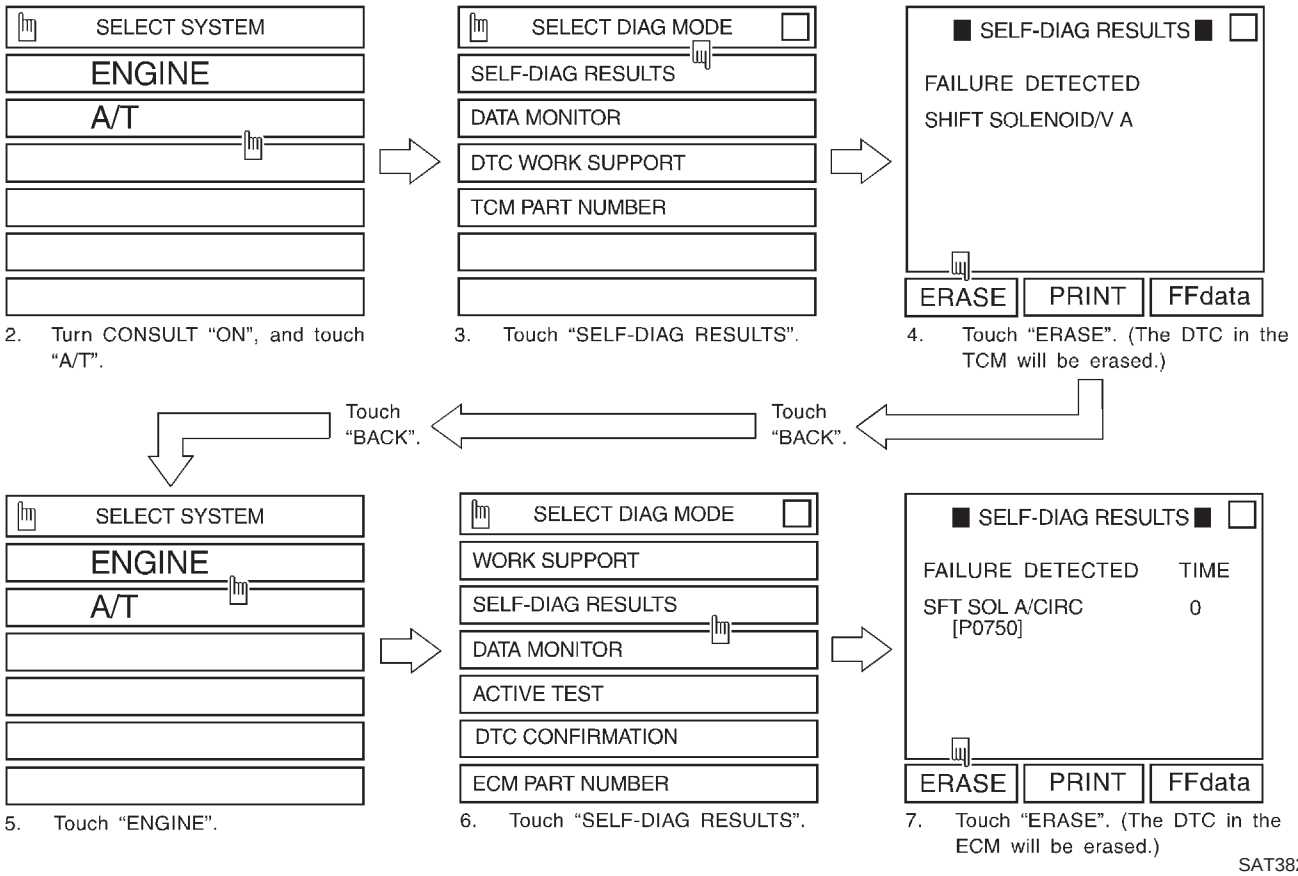
NOTE:
If the DTC is not for A/T related items (see EC-8), skip steps 2 through 4.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

How to erase DTC (With CONSULT)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



SAT382J

The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT.

How to Erase DTC (GST With GST)

NAEC0030S0602

NOTE:
If the DTC is not for A/T related items (see EC-8), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

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

How to Erase DTC (NO TOOLS No Tools)

NAEC0030S0603

NOTE:
If the DTC is not for A/T related items (see EC-8), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis".
   (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-72.)

The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM.

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**

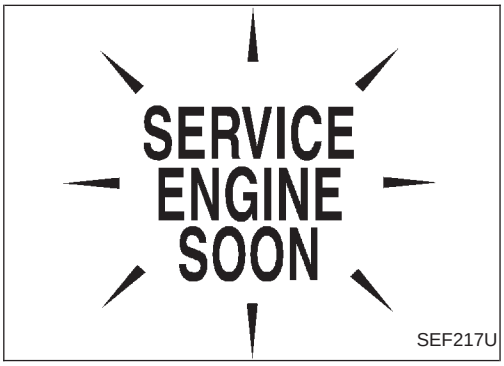
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NAEC0031



The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL section ("WARNING LAMPS") or see EC-587.

2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

=NAEC0031S01

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit and ECM test mode selector. (See EC-72.)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode
Mode II	Ignition switch in "ON" position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	FRONT HEATED OXYGEN SENSOR MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

MIL Flashing without DTC

NAEC0031S0101

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM test mode selector following "How to Switch Diagnostic Test Modes", EC-72.

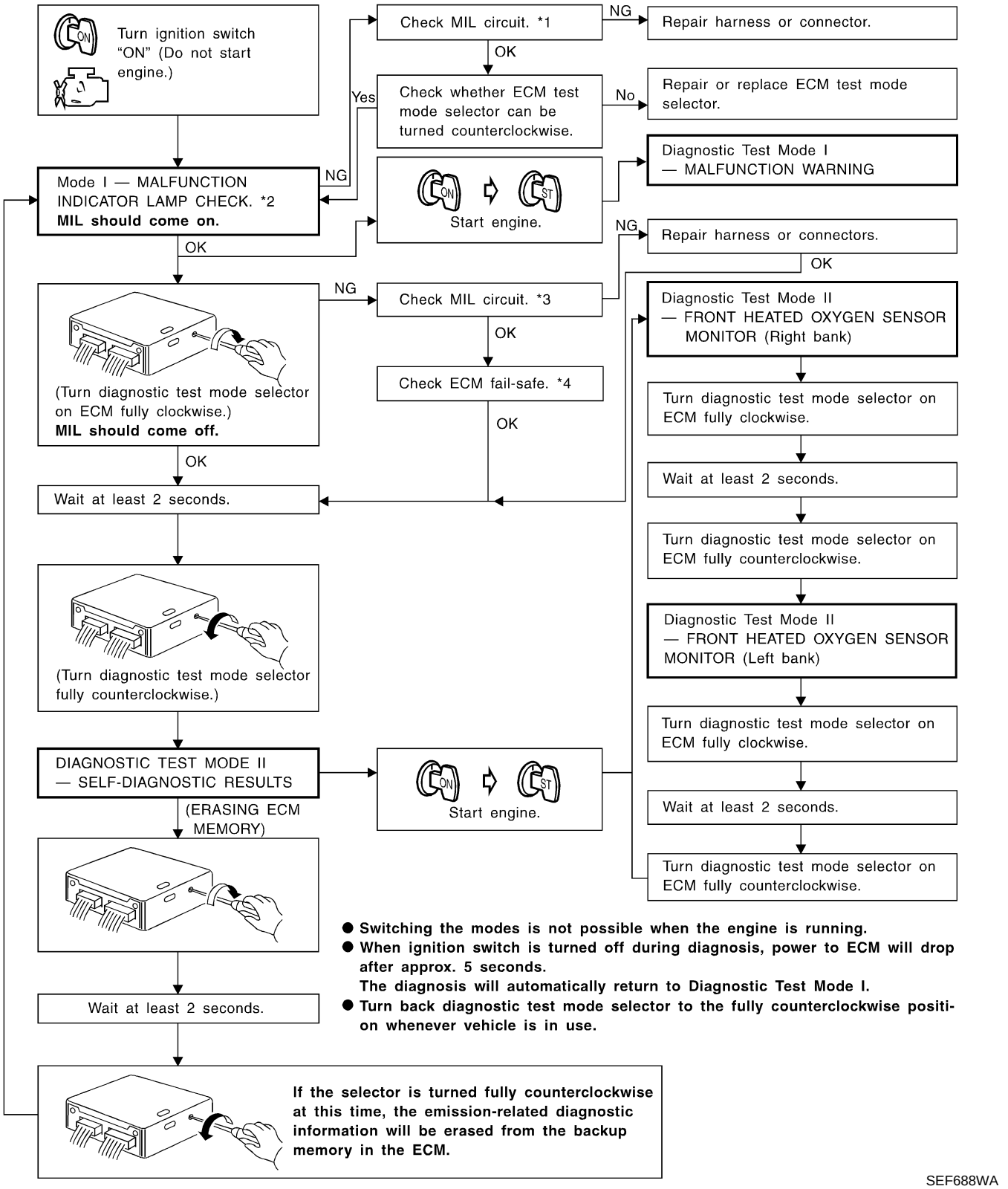
How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-72.)

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

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

How to Switch Diagnostic Test Modes

NAEC0031S02



- **Switching the modes is not possible when the engine is running.**
- **When ignition switch is turned off during diagnosis, power to ECM will drop after approx. 5 seconds.**
  The diagnosis will automatically return to Diagnostic Test Mode I.
- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**

SEF688WA

*1 EC-587
*2 EC-70
*3 EC-587
*4 EC-117

Diagnostic Test Mode I — Bulb Check

NAEC0031S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section ("WARNING LAMPS") or see EC-587.

Diagnostic Test Mode I — Malfunction Warning

NAEC0031S04

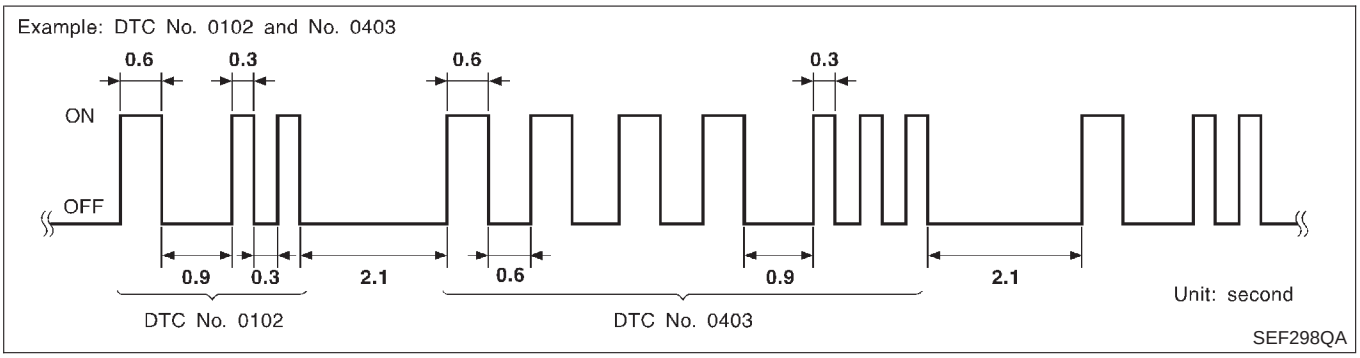
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

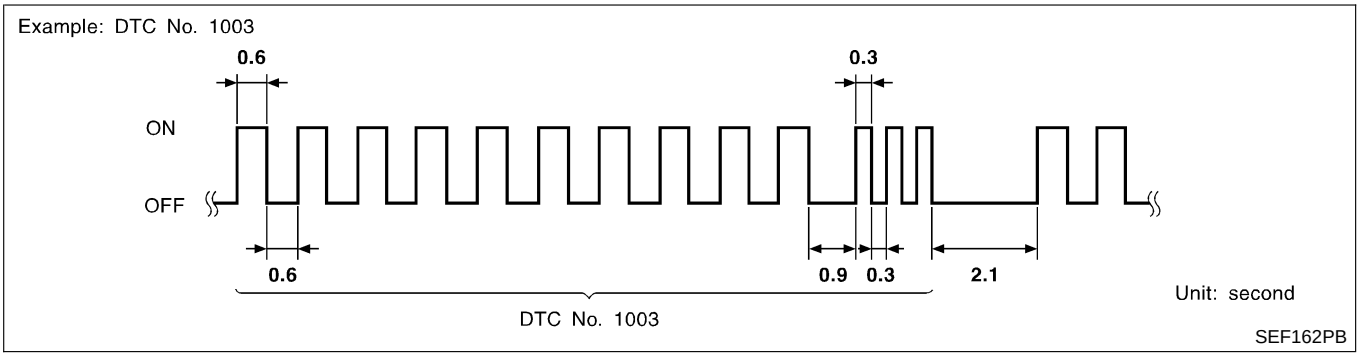
- These DTC Numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).

Diagnostic Test Mode II — Self-diagnostic Results

NAEC0031S05

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTC's. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTC's or 1st trip DTC's. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.





Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the MIL blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position switch.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-8.)

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

NAEC0031S0501

The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "How to Switch Diagnostic Test Modes", EC-72.)

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

Malfunction Indicator Lamp (MIL) (Cont'd)

Diagnostic Test Mode II — Front Heated Oxygen Sensor Monitor

=NAEC0031S06

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the front heated oxygen sensor.

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

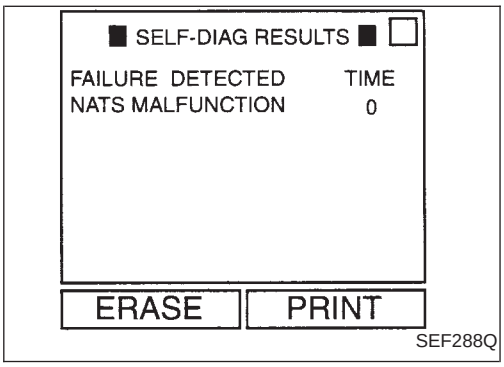
*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

NVIS (Nissan Vehicle Immobilizer System — NATS)

NAEC0031S07

- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT using NATS program card (NATS-E980U). Refer to EL-285, "NVIS (Nissan Vehicle Immobilizer System — NATS").**
- **Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT using NATS program card (NATS-E980U).**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT operation manual, NATS.



OBD System Operation Chart

NAEC0032

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

NAEC0032S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-54.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in "OK" for the 2nd trip.

SUMMARY CHART

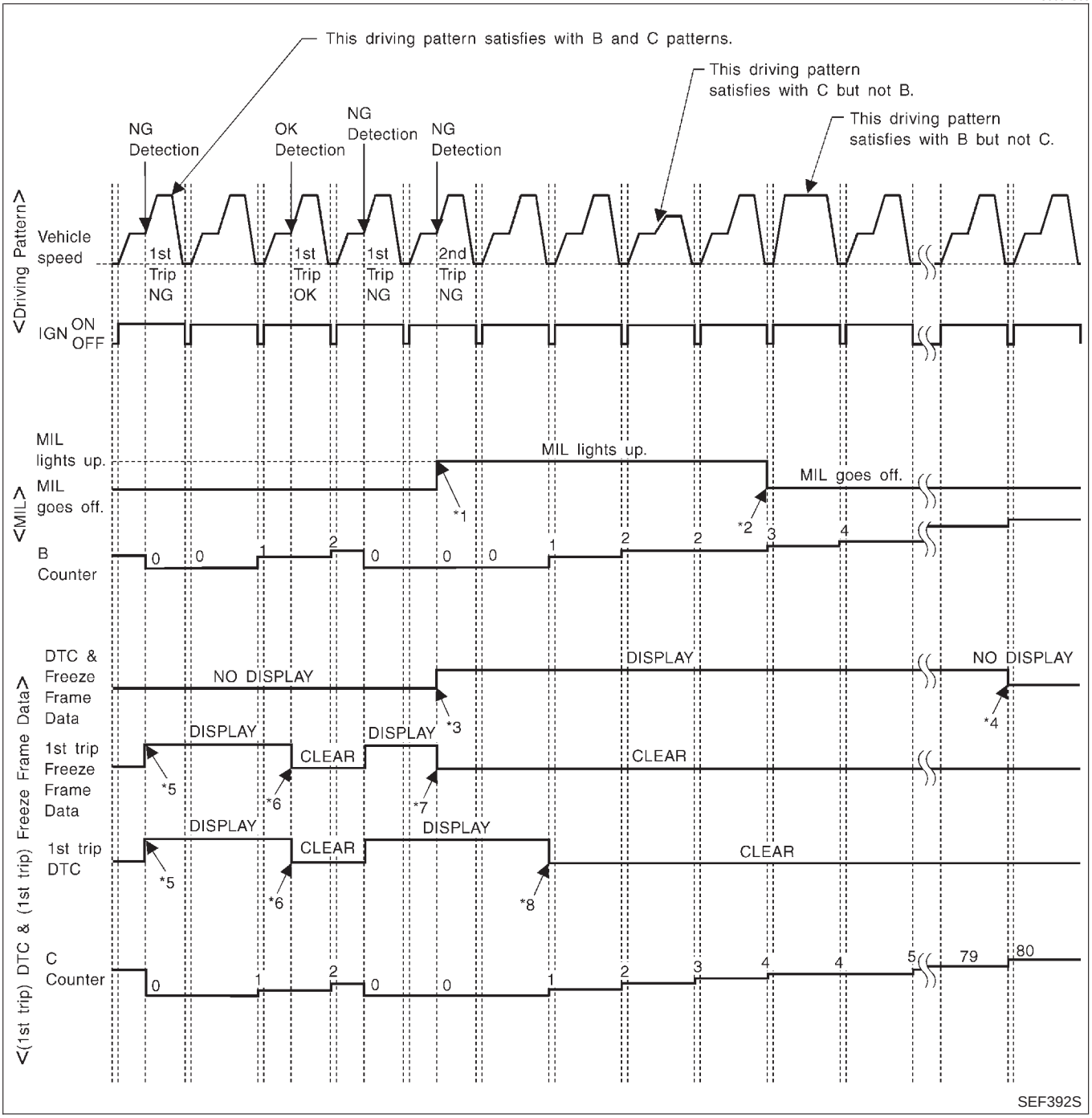
NAEC0032S02

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

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-77.
For details about patterns "A" and "B" under "Other", see EC-79.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE" <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

NAEC0032S03



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

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

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

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

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

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

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

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

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0032S04

<Driving Pattern B>

NAEC0032S0401

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

<Driving Pattern C>

NAEC0032S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
   Engine coolant temperature (T) condition:

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

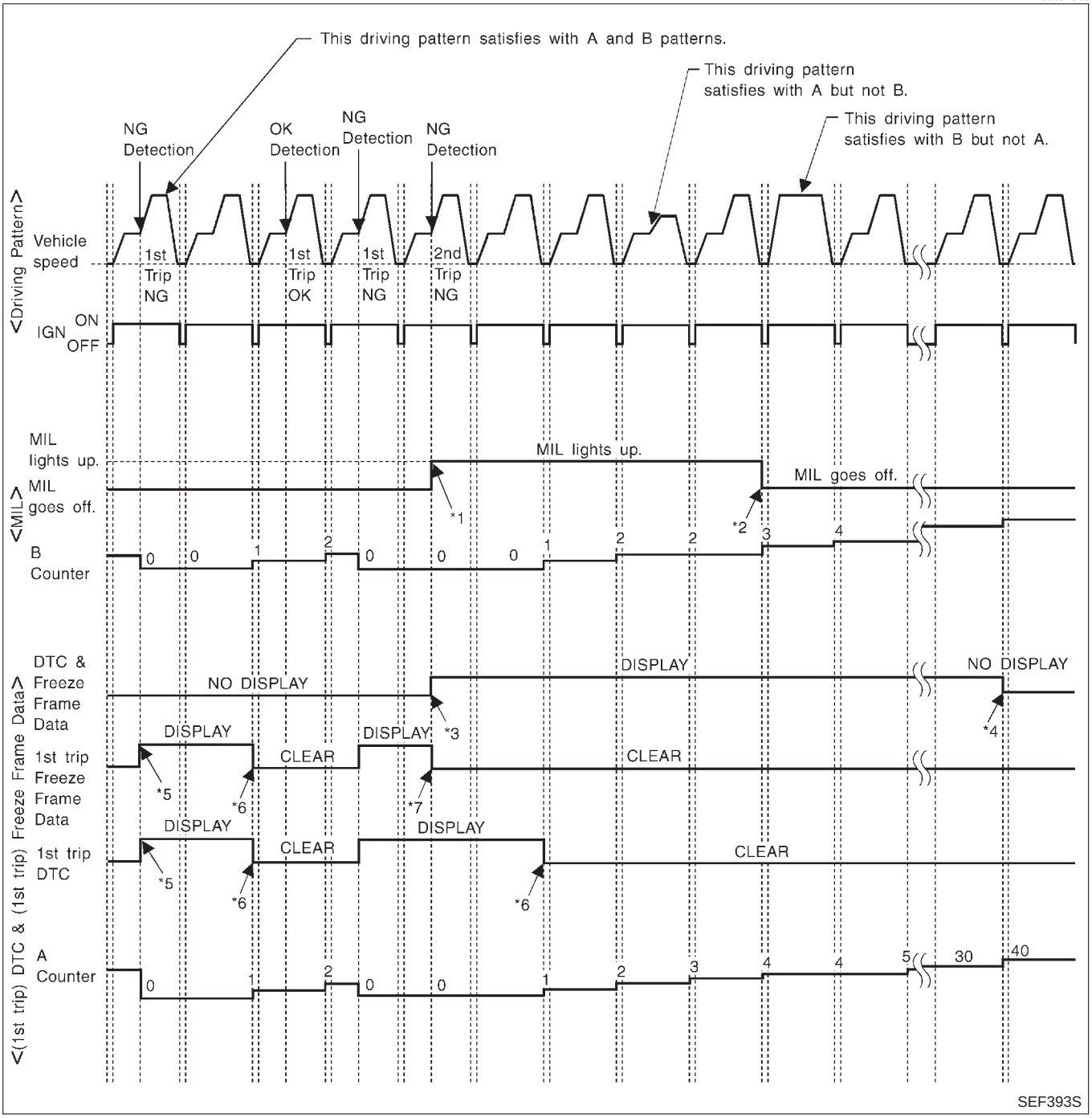
Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 -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

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

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0032S05



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

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

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

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

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

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

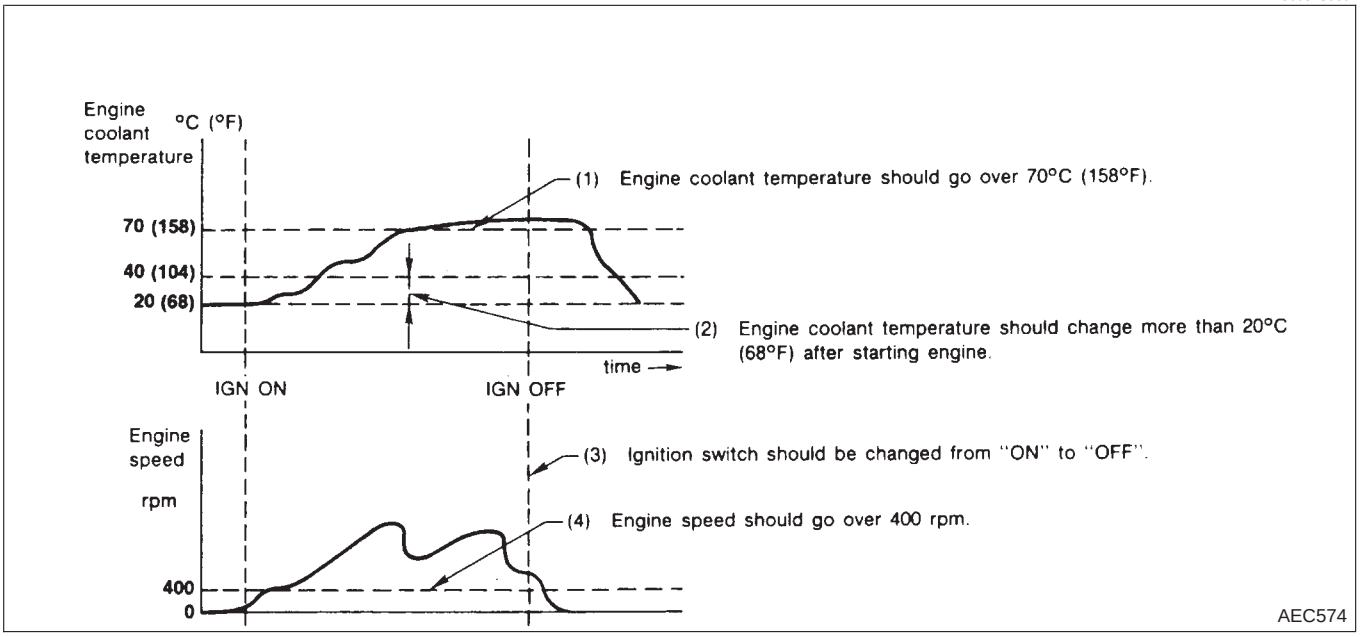
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0032S06

<Driving Pattern A>

NAEC0032S0601



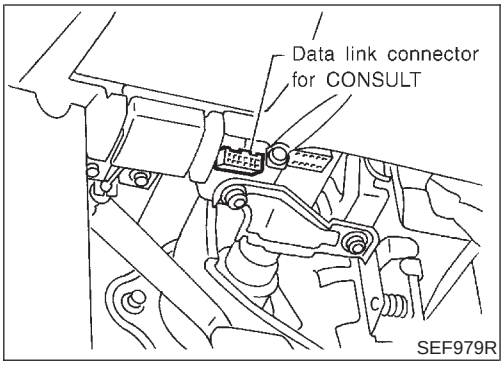
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NAEC0032S0602

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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



SEF979R

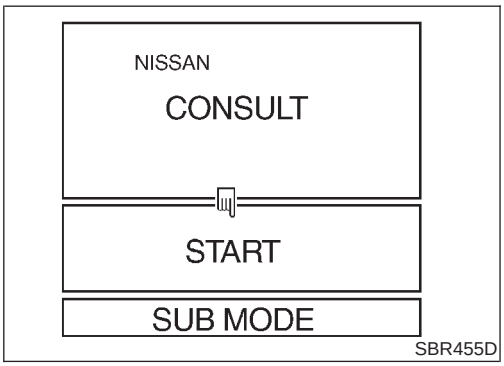
CONSULT

=NAEC0033

CONSULT INSPECTION PROCEDURE

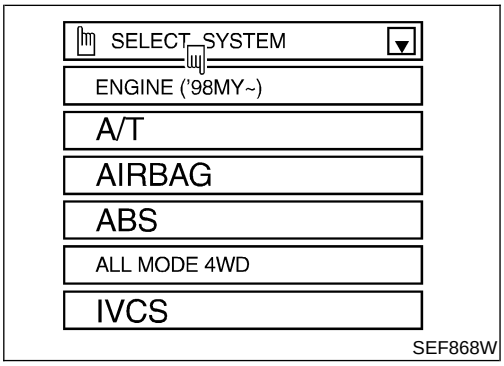
NAEC0033S01

1. Turn off ignition switch.
2. Connect “CONSULT” to data link connector for CONSULT. (Data link connector for CONSULT is located under LH dash panel near the fuse box cover.)



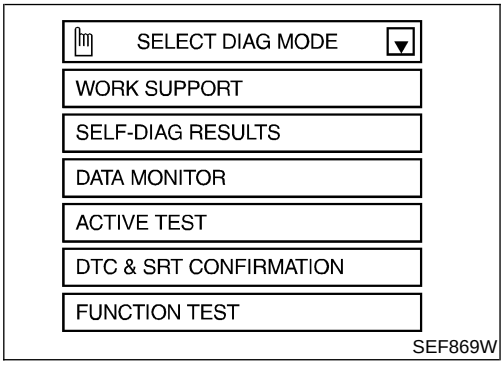
SBR455D

3. Turn on ignition switch.
4. Touch “START”.



SEF868W

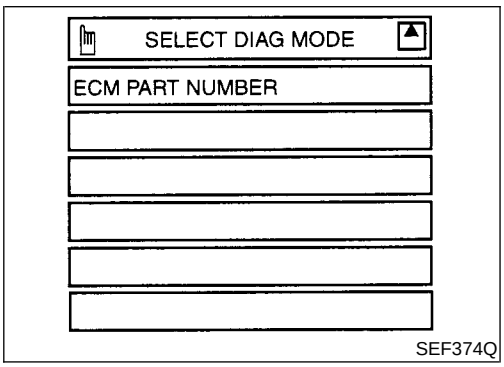
5. Touch “ENGINE”.



SEF869W

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

For further information, see the CONSULT Operation Manual. This sample shows the display when using the UE991 program card. Screen differs in accordance with the program card used.



SEF374Q

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NAEC0033S02

		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	DTC CONFIRMATION		FUNCTION TEST
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT	
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X				
		Mass air flow sensor		X		X				
		Engine coolant temperature sensor		X	X	X	X			
		Front heated oxygen sensor		X		X		X	X	X
		Rear heated oxygen sensor		X		X		X	X	
		Vehicle speed sensor		X	X	X				X
		Throttle position sensor		X		X				X
		Fuel tank temperature sensor		X		X	X			
		EVAP control system pressure sensor		X		X				
		Absolute pressure sensor		X		X				
		EGR temperature sensor		X		X				
		Intake air temperature sensor		X		X				
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Ignition switch (start signal)				X				X
		Closed throttle position switch		X						
		Closed throttle position switch (throttle position sensor signal)				X				X
		Air conditioner switch				X				
		Park/Neutral position (PNP) switch		X		X				X
		Power steering oil pressure switch				X				X
		Air conditioner switch				X				
		Battery voltage				X				
		Ambient air temperature switch				X				

CONSULT (Cont'd)

Item			DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	DTC CONFIRMATION		FUNCTION TEST
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT	
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X			X
		Power transistor (Ignition timing)		X (Ignition signal)		X	X			X
		IACV-AAC valve	X	X		X	X			X
		EVAP canister purge volume control solenoid valve		X		X	X		X	
		Air conditioner relay				X				
		Fuel pump relay	X			X	X			X
		EGRC-solenoid valve		X		X	X			X*3
		Front heated oxygen sensor heater		X		X		X		
		Rear heated oxygen sensor heater		X		X		X		
		EVAP canister vent control valve		X		X	X			
		Vacuum cut valve bypass valve		X		X	X		X	
		MAP/BARO switch solenoid valve		X		X	X			
		Calculated load value			X	X				

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-56.

*3: If this function test mode is not available, use the ACTIVE TEST mode.

CONSULT (Cont'd)

FUNCTION

=NAEC0033S03

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

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

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

WORK SUPPORT MODE

NAEC0033S04

WORK ITEM	CONDITION	USAGE
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting initial ignition timing and idle speed
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" ● WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system

SELF-DIAGNOSTIC MODE

NAEC0033S05

DTC and 1st Trip DTC

NAEC0033S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX". (See EC-8.)

CONSULT (Cont'd)

Freeze Frame Data and 1st Trip Freeze Frame Data

NAEC0033S0502

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	• ECCS component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-8.)
FUEL SYS-B1*2	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2*2	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	• The absolute pressure at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding R50 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR MODE

=NAEC0033S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS·RPM (REF) [rpm]	○	○	• Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 SEN-B2 [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
FR O2 SEN-B1 [V]	○			
RR O2 SEN-B1 [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
RR O2 SEN-B2 [V]	○			
FR O2 MNTR-B2 [RICH/LEAN]	○	○	• Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
FR O2 MNTR-B1 [RICH/LEAN]	○	○		
RR O2 MNTR-B1 [RICH/LEAN]	○		• Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
RR O2 MNTR-B2 [RICH/LEAN]	○	○		
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
TANK F/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
EGR TEMP SEN [V]	○		• The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CLSD THL/P SW [ON/OFF]			• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
CLSD THL POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B2 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B1 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [%]		○	• Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]			• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA-B2 [%]			• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B1 [%]				
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	
AIR COND RLY [ON/OFF]			• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]			• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EGRC SOL/V [ON/OFF] (FLOW/CUT)			• The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. • ON ... EGR is operational OFF ... EGR operation is cut-off	
VENT CONT/V [ON/OFF]			• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. • ON ... Closed OFF ... Open	
FR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
MAP/BARO SW/V [MAP/BARO]			• The control condition of the MAP/BARO switch solenoid valve (determined by ECM according to the input signal) is indicated. MAP ... Intake manifold absolute pressure BARO ... Ambient barometric pressure	
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

CONSULT (Cont'd)

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding R50 model, "-B1" indicates right bank and "-B2" indicates left bank.

ACTIVE TEST MODE

NAEC0033S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Front heated oxygen sensor
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
TANK F/TEMP SEN	• Change the tank fuel temperature using CONSULT.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve

CONSULT (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
VC/V BYPASS/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped) • Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve

DTC CONFIRMATION MODE

NAEC0033S10

SRT STATUS Mode

NAEC0033S1001

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-56.

SRT WORK SUPPORT Mode

NAEC0033S1003

The SRT status and some of the data monitor items can be read.

DTC Work Support Mode

NAEC0033S1002

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURGE FLOW P1447	Refer to corresponding trouble diagnosis for DTC.	EC-510
	VC CUT/V BP/V P1491		EC-532
	PURG VOL CN/V P1444		EC-496
	EVAP SML LEAK P0440		EC-367
	EVAP SML LEAK P1440		EC-486
FR O2 SENSOR	FR O2 SEN-B1 P0131		EC-209
	FR O2 SEN-B1 P0132		EC-216
	FR O2 SEN-B1 P0133		EC-224
	FR O2 SEN-B1 P0130		EC-200
	FR O2 SEN-B2 P0151		EC-209
	FR O2 SEN-B2 P0152		EC-216
	FR O2 SEN-B2 P0153		EC-224
	FR O2 SEN-B2 P0150		EC-200
RR O2 SENSOR	RR O2 SEN-B1 P0137		EC-251
	RR O2 SEN-B1 P0138		EC-261
	RR O2 SEN-B1 P0139		EC-271
	RR O2 SEN-B2 P0157		EC-251
	RR O2 SEN-B2 P0158		EC-261
	RR O2 SEN-B2 P0159		EC-271
EGR SYSTEM	EGR SYSTEM P0400		EC-347
	EGRC-BPT/VLV P0402		EC-358
	EGR SYSTEM P1402		EC-478

CONSULT (Cont'd)

FUNCTION TEST MODE

NAEC0033S08

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Throttle position sensor circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position) • Throttle position sensor (Closed throttle position) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	• Ignition switch: ON (Engine stopped) • PNP switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • PNP switch • Linkage or PNP switch adjustment
		In N/P positions	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT*	• Ignition switch: ON (Engine stopped) • EGRC-solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery voltage and engine coolant temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering oil pressure switch circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)	• Harness and connector • Vehicle speed sensor • Speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.	• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the front heated oxygen sensor output at 2,000 rpm under non-loaded state.	Front heated oxygen sensor COUNT: More than 5 times during 10 seconds	• INJECTION SYSTEM (Injector, fuel pressure regulator, harness or connector) • IGNITION SYSTEM (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYSTEM (Intake air leaks) • Front heated oxygen sensor circuit • Front heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, ignition coil with power transistor harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and 20%.	• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment

*: If this function test mode is not available, use the ACTIVE TEST mode.

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

NAEC0033S09

CONSULT has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1) "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed at the moment the malfunction is detected by ECM. DATA MONITOR can be performed continuously until a malfunction is detected. However, DATA MONITOR cannot continue any longer after the malfunction detection.

2) "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

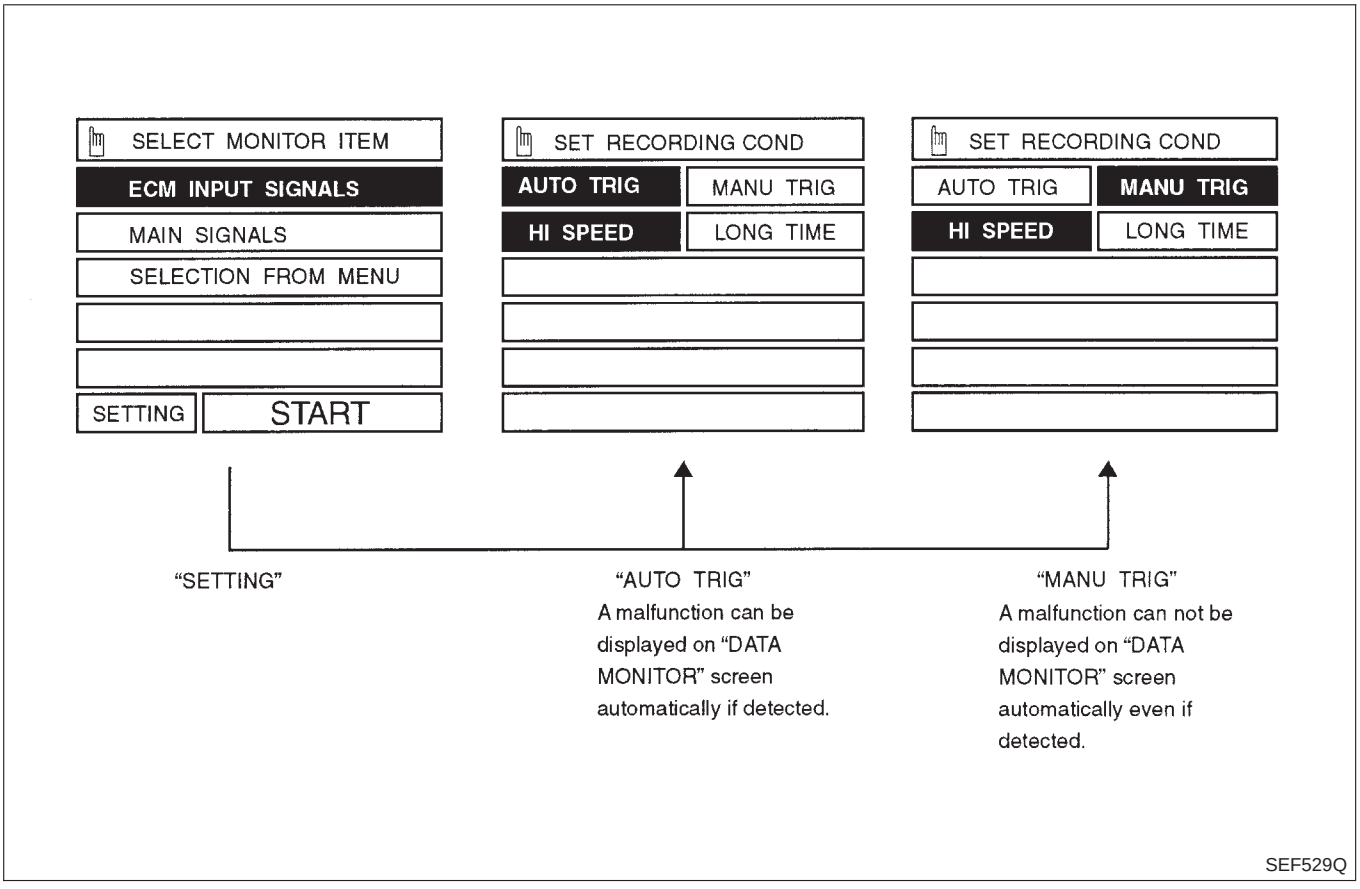
Use these triggers as follows:

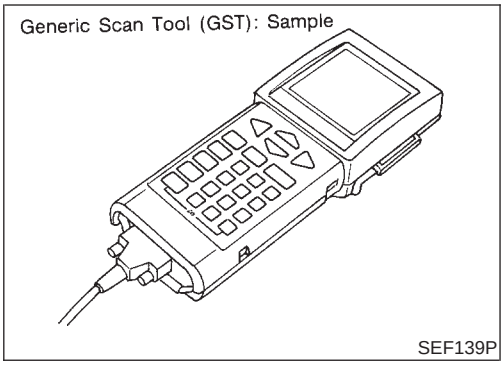
1) "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI section, "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".)

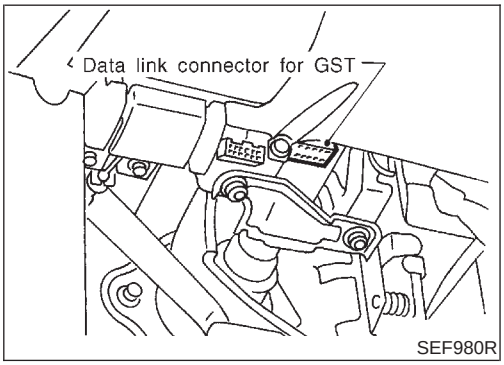
2) "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

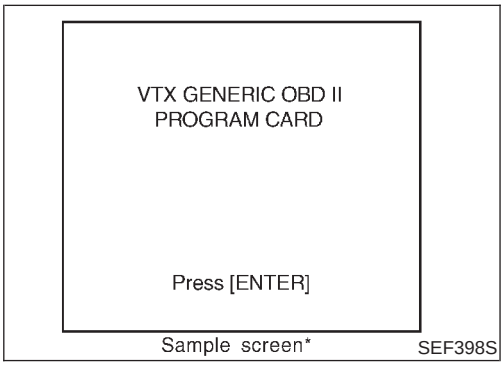




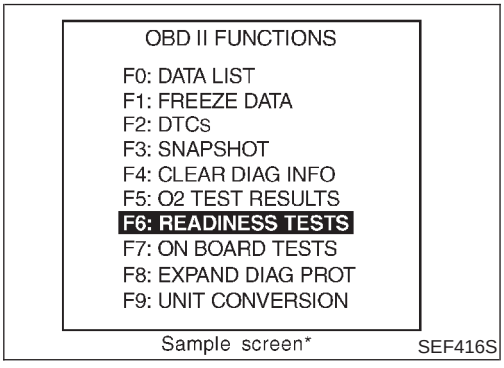
SEF139P



SEF980R



Sample screen* SEF398S



Sample screen* SEF416S

Generic Scan Tool (GST)

NAEC0034

DESCRIPTION

NAEC0034S01

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.

GST INSPECTION PROCEDURE

NAEC0034S02

1. Turn off ignition switch.
2. Connect “GST” to data link connector for GST. (Data link connector for GST is located under LH dash panel near the fuse box cover.)
3. Turn on ignition switch.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)

5. Perform each diagnostic mode according to each service procedure.

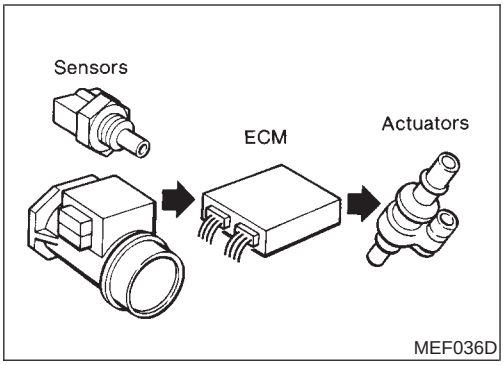
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

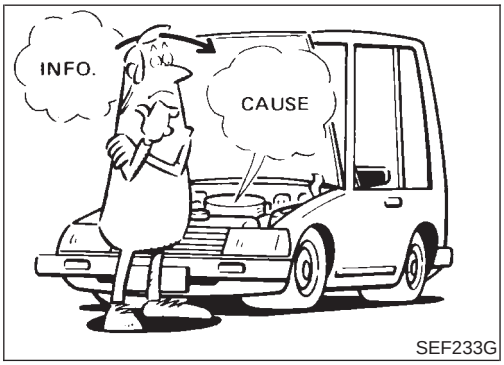
FUNCTION

NAEC0034S03

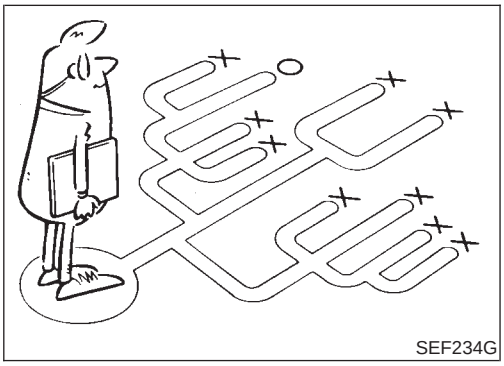
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-83).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch "OFF" ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode enables the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.



MEF036D



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NAEC0035

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-97.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on next page should be used.

Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NAEC0035S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

Worksheet Sample

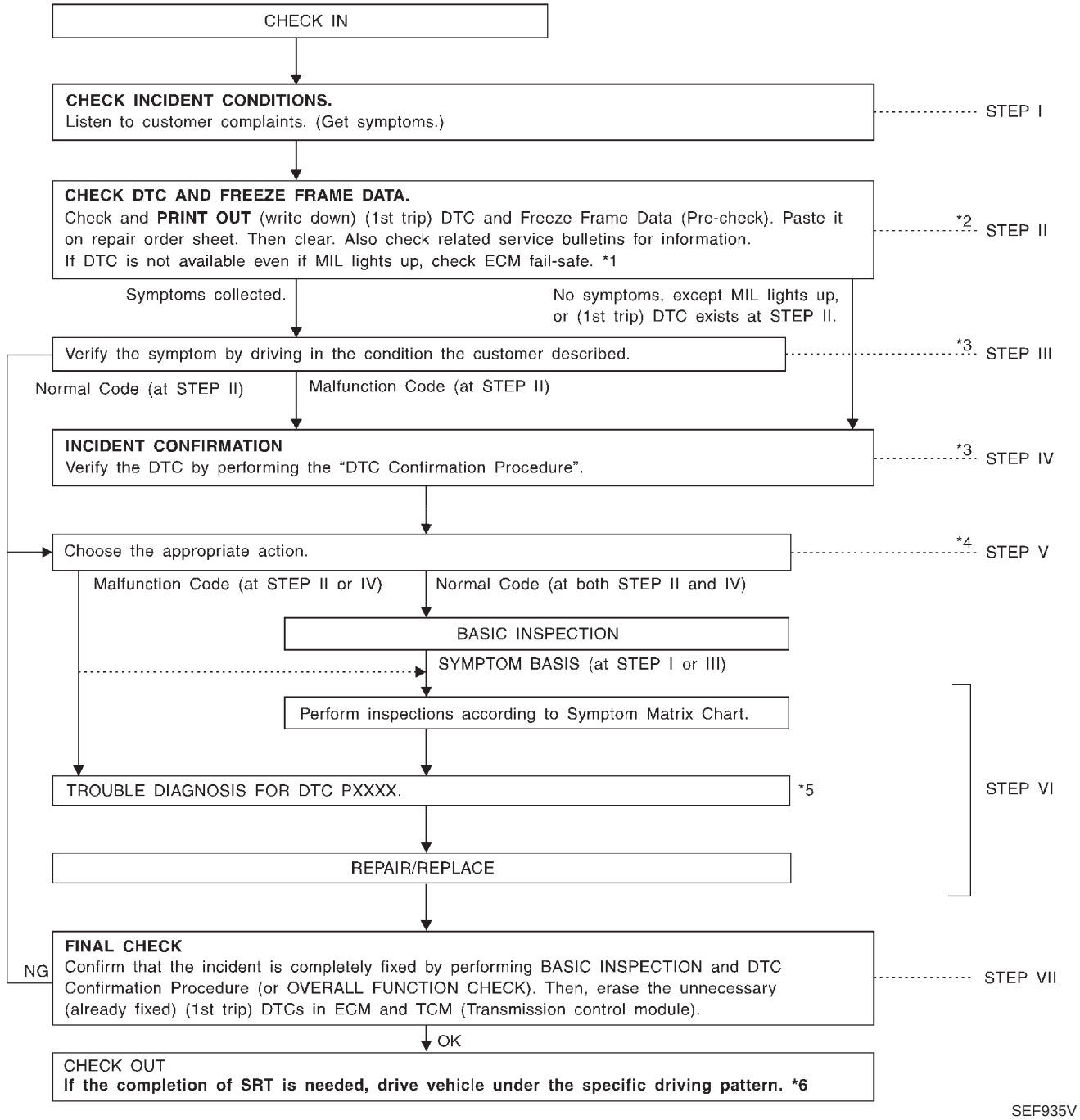
NAEC0035S0101

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

MTBL0017

Work Flow

NAEC0036



SEF935V

*1 EC-117

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-137.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

*6 EC-62

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NAEC0036S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-96.
STEP II	Before confirming the concern, check and write down (print out using CONSULT or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-68.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-118.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or GST. During the (1st trip) DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-99.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-118.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT. Refer to EC-122, EC-127. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-68.)

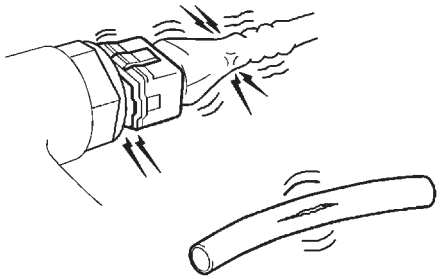
Basic Inspection

NAEC0037

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

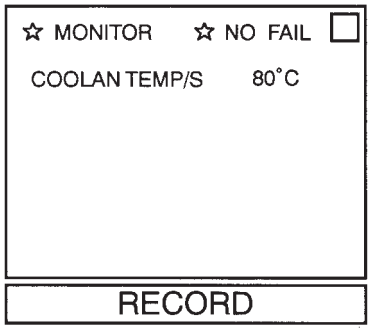
1	INSPECTION START	
1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance. 2. Open engine hood and check the following: ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts  SEF983U		
Models with CONSULT	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 16.

2	CONNECT CONSULT OR GST TO THE VEHICLE	
With CONSULT Connect “CONSULT” to the data link connector for CONSULT and select “ENGINE” from the menu. Refer to EC-80.		
With GST Connect “GST” to the data link connector for GST. Refer to EC-93.		
Models with CONSULT	▶	GO TO 3.
Models with GST	▶	GO TO 15.

3	CHECK FI CAM FUNCTION

With CONSULT

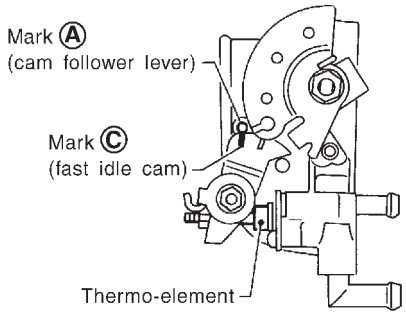
1. Turn ignition switch "ON".
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
3. Start engine and warm it up.



SEF522P

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

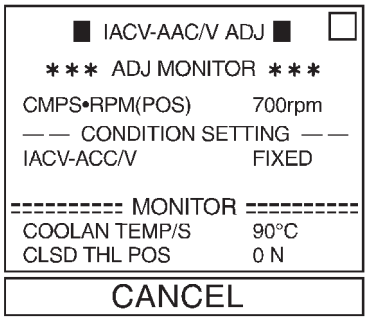
OK or NG

OK	▶	GO TO 4.
NG	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-39.

4	CHECK IGNITION TIMING

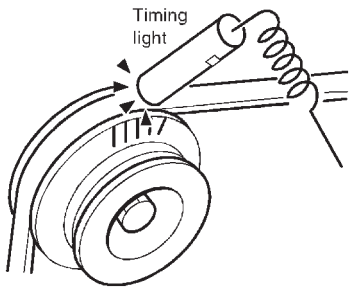
With CONSULT

1. Warm up engine to normal operating temperature.
2. Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode and touch "START".



SEF120W

3. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 15°±2° BTDC

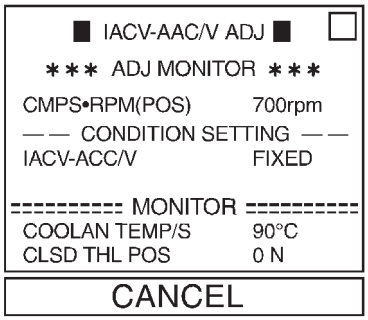
OK or NG

OK	▶	GO TO 5.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41. 2. GO TO 5.

5	CHECK BASE IDLE SPEED

With CONSULT

1. Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode and touch "START".



SEF120W

2. Check idle speed.

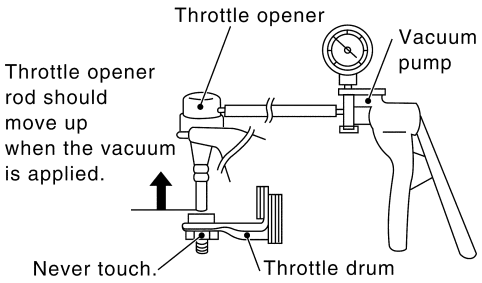
700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41. 2. GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

With CONSULT
NOTE:
Always check ignition timing and base idle speed before performing the following.
1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 3.
3. Stop engine.
4. Remove the vacuum hose connected to the throttle opener.
5. Connect suitable vacuum hose to vacuum pump as shown below.



SEF793W

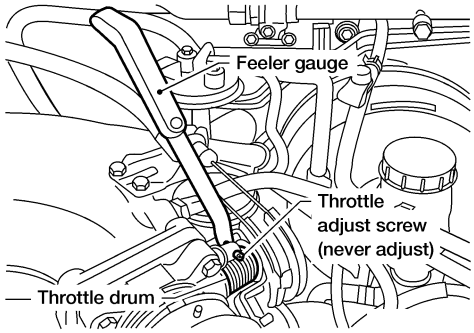
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)]

▶	GO TO 7.

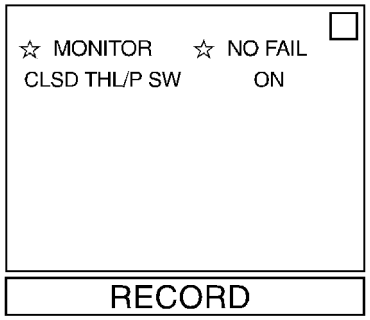
7	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch "ON".
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
3. Read "CLSD THL/P SW" signal under the following conditions.

- Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



AEC887A



SEF577W

"CLSD THL/P SW" signal should remain "ON" while inserting 0.3 mm (0.012 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

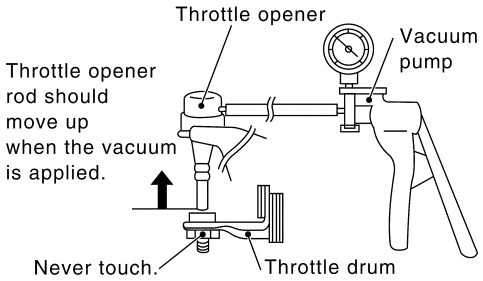
8	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

With CONSULT

NOTE:

- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "CLSD THL/P SW" signal, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Remove the vacuum hose connected to the throttle opener.
6. Connect suitable vacuum hose to vacuum pump as shown below.



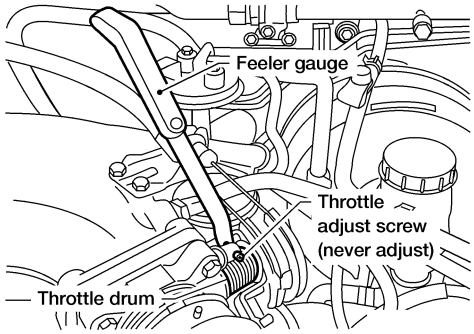
SEF793W

7. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.82 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During adjustment procedure, vacuum should be applied.

▶	GO TO 9.

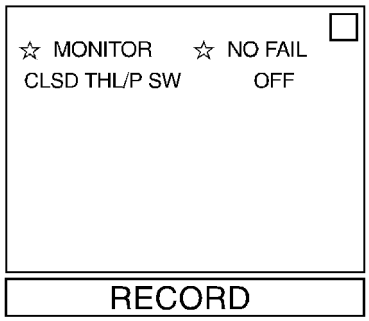
9	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch "ON".
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC887A

4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.



SEF122W

"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

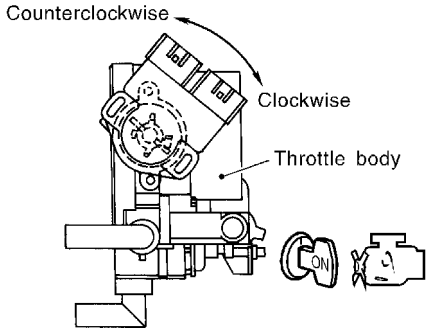
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

10	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

With CONSULT

Turn throttle position sensor body clockwise until "CLSD THL/P SW" signal switches to "OFF".



SEF689W

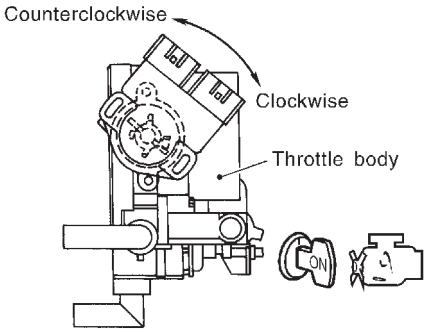
	▶	GO TO 11.

11	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body counterclockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**



SEF689W

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

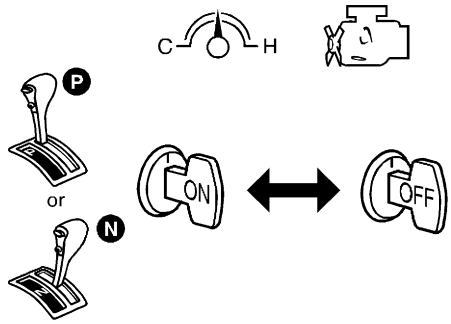
12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT

NOTE:

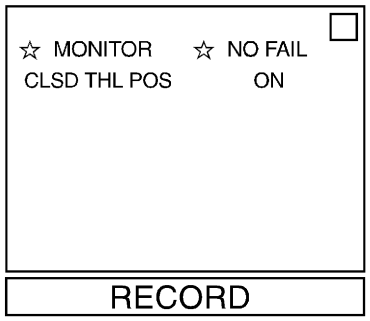
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Select "CLSD THL POS" in "DATA MONITOR" mode.
5. Stop engine. (Turn ignition switch "OFF".)
6. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

7. Turn ignition switch "OFF" and wait at least 5 seconds.
8. Repeat steps 6 and 7 until "CLSD THL POS" signal changes to "ON".



SEF123W

▶	GO TO 13.

13	REMOVE VACUUM PUMP

1. Release vacuum from the throttle opener.
2. Remove vacuum pump and vacuum hose from the throttle opener.
3. Reinstall the original vacuum hose to the throttle opener securely.

▶	GO TO 14.

14	CHECK TARGET IDLE SPEED

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "CMPS·RPM (REF)" in "DATA MONITOR" mode.
3. Check idle speed.

750±50 rpm (in "P" or "N" position)

OK or NG

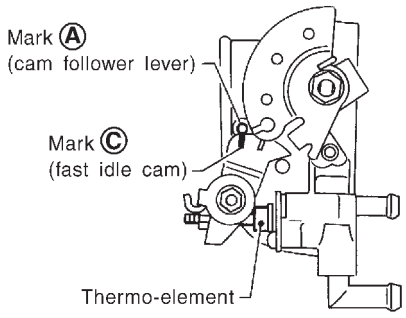
OK	▶	**INSPECTION END**
NG	▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41.

15	CHECK FI CAM FUNCTION

With GST

1. Turn ignition switch "ON".
2. Select "MODE 1" with GST.
3. Start engine and warm it up.
4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

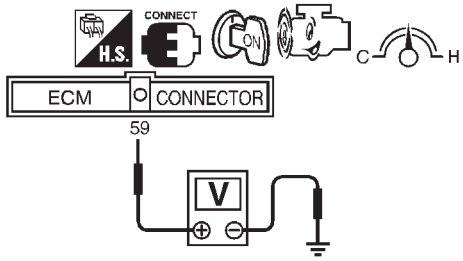
OK or NG

OK	▶	GO TO 17.
NG	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-39.

16	CHECK FI CAM FUNCTION

No Tools

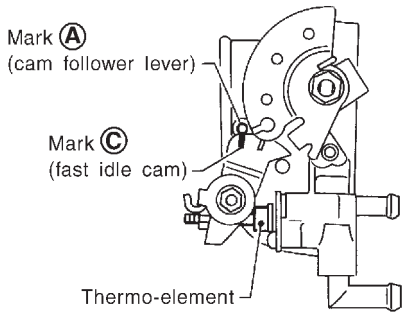
1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



SEF119W

3. When the voltage is between 1.10 to 1.36V, check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

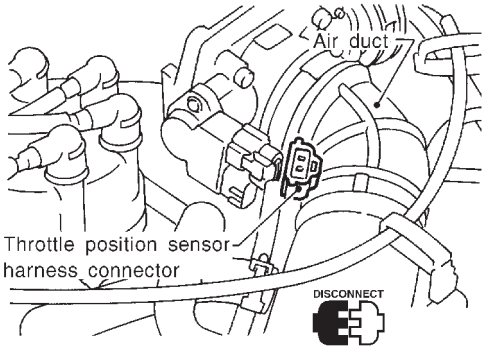
OK or NG

OK	▶	GO TO 17.
NG	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-39.

17	CHECK IGNITION TIMING

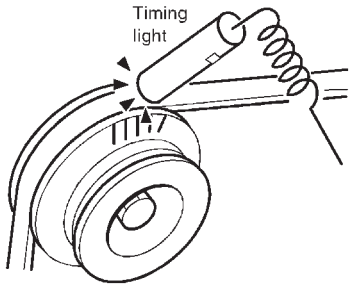
Without CONSULT

1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.



SEF975R

3. Start engine.
4. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 15°±2° BTDC

OK or NG

OK	▶	GO TO 18.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41. 2. GO TO 18.

18	CHECK BASE IDLE SPEED

Without CONSULT

Does engine speed fall to the following speed?

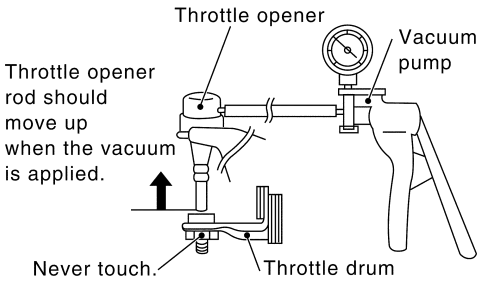
700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 19.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41. 2. GO TO 19.

19	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT
NOTE:
Always check ignition timing and base idle speed before performing the following.
1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 12 or 13.
3. Stop engine.
4. Remove the vacuum hose connected to the throttle opener.
5. Connect suitable vacuum hose to vacuum pump as shown below.



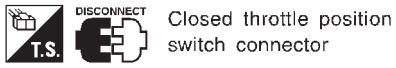
SEF793W

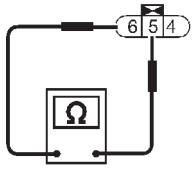
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During checking procedure, vacuum should be applied.

▶	GO TO 20.

20	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

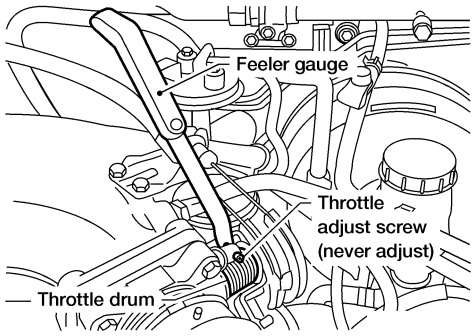
1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **5** and **6** under the following conditions.





SEF862V

- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



AEC887A

"Continuity should exist" while inserting 0.3 mm (0.012 in) feeler gauge.
"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 25.
NG	▶	GO TO 21.

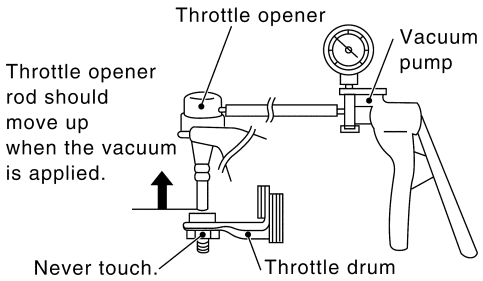
21	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT

NOTE:

- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity", doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 12 or 13.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Remove the vacuum hose connected to the throttle opener.
6. Connect suitable vacuum hose to vacuum pump as shown below.



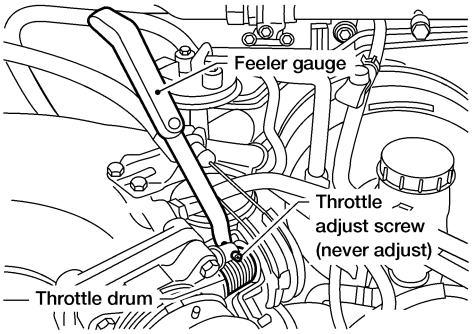
SEF793W

7. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During adjustment procedure, vacuum should be applied.

▶	GO TO 22.

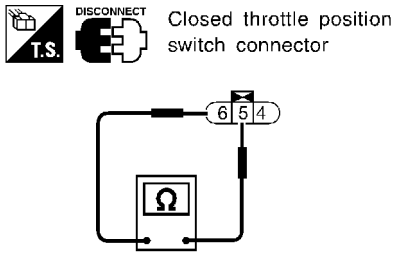
22	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



AEC887A

3. Open throttle valve then close.
4. Check continuity between closed throttle position switch terminals 5 and 6.



SEF862V

Continuity should not exist while closing the throttle position sensor.

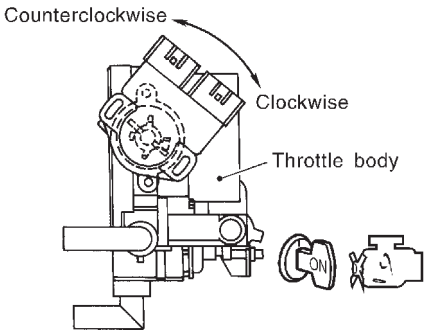
OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 23.

23	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT

Turn throttle position sensor body clockwise until continuity does not exist.



SEF689W

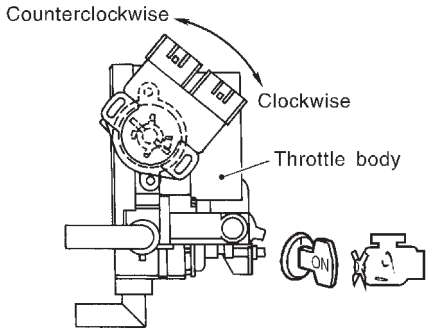
	▶	GO TO 24.

24	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

Without CONSULT

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body counterclockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.**



SEF689W

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 25.
NG	▶	GO TO 21.

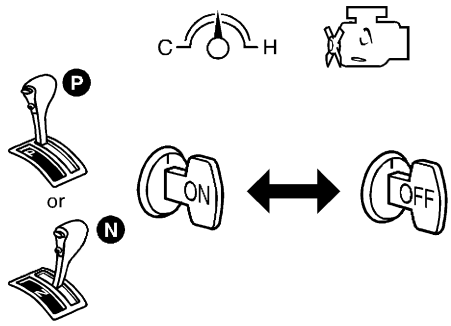
25	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT

NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch "OFF".)
5. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

6. Turn ignition switch "OFF" and wait at least 5 seconds.
7. Repeat steps 5 and 6, 20 times.

	▶	GO TO 26.

26	REINSTALLATION
	Without CONSULT 1. Release vacuum from the throttle opener. 2. Remove vacuum pump and vacuum hose from the throttle opener. 3. Reinstall the original vacuum hose to the throttle opener securely. 4. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.
▶	GO TO 27.

27	CHECK TARGET IDLE SPEED
	Without CONSULT 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **750±50 rpm (in "P" or "N" position)**
	OK or NG
OK ▶	GO TO 28.
NG ▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-41.

28	ERASE UNNECESSARY DTC
	After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68 and "HOW TO ERASE DTC" in AT section.
▶	**INSPECTION END**

DTC Inspection Priority Chart

NAEC0038

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

Priority	Detected items (DTC)
1	• P0100 Mass air flow sensor (0102) • P0110 Intake air temperature sensor (0401) • P0115, P0125 Engine coolant temperature sensor (0103) (0908) • P0120 Throttle position sensor (0403) • P0180 Fuel tank temperature sensor (0402) • P0325 Knock sensor (0304) • P0335, P1336 Crankshaft position sensor (OBD) (0802) (0905) • P0340 Camshaft position sensor (0101) • P0500 Vehicle speed sensor (0104) • P0600 A/T communication line • P0605 ECM (0301) • P1320 Ignition signal (0201) • P1400 EGRC-solenoid valve (1005) • P1605 A/T diagnosis communication line (0804) • P1706 Park/Neutral position (PNP) switch (1003)
2	• P0105 Absolute pressure sensor (0803) • P0130-P0134, P0150-P0154 Front heated oxygen sensor (0413-0415) (0503) (0509), (0303) (0409-0412) • P0135, P0155 Front heated oxygen sensor heater (0901) (1001) • P0137-P0140, P0157-P0160 Rear heated oxygen sensor (0510-0512) (0707), (0313-0315) (0708) • P0141, P0161 Rear heated oxygen sensor heater (0902) (1002) • P0443, P1444 EVAP canister purge volume control solenoid valve (1008) (0214) • P0446, P1446, P1448 EVAP canister vent control valve (0903) (0215) (0309) • P0450 EVAP control system pressure sensor (0704) • P0510 Closed throttle position switch (0203) • P0705-P0755, P1705 P1760 A/T related sensors, solenoid valves and switches (1101-1208) • P1105 MAP/BARO switch solenoid valve (1302) • P1401 EGR temperature sensor (0305) • P1490, P1491 Vacuum cut valve bypass valve (0801) (0311) • P1447 EVAP control system purge flow monitoring (0111)
3	• P0172, P0171 P0175 P0174 Fuel injection system function (0114) (0115) (0209) (0210) • P0306-P0300 Misfire (0603 - 0701) • P0400, P1402 EGR function (0302) (0514) • P0402 EGRC-BPT valve function (0306) • P0420, P0430 Three way catalyst function (0702) (0703) • P0440, P1440, P0455 EVAP control system (SMALL LEAK) (0705) (0213), (GROSS LEAK) (0715) • P0505 IACV-AAC valve (0205) • P0731-P0734, P0744 A/T function (1103 - 1106) (1107) • P1148, P1168 Closed loop control (0307) (0308)

Fail-safe Chart

=NAEC0039

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.		Detected items	Engine operating condition in fail-safe mode	
CONSULT GST	ECM*1			
P0100	0102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	0103	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT displays the engine coolant temperature decided by ECM.	
			Condition	Engine coolant temperature decided (CONSULT display)
			Just as ignition switch is turned ON or Start	40°C (104°F)
			More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
			Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0120	0403	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
			Condition	Driving condition
			When engine is idling	Normal
			When accelerating	Poor acceleration
Unable to access ECM	Unable to access Diagnostic Test Mode II	ECM	**ECM fail-safe activating condition** The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed. **Engine control with fail-safe** When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.	
				ECM fail-safe operation
			Engine speed	**Engine speed will not rise more than 3,000 rpm**
			Fuel injection	Simultaneous multiport fuel injection system
			Ignition timing	Ignition timing is fixed at the preset valve
			Fuel pump	Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls
			IACV-AAC valve	Full open
			Replace ECM, if ECM fail-safe condition is confirmed.	

*1: In Diagnostic Test Mode II (Self-diagnostic results)

Symptom Matrix Chart

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NAEC0040

NAEC0040S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2			3		1	EC-568
	Injector circuit							2							EC-555
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3		4			EC-38
	Evaporative emission system														EC-30
Air	Positive crankcase ventilation system												1		EC-36
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-41
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2		3		1	EC-416
	IACV-FICD solenoid valve circuit		2				3	3							EC-582
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-41
	Ignition circuit	1	1	2	2	2		2	2			2			EC-454
EGR	EGRC-solenoid valve circuit		2		3	3						3			EC-467
	EGR system	4	4	4	4	4	4	4	3	3		4			EC-347, 478
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-137
Air conditioner circuit		2					3			2					HA-31

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

(continued on next page)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1	1	2	2	2		2	2			2			EC-339
Mass air flow sensor circuit				3										EC-146
Front heated oxygen sensor circuit														EC-200
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-175, 194
Throttle position sensor circuit		1	2		2	2					2			EC-181
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-99
Vehicle speed sensor circuit		2	3		3						3			EC-411
Knock sensor circuit				3										EC-327
ECM	2	2				3	3	2	2	1				EC-436, 117
Start signal circuit	1													EC-563
Park/Neutral position (PNP) switch circuit			3		3		3	2			3			EC-545
Power steering oil pressure switch circuit		2												EC-576

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NAEC0040S03

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE-5
	Fuel piping			5	5	5		5	4			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	4	4		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FE-3
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	SC-3, SC-11 and SC-6
	Alternator circuit														
	Starter circuit														
	Clutch interlock switch														CL-5
	Park/neutral position (PNP) switch														AT-99
	Drive plate/Flywheel	6													EM-54

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

(continued on next page)

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-18, EM-27 and EM-45
	Cylinder head gasket										2		2		
	Cylinder block	6	6	6	6	6		6	6			6	3		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	6	6	6	6	6		6	6			6			
	Camshaft														
	Intake valve												2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			FE-8
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		MA-20, EM-15, LC-4
	Oil level (Low)/Filthy oil														MA-19
Cooling	Radiator/Hose/Radiator filler cap	6	6	6	6	6		6	6		2	6			LC-8
	Thermostat						5			5					
	Water pump														
	Water gallery														
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														MA-16
NVIS (Nissan Vehicle Immobilizer System — NATS)		1	1												EC-74 or EL-282

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

CONSULT Reference Value in Data Monitor Mode

NAEC0041

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

  * Specification data may not be directly related to their components signals/values/operations.

  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.
- If the real-time diagnosis results are NG and the on board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
CMPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
FR O2 SEN-B2 FR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B2 FR O2 MNTR-B1			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Engine: After warming up • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.15 - 0.85V
		Throttle valve: fully opened	3.5 - 4.7V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW	• Engine: After warming up • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: “OFF”	OFF
		Air conditioner switch: “ON” (Compressor operates.)	ON

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
AMB TEMP SW	• Ignition switch: ON • Compare ambient temperature with the following:	Below 23.5°C (74°F)	OFF
		Above 23.5°C (74°F)	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec
IGN TIMING	ditto	Idle	10° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	ditto	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	OFF (CUT)
		Engine speed: Revving from idle up to 3,000 rpm quickly	ON (FLOW)
VENT CONT/V	• Ignition switch: ON		OFF
FR O2 HTR-B1 FR O2 HTR-B2	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
RR O2 HTR-B1 RR O2 HTR-B2	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,200 rpm		OFF
	• Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%

CONSULT Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
ABSOL TH·P/S	• Engine: After warming up • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump.	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped)		MAP
	• Engine speed: Idle	For 5 seconds after starting engine	BARO
		More than 5 seconds after starting engine	MAP
ABSOL PRES/SE	• Ignition switch: ON (Engine stopped)		Approx. 4.4V
	• Engine speed: Idle	For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.3V

Major Sensor Reference Graph in Data Monitor Mode

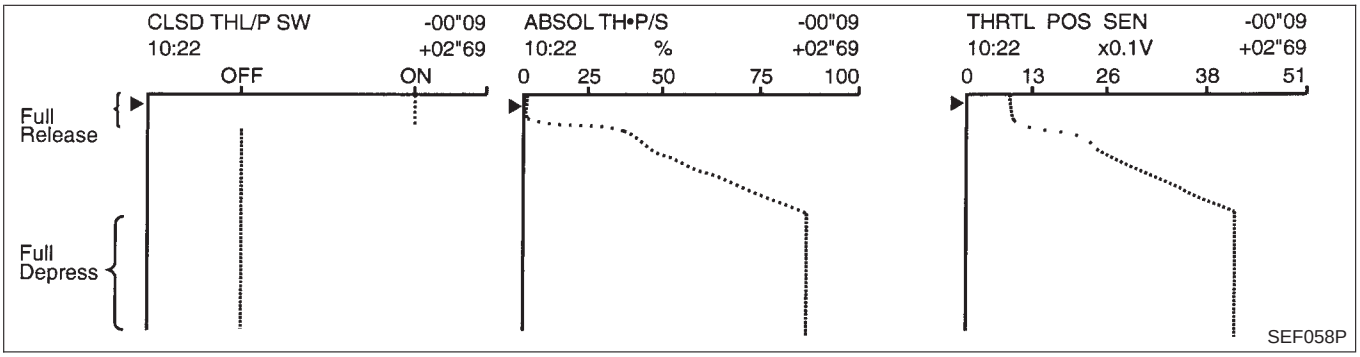
NAEC0042

The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "HI SPEED" in "DATA MONITOR" with CONSULT.)

THRTL POS SEN, ABSOL TH·P/S, CLSD THL/P SW

NAEC0042S01

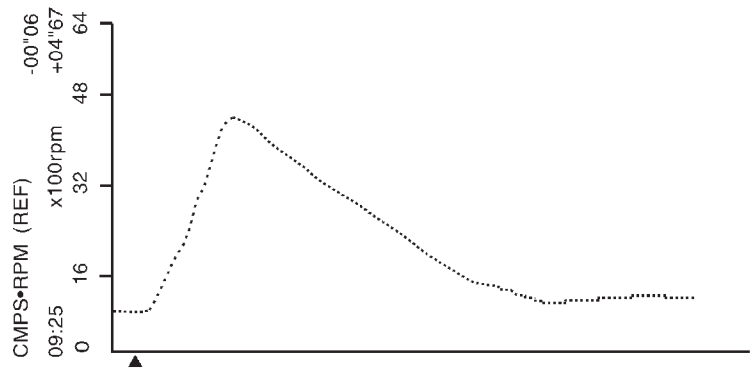
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL/P SW" when depressing the accelerator pedal with the ignition switch "ON".
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL/P SW" is changed from "ON" to "OFF".



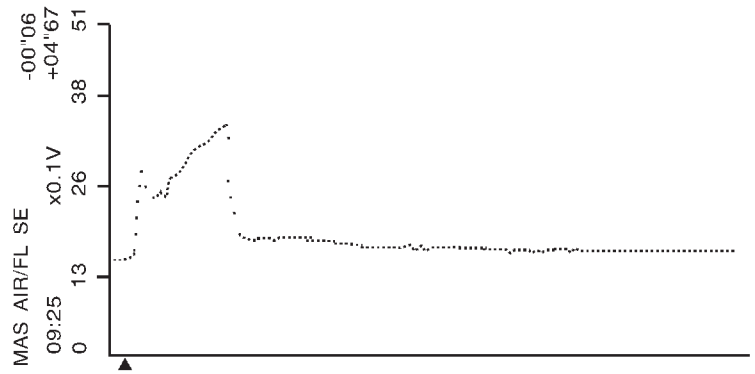
CMPS·RPM (REF), MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

NAEC0042S02

Below is the data for "CMPS·RPM (REF)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SEN-B1", "FR O2 SEN-B1" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

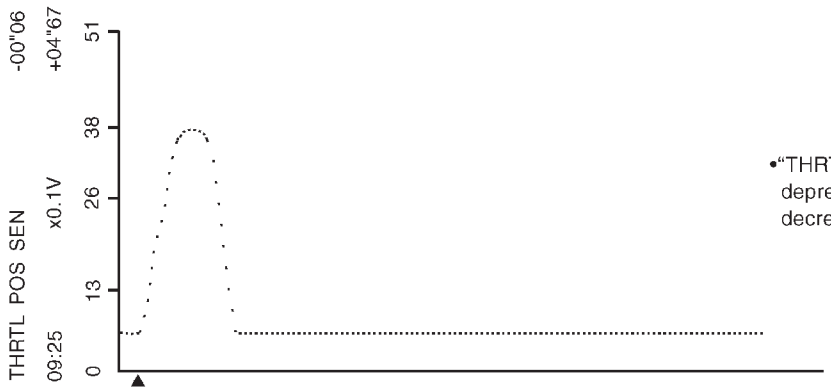


- "CMPS•RPM (REF)" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.

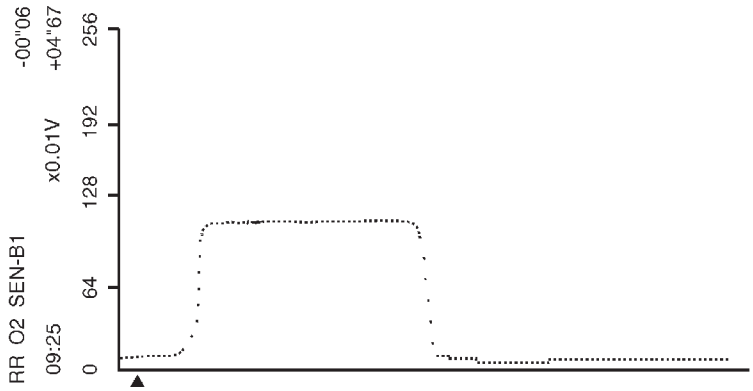


- "MAS AIR/FL SE" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

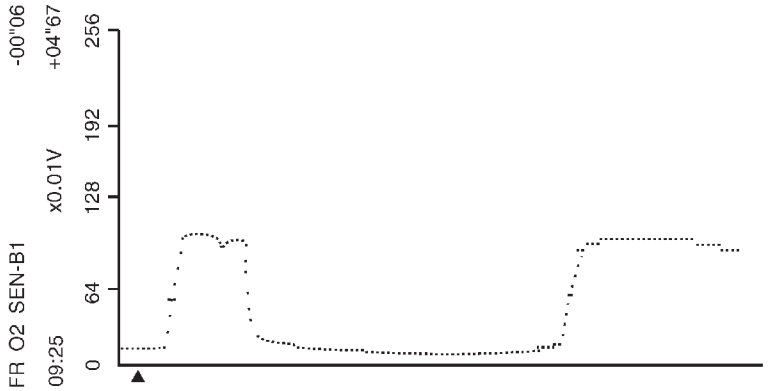
SEF935QA



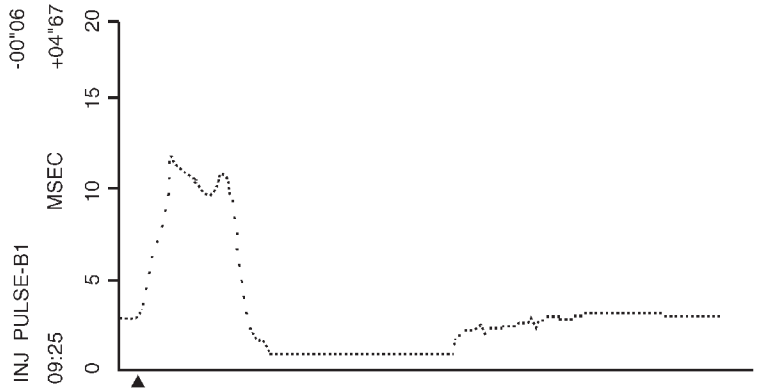
- "THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



- "RR O2 SEN-B1" may increase immediately after depressing the accelerator pedel and may decrease after releasing the pedal.

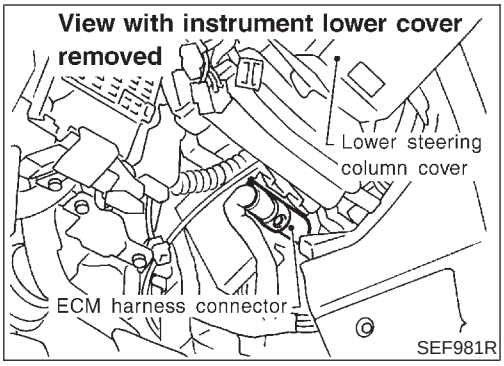


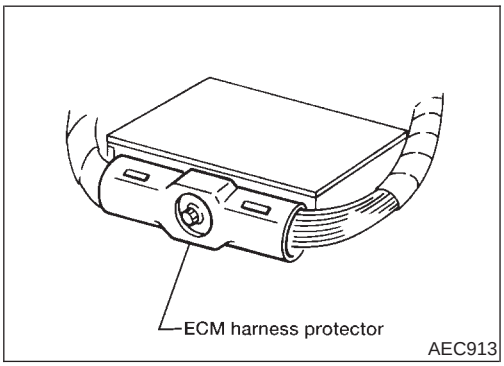
- "FR O2 SEN-B1" may increase immediately after depressing the accelerator pedel and may decrease after releasing the pedal.

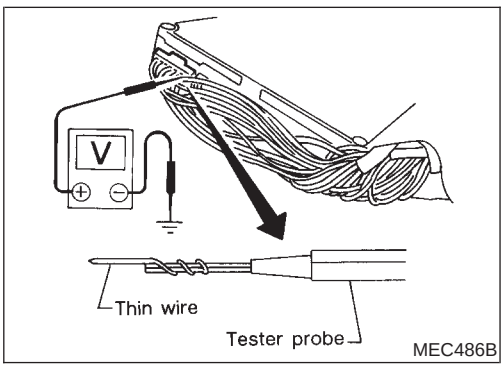


- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF936Q







ECM Terminals and Reference Value

NAEC0043

PREPARATION

NAEC0043S01

1. ECM is located behind the instrument lower cover. For this inspection:

- Remove instrument lower cover.

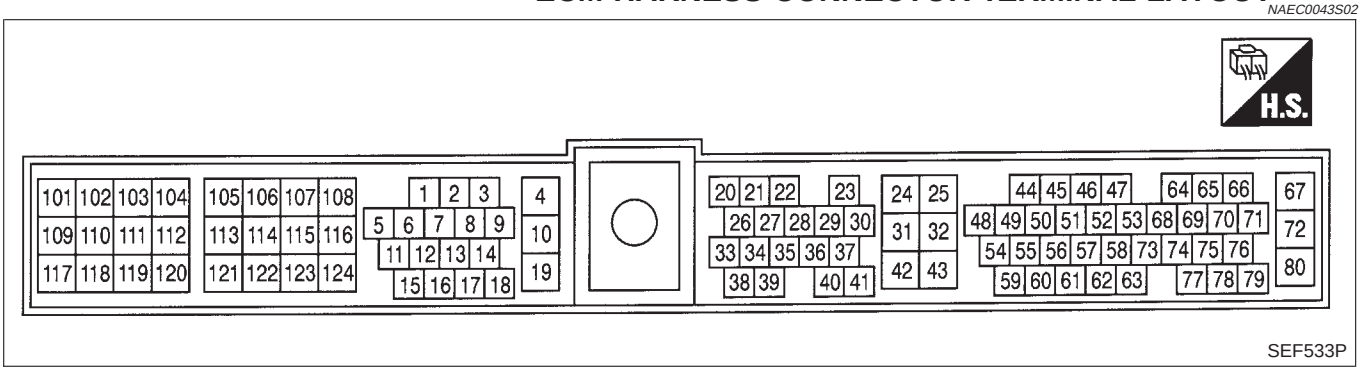
2. Remove ECM harness protector.

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

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NAEC0043S02



ECM INSPECTION TABLE

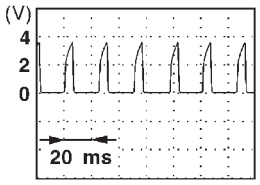
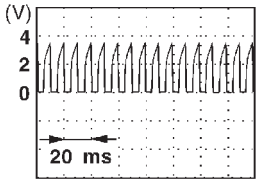
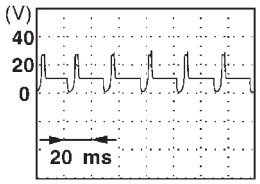
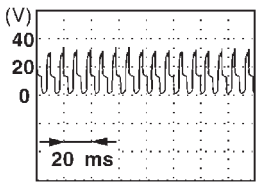
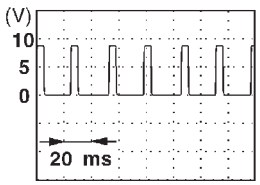
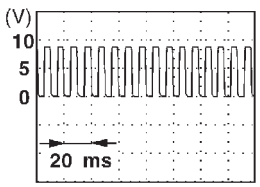
NAEC0043S03

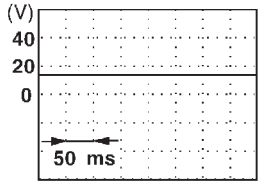
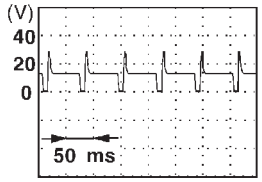
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

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

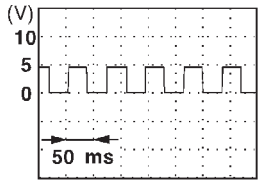
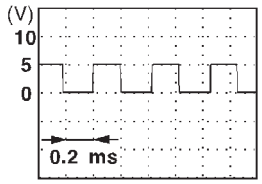
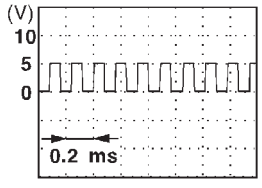
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	**[Engine is running]** ● Idle speed	0.7V  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V  SEF989U
2	W/G	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 12V  SEF990U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 11V  SEF991U
3	W	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2V  SEF992U
			[Engine is running] ● Engine speed is 2,000 rpm	4 - 5V  SEF993U

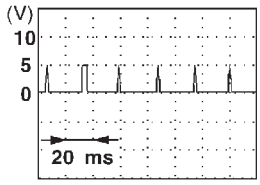
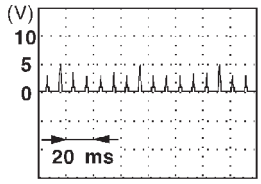
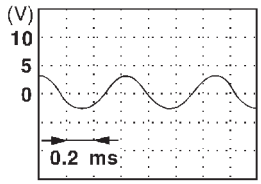
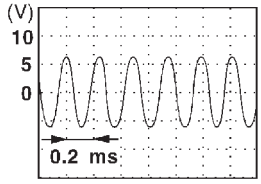
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	LG/B	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
7	Y/G	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	0 - 3.0V
9	G/OR	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 23.5°C (74°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 23.5°C (74°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 23.5°C (74°F) ● Air conditioner is not operating	Approximately 5V
10	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	R/L	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
12	G/R	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON"*	0 - 1V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)

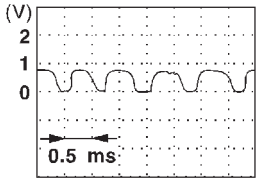
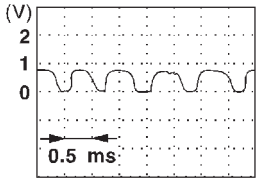
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	OR	Malfunction indicator lamp	**[Ignition switch "ON"]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
20	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)
21	B/W	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor operates)*	Approximately 0V
			[Engine is running] ● A/C switch is "OFF"	Approximately 5V
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch "ON"]** ● Gear position is "N" or "P" (A/T models) ● Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (A/T) (11 - 14V) Approximately 5V (M/T)
23	W	Throttle position sensor	**[Ignition switch "ON"]** ● **Warm-up condition** ● More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
25	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
28	OR/W	Throttle position switch (Closed position)	**[Ignition switch "ON"]** ● **Warm-up condition** ● More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

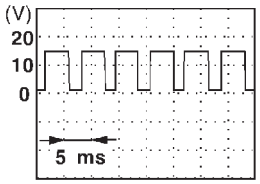
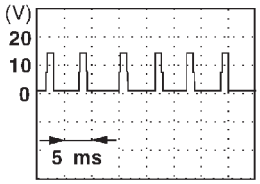
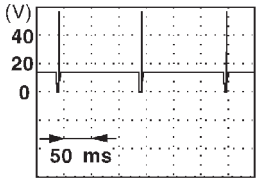
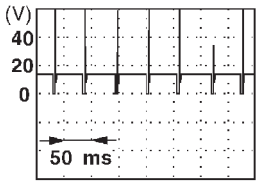
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	W/L	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h	2 - 3V  SEF996U
31	B/W	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
32	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
35	P	A/T signal No. 3	**[Ignition switch "ON"]**	0V
37	P	Throttle position sensor signal to TCM (Transmission control module)	**[Ignition switch "ON"]** ● **Warm-up condition** ● More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
39	R/B	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being fully turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
44	B/W	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.5V  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V  SEF001V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49 53	L L	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed	0.3 - 0.5V  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V  SEF998U
45	W	Absolute pressure sensor	**[Ignition switch "ON"]** ● Engine is not running ● For 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (for 5 seconds after engine start)	Approximately 4.4V
			[Ignition switch "ON"] ● Engine is not running ● More than 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (More than 5 seconds after engine start)	Approximately 1.3V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	2 - 4V (AC range)  SEF691W

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
54	W	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	L/W	Rear heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
57	W	Rear heated oxygen sensor LH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	LG/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	Y/L	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	G/B	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
63	P/G	EGR temperature sensor	**[Ignition switch "ON"]**	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	LG/R	Data link connector for GST	**[Engine is running]** ● Idle speed (GST is disconnected)	6 - 10V
72	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
75	W	Data link connector for CONSULT	**[Engine is running]** ● Idle speed (Connect CONSULT and turned on.)	0 - 4V
76	L			3 - 9V
80	W/R	Power supply (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
101	OR	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	8 - 11V  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	2 - 3V  SEF692W
102 104 106 109 111 113	W Y/R W/G Y W/L W/B	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V
103	L/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is revving from idle up to 3,000 rpm quickly	0 - 1.5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	G/R	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
118	G/OR	MAP/BARO switch solenoid valve	**[Ignition switch "ON"]** ● Engine is not running ● For 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (for 5 seconds after engine start)	0 - 1V
			[Ignition switch "ON"] ● Engine is not running ● More than 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (More than 5 seconds after engine start)	BATTERY VOLTAGE (11 - 14V)
119	PU	Front heated oxygen sensor heater RH	**[Engine is running]** ● Engine speed is below 3,200 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
120	G/W	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
121	PU/W	Front heated oxygen sensor heater LH	**[Engine is running]** ● Engine speed is below 3,200 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
122	PU/G	Rear heated oxygen sensor heater RH	**[Engine is running]** ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
123	PU/R	Rear heated oxygen sensor heater LH	**[Engine is running]** ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
124	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*: Any mode except "OFF", ambient air temperature is above 23.5°C (74°F).

Description

NAEC0388

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

COMMON I/I REPORT SITUATIONS

NAEC0388S01

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

Diagnostic Procedure

NAEC0389

1	**INSPECTION START**
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-68.	
▶	GO TO 2.

2	**CHECK GROUND TERMINALS**
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION" in GI section.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

3	**SEARCH FOR ELECTRICAL INCIDENT**
Perform "Incident Simulation Tests" in GI section.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

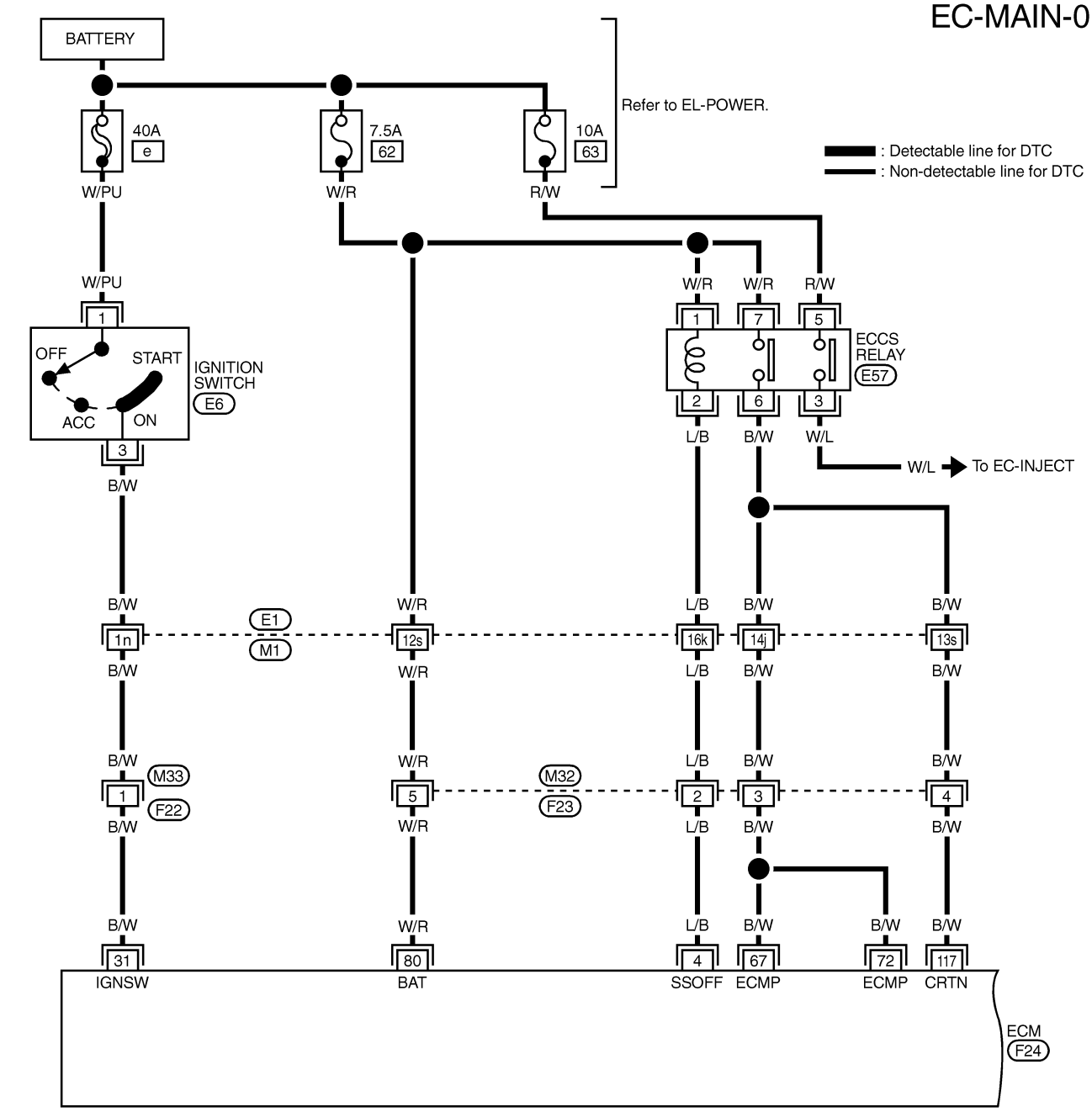
4	**CHECK CONNECTOR TERMINALS**
Refer to "How to Check Enlarged Contact Spring of Terminal" in GI section.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

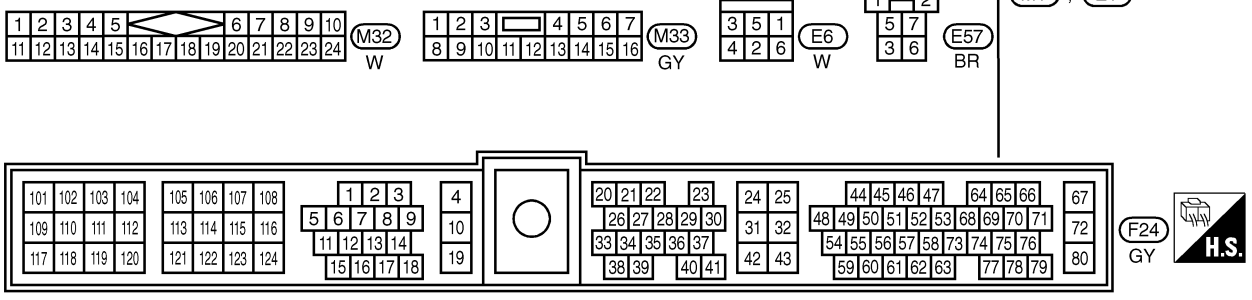
Main Power Supply and Ground Circuit

WIRING DIAGRAM

NAEC0044

EC-MAIN-01

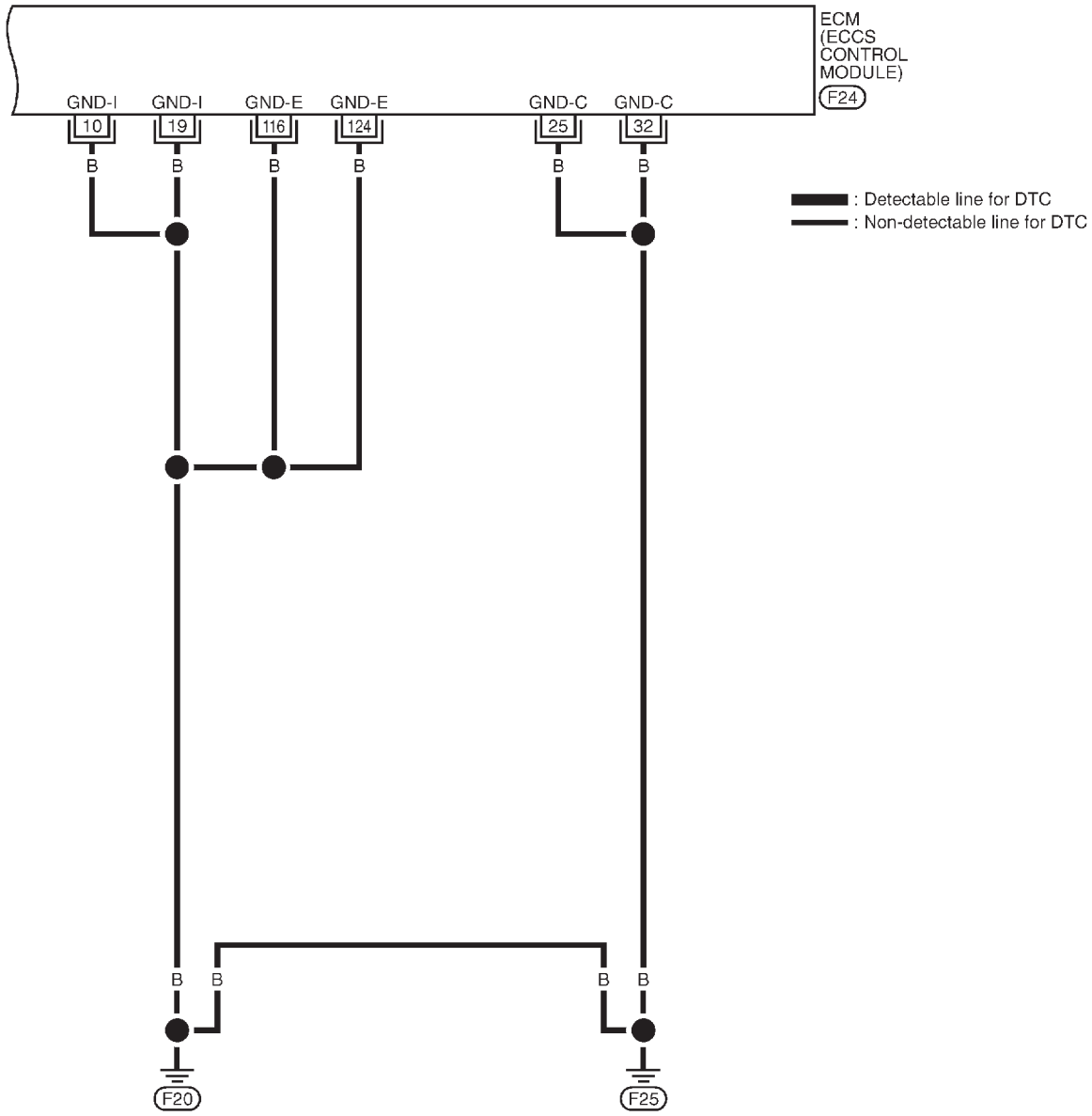


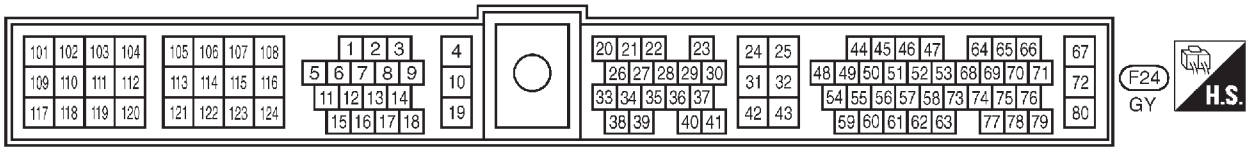


Refer to last page (Foldout page).
M1 , E1

MEC681C

EC-MAIN-02





MEC041C

ECM TERMINALS AND REFERENCE VALUE

NAEC0045

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shutoff)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
10	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
25	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
31	B/W	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
32	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
80	W/R	Power supply (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

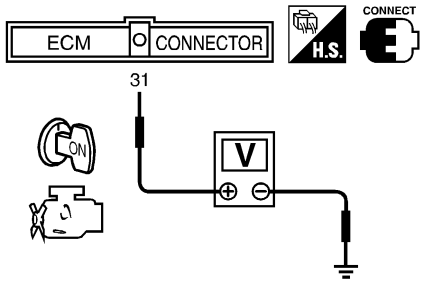
DIAGNOSTIC PROCEDURE

NAEC0046

1	INSPECTION START	
Start engine. **Is engine running?**		
	Yes or No	
Yes	▶	GO TO 9.
No	▶	GO TO 2.

2	CHECK POWER SUPPLY-I

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 31 and ground with CONSULT or tester.



SEF894W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

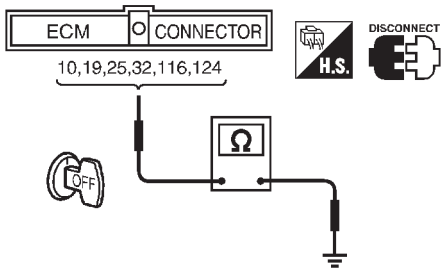
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between ECM and ignition switch

	▶	Repair harness or connectors.

4	CHECK GROUND CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground.



SEF675U

Continuity should exist.

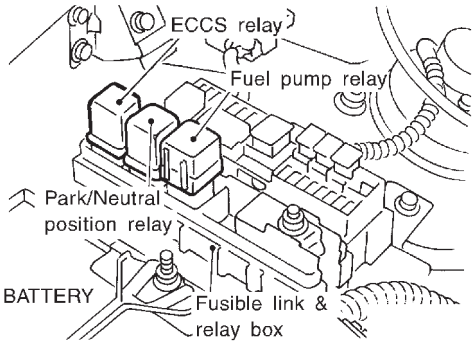
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

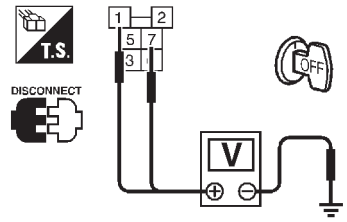
5	CHECK POWER SUPPLY-II

1. Disconnect ECCS relay.



SEF681U

2. Check voltage between terminals 1, 7 and ground with CONSULT or tester.



SEF676U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

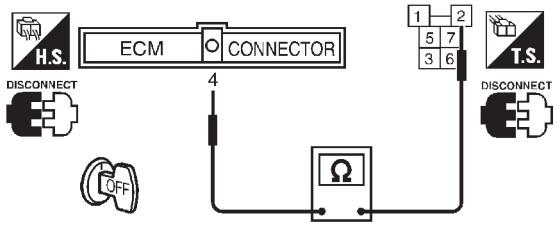
6	DETECT MALFUNCTIONING PART

Check the following.
- 7.5A fuse
- Harness for open or short between ECCS relay and battery

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

7	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and relay terminal 2.



SEF677U

Continuity should exist.

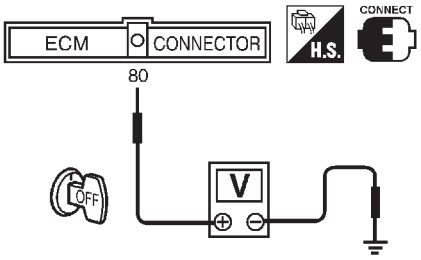
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	Go to "INJECTOR", EC-553.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. 1. Harness connectors E1, M1 2. Harness connectors M32, F23 3. Harness for open or short between ECCS relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK POWER SUPPLY-III
1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT or tester.	



SEF678U

Voltage: Battery voltage

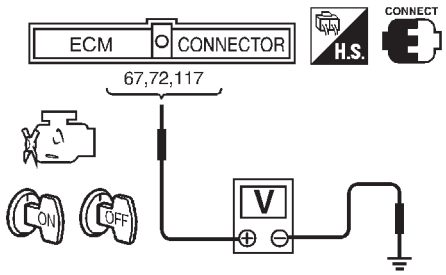
OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F23, M32 ● Harness connectors M1, E1 ● Harness for open or short between ECM and fuse	
▶	Repair harness or connectors.

11	CHECK POWER SUPPLY-IV

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT or tester.



SEF679U

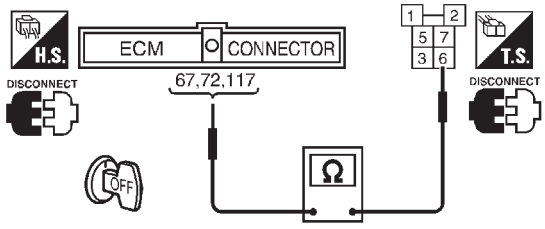
Voltage:
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.

OK or NG

OK	▶	GO TO 19.
NG (Battery voltage does not exist.)	▶	GO TO 12.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 18.

12	CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECCS relay.
3. Check harness continuity between ECM terminals 67, 72, 117 and relay terminal 6.



SEF680U

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

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

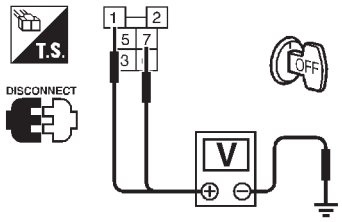
13	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M32
- Harness connectors E1, M1
- Harness for open or short between ECCS relay and ECM

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

14	CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND

Check voltage between relay terminals 1, 7 and ground with CONSULT or tester.



SEF676U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

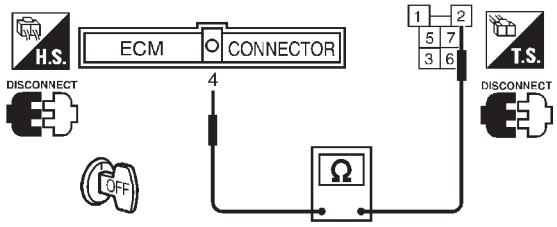
15	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECCS relay and 7.5A fuse

▶	Repair harness or connectors.

16	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and relay terminal 2.



SEF677U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

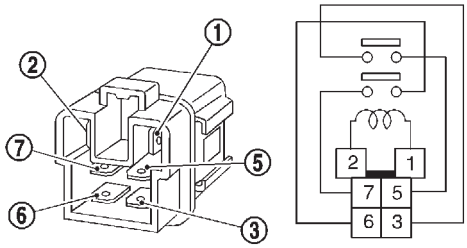
17	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between ECM and ECCS relay

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

18	CHECK ECCS RELAY

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



SEF745U

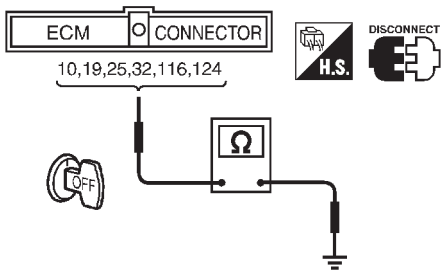
12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace ECCS relay.

19	CHECK GROUND CIRCUIT-II

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground.



SEF675U

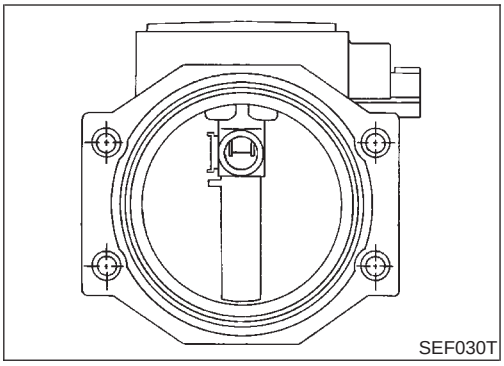
Continuity should exist.

4. Also check harness for short.

OK or NG

OK	▶	GO TO 20.
NG	▶	Repair harness or connectors.

20	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**


SEF030T

Component Description

NAEC0047

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

CONSULT Reference Value in Data Monitor Mode

NAEC0048

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

NAEC0049

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	1.0 - 1.7V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,500 rpm	1.7 - 2.3V
55	B	Mass air flow sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0050

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0100 0102	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to ECM when engine is running.*	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	

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

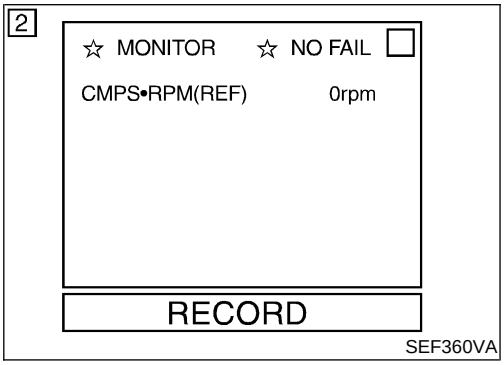
Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

NAEC0051

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NAEC0051S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

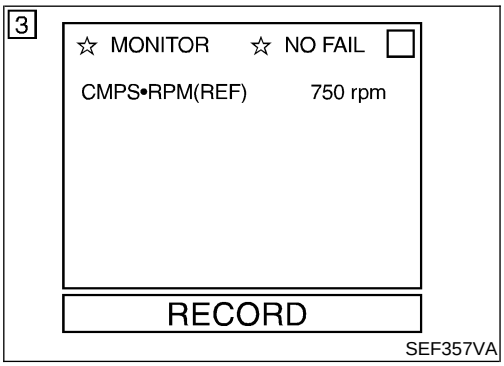
With GST

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Select "MODE 7" with GST.

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

No Tools

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.



PROCEDURE FOR MALFUNCTION B

NAEC0051S02

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

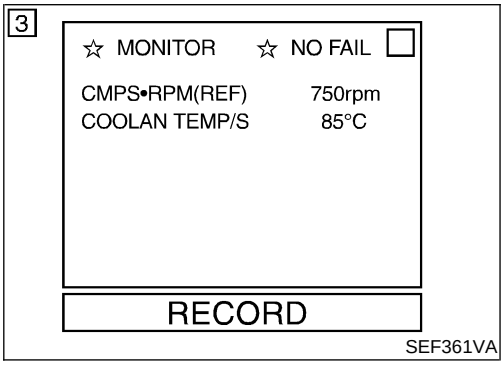
With GST

1) Start engine and wait 5 seconds at most.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

No Tools

1) Start engine and wait 5 seconds at most.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

NOTE:
If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.



PROCEDURE FOR MALFUNCTION C

NAEC0051S03

NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up to normal operating temperature.
4) Run engine for at least 10 seconds at idle speed.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

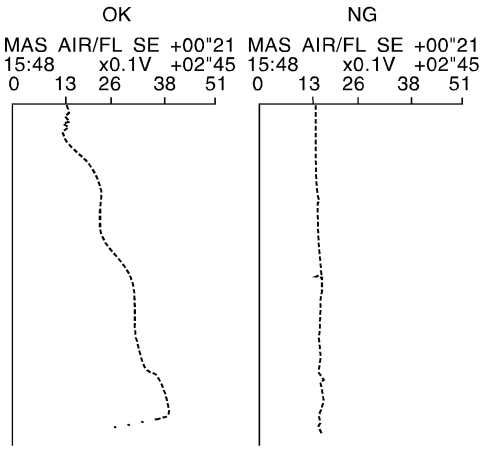
With GST

1) Start engine and warm it up to normal operating temperature.
2) Run engine for at least 10 seconds at idle speed.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

No Tools

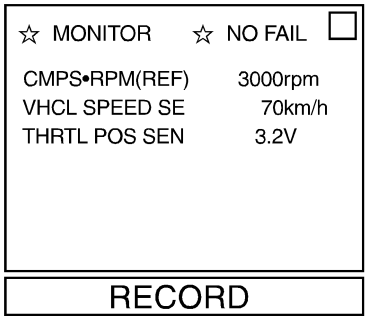
1) Start engine and warm it up to normal operating temperature.
2) Run engine for at least 10 seconds at idle speed.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

6

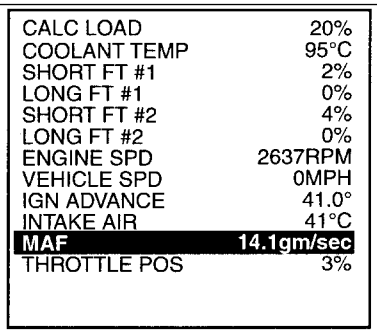


SEF998NA

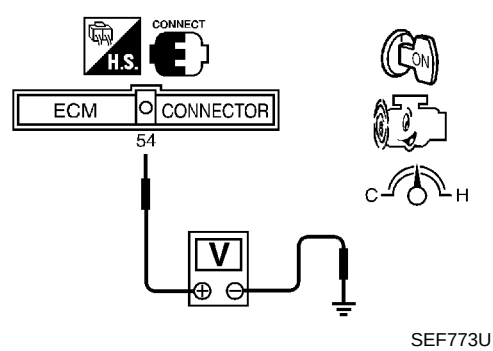
7



SEF362VA



SEF534P



SEF773U

PROCEDURE FOR MALFUNCTION D

NAEC0051S04

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-152.**
3) Select "DATA MONITOR" mode with CONSULT.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-152.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

CMPS·RPM (REF)	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-152.

Overall Function Check

NAEC0051S0401

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-152.

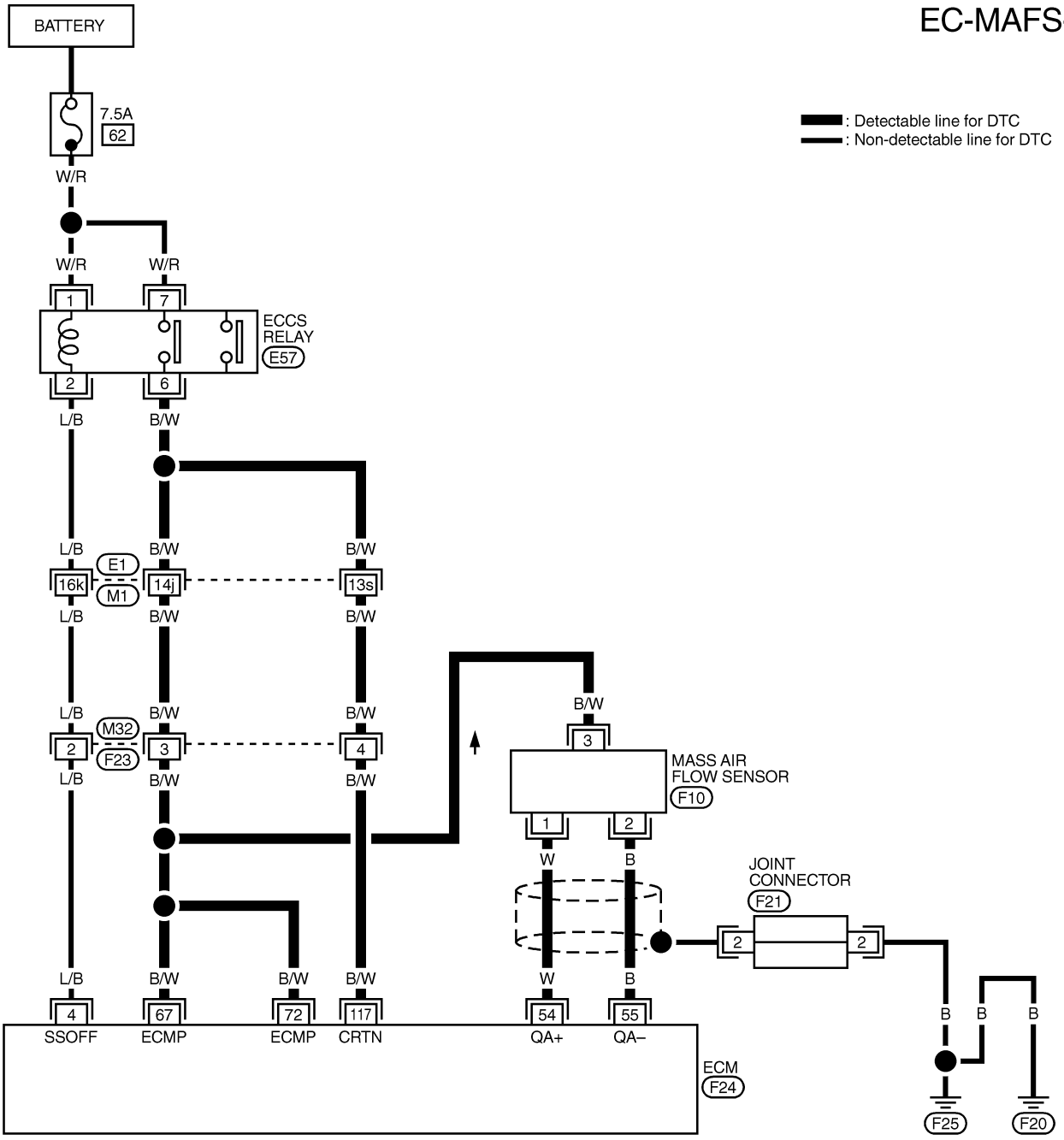
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.
3) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
4) If NG, go to "Diagnostic Procedure", EC-152.

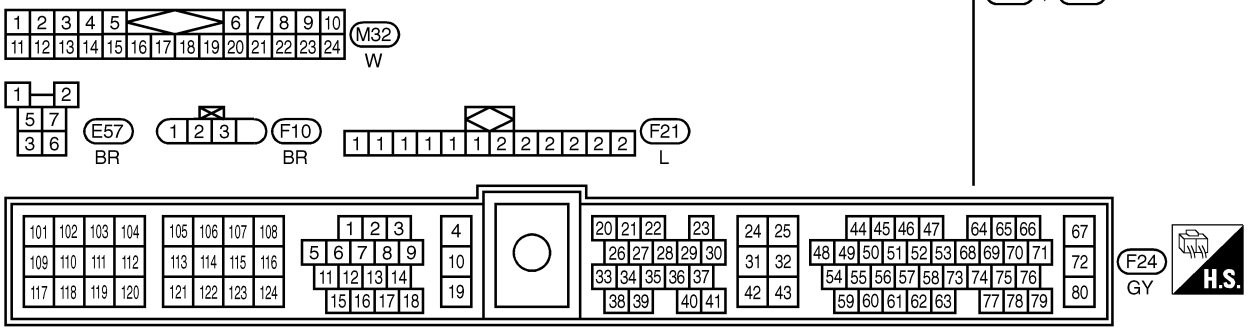
Wiring Diagram

NAEC0052

EC-MAFS-01



Refer to last page (Foldout page).
M1 , E1



MEC661C

Diagnostic Procedure

NAEC0053

1	INSPECTION START

Which malfunction (A, B, C or D) is duplicated?

MALFUNCTION	Type
A and/or C	I
B and/or D	II

MTBL0063

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

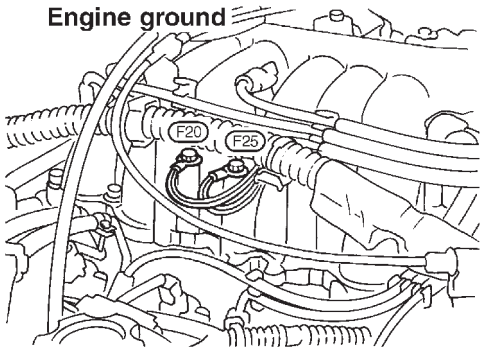
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

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

3	RETIGHTEN GROUND SCREWS

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

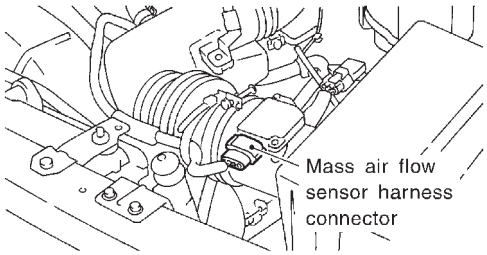


SEF031S

	▶	GO TO 4.

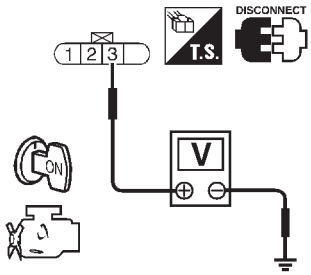
4	CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



SEF746U

2. Turn ignition switch "ON".
3. Check voltage between terminal 3 and ground with CONSULT or tester.



SEF682U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

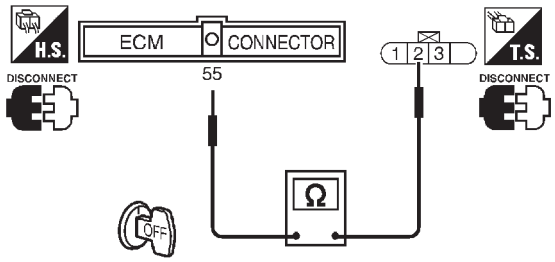
Check the following.
- Harness connectors F23, M32
- Harness connectors M1, E1
- Harness for open or short between ECCS relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal 2 and ECM terminal 55.



SEF683U

Continuity should exist.

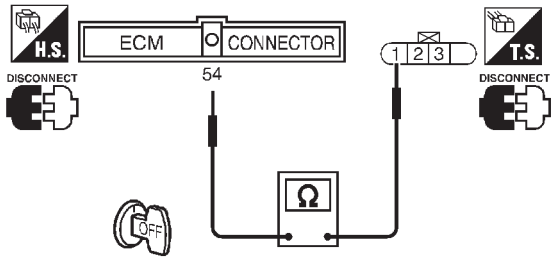
4. Also check harness for short to ground and short to power.

OK or NG

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

7	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between terminal 1 and ECM terminal 54.



SEF684U

Continuity should exist.

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

OK or NG

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

8	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-155.

OK or NG

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

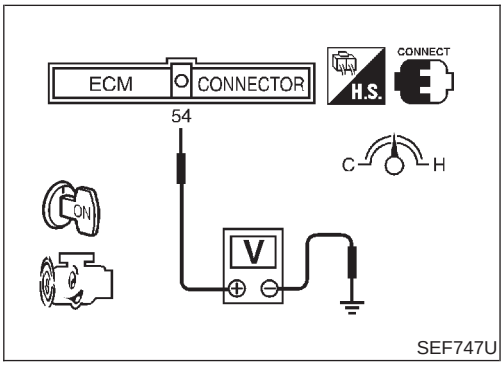
9	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector F21.
3. Check the following.
- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to "HARNESS LAYOUT" in EL section.)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

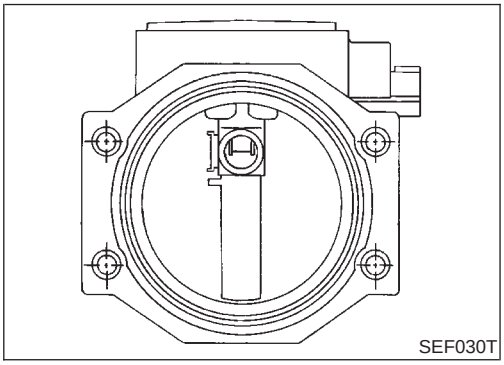
OK or NG

OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF747U


SEF030T

Component Inspection

NAEC0054

MASS AIR FLOW SENSOR

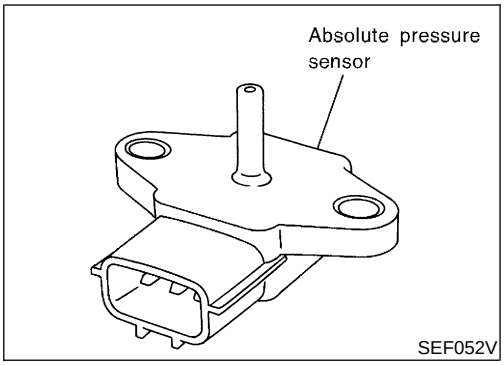
NAEC0054S01

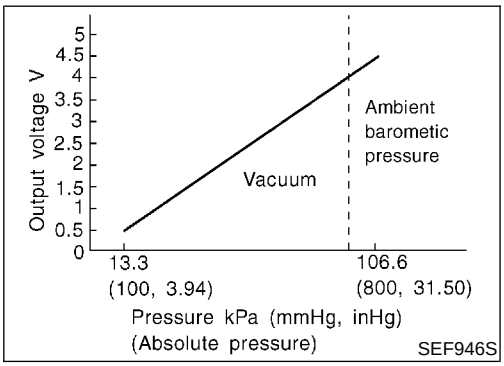
1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again.
   Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.





Component Description

NAEC0055

The absolute pressure sensor is connected to the MAP/BARO switch solenoid valve by a hose. The sensor detects ambient barometric pressure and intake manifold absolute pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.

On Board Diagnosis Logic

NAEC0056

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0105 0803	A)	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (Absolute pressure sensor circuit is open or shorted.) • Absolute pressure sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving conditions.	• Hoses (Hoses between the intake manifold and absolute pressure sensor are disconnected or clogged.) • Intake air leaks • MAP/BARO switch solenoid valve • Absolute pressure sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving conditions.	• Absolute pressure sensor

DTC Confirmation Procedure

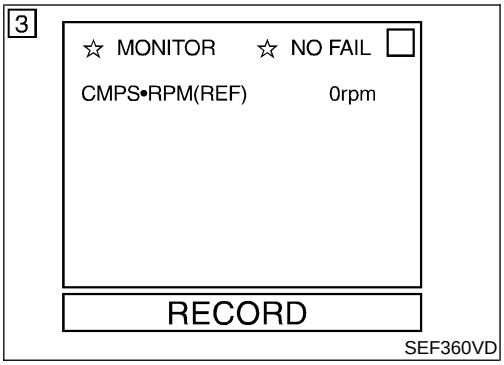
NAEC0057

Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

If the 1st trip DTC is not confirmed on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NAEC0057S01

With CONSULT

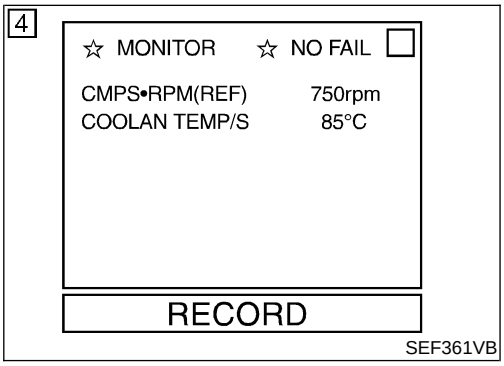
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

With GST

1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

No Tools

1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.



PROCEDURE FOR MALFUNCTION B

NAEC0057S02

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and let it idle.
5) Wait at least 15 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

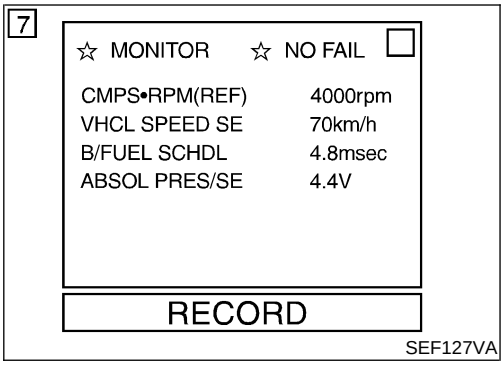
With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

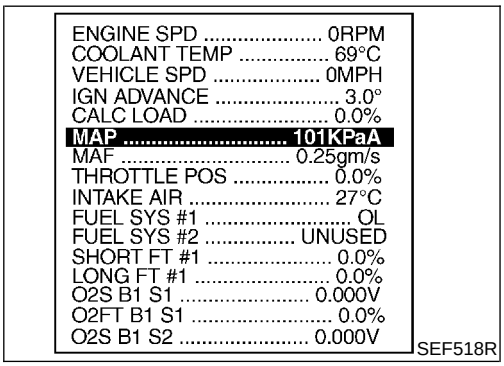
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine.
4) Let engine idle and wait at least 15 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

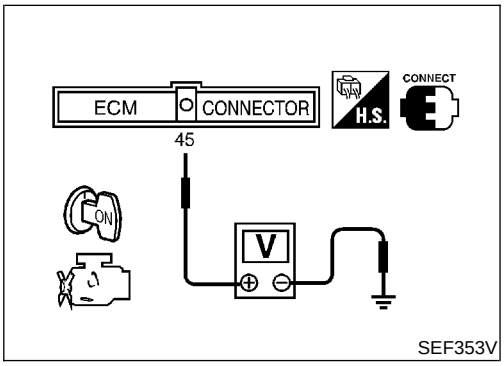
DTC Confirmation Procedure (Cont'd)



SEF127VA



SEF518R



SEF353V

PROCEDURE FOR MALFUNCTION C

NAEC0057S04

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
   The voltage of "ABSOL PRES/SE" should be more than 1.74 [V].
   If the check result is NG, go to "Diagnostic Procedure", EC-160.
   If the check result is OK, go to following step.
3) Start engine and warm it up to normal operating temperature.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Start engine and let it idle for at least 13 seconds.
6) Select "DATA MONITOR" mode with CONSULT.
7) Drive the vehicle at least 3 consecutive seconds under the following conditions,

CMPS·RPM (REF)	3,000 - 4,800 rpm
B/FUEL SCHDL	More than 4.6 msec
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-160.

Overall Function Check

NAEC0522

PROCEDURE FOR MALFUNCTION C

NAEC0522S01

Use this procedure to check the overall function of the absolute pressure sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Turn ignition switch "ON".
2) Select absolute pressure sensor signal in "MODE 1" with GST.
3) Make sure that the signal is more than 46 kPa (0.47 kg/cm^2, 6.7 psi).
4) If NG, go to "Diagnostic Procedure", EC-160.

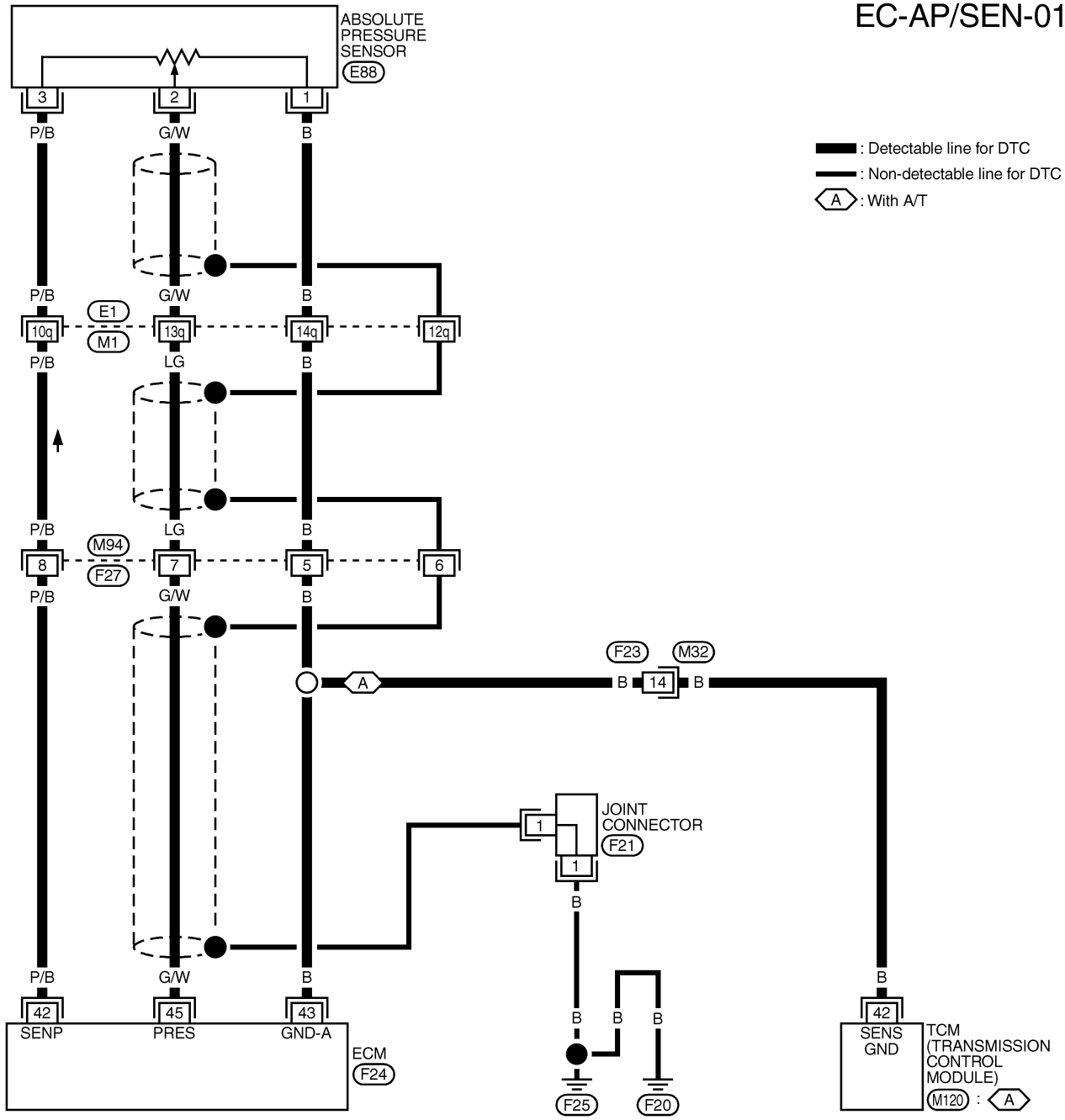
No Tools

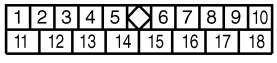
1) Turn ignition switch "ON".
2) Make sure that the voltage between ECM terminal 45 (Absolute pressure sensor signal) and ground is more than 1.74 [V].
3) If NG, go to "Diagnostic Procedure", EC-160.

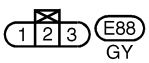
Wiring Diagram

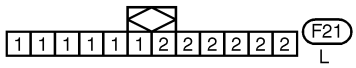
NAEC0058

EC-AP/SEN-01

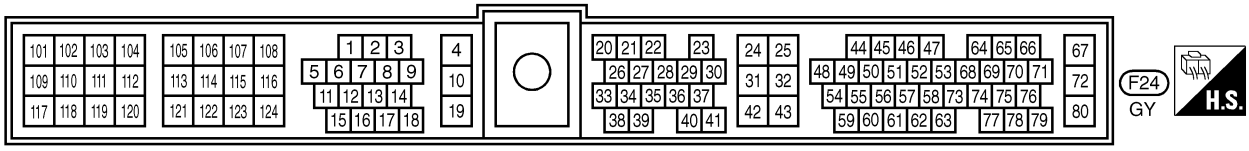








Refer to last page (Foldout page).
M1 , E1
M120



MEC662C

Diagnostic Procedure

NAEC0059

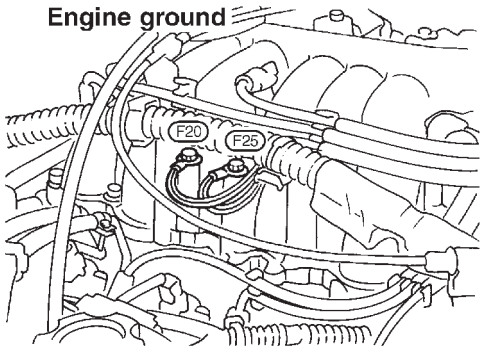
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A or C", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B", EC-163.

PROCEDURE A

NAEC0059S01

1	RETIGHTEN GROUND SCREWS

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

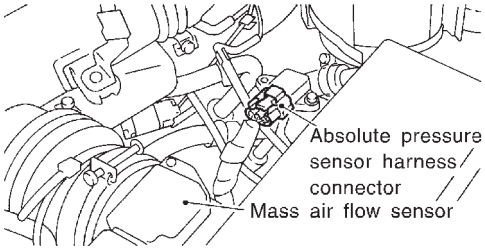


SEF031S

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.



SEF748U

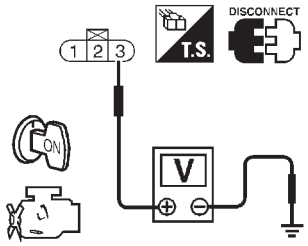
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between terminal 3 and engine ground with CONSULT or tester.



SEF685U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

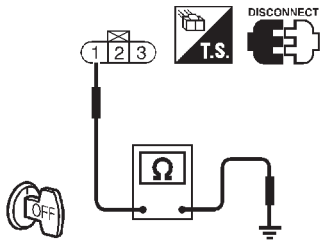
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F27, M94
- Harness connectors M1, E1
- Harness for open or short between ECM and absolute pressure sensor

	▶	Repair harness or connectors.

5	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF686U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

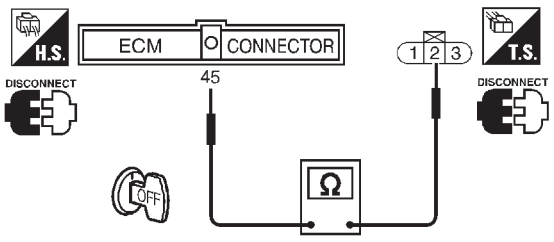
Check the following.
- Harness connectors F27, M94
- Harness connectors M1, E1
- Harness for open or short between ECM and absolute pressure sensor
- Harness connectors F23, M32
- Harness for open or short between TCM (Transmission control module) and absolute pressure sensor

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

Diagnostic Procedure (Cont'd)

7	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 45 and terminal 2.



SEF687U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F27, M94
- Harness connectors M1, E1
- Harness for open or short between ECM and absolute pressure sensor

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

9	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-166.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace absolute pressure sensor.

10	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector.
3. Check the following.
- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to EL-312, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

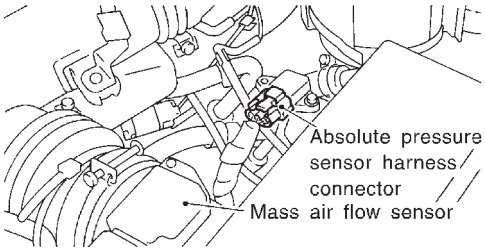
	▶	**INSPECTION END**

PROCEDURE B

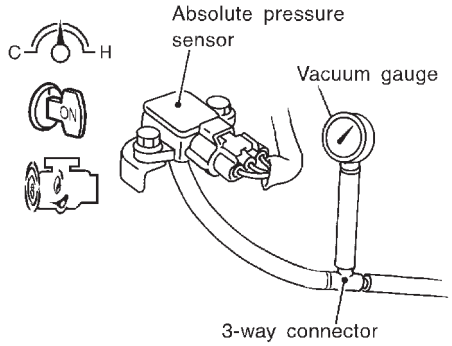
=NAEC0059S02

1	INSPECTION START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Attach the vacuum gauge between the absolute pressure sensor and the rubber tube connected to the MAP/BARO switch solenoid valve.



SEF748U



SEF385U

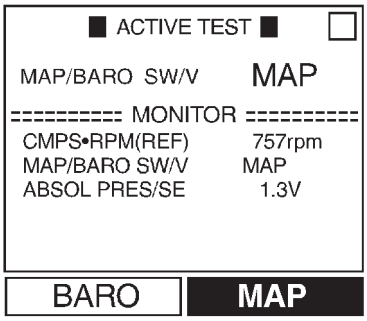
Models with CONSULT	▶	GO TO 2.
Models without CONSULT	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

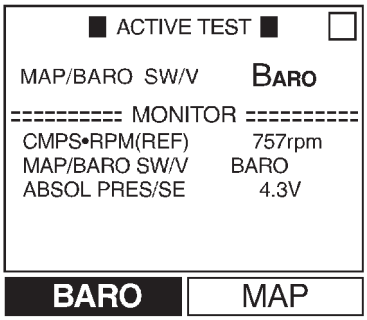
2	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(With CONSULT)

1. Start engine and let it idle.
2. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "MAP" and "BARO" alternately and check for vacuum.



SEF396V



SEF397V

MAP/BARO SW/V	Vacuum
BARO	Should not exist
MAP	Should exist

MTBL0079

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

3	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(Without CONSULT)

1. Start engine and let it idle.
2. Check for vacuum under the following condition.

Condition	Vacuum
For 5 seconds after starting engine	Should not exist
More than 5 seconds after starting engine	Should exist

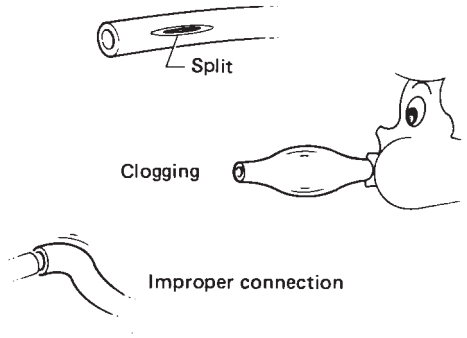
MTBL0080

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

4	CHECK VACUUM HOSE

1. Turn ignition switch "OFF".
2. Check vacuum hose for clogging, cracks, disconnection or improper connection.



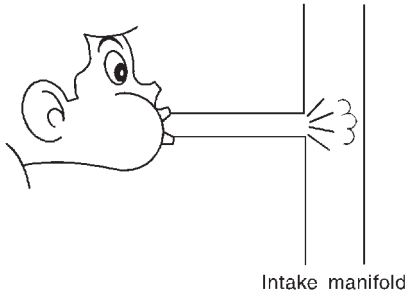
SEF109L

OK or NG

OK	▶	GO TO 5.
NG	▶	Clean, repair or replace the hose.

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean or repair the vacuum port.

6	CHECK MAP/BARO SWITCH SOLENOID VALVE

Refer to "Component Inspection", EC-450.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace MAP/BARO switch solenoid valve.

7	CHECK INTAKE SYSTEM

Check intake system for air leaks.

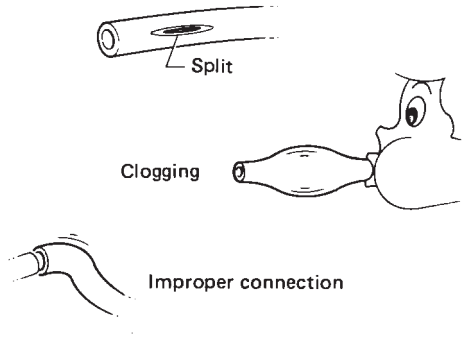
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

8	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE

1. Turn ignition switch "OFF".
2. Check hose for clogging, cracks, disconnection or improper connection.



SEF109L

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or reconnect hose.

9	CHECK HARNESS CONNECTOR

1. Disconnect absolute pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace harness connector.

10	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-166.

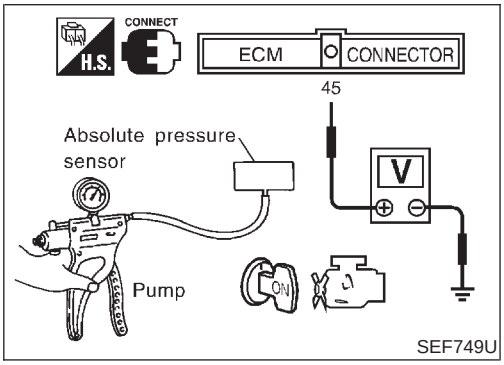
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace absolute pressure sensor.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF749U

Component Inspection

NAEC0060

ABSOLUTE PRESSURE SENSOR

NAEC0060S01

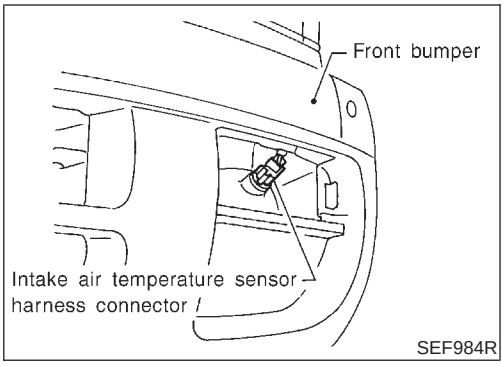
1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch "ON" and check output voltage between ECM terminal 45 and engine ground.
   The voltage should be 3.2 to 4.8V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.

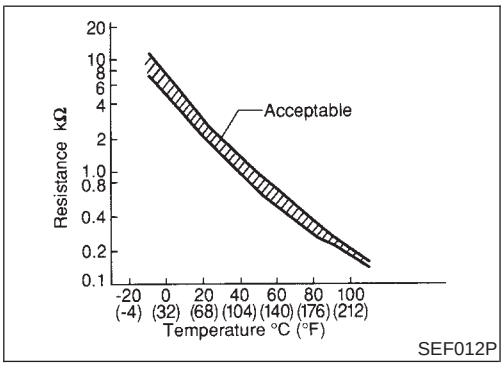
The voltage should be 1.0 to 1.4V lower than the value measured in step 3.

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

5. If NG, replace absolute pressure sensor.





Component Description

NAEC0061

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

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0062

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0110 0401	A)	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

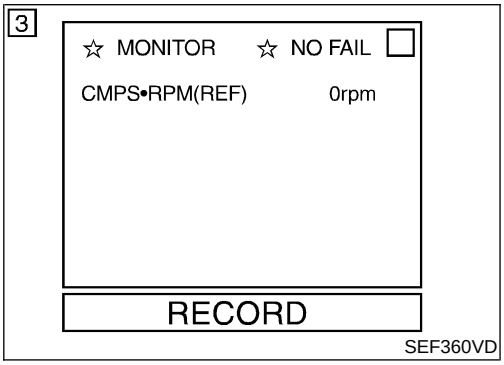
DTC Confirmation Procedure

NAEC0063

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NAEC0063S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.

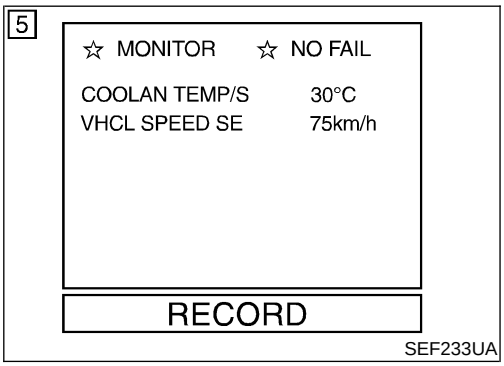
With GST

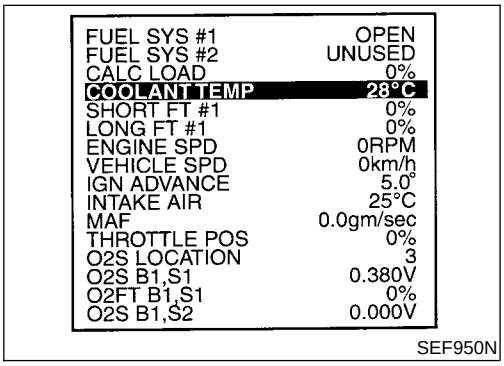
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 7 with GST.

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.

No Tools

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.





PROCEDURE FOR MALFUNCTION B

NAEC0063S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT

1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".
b) Select "DATA MONITOR" mode with CONSULT.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2) Turn ignition switch "ON".
3) Select "DATA MONITOR" mode with CONSULT.
4) Start engine.
5) Hold vehicle speed more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.

With GST

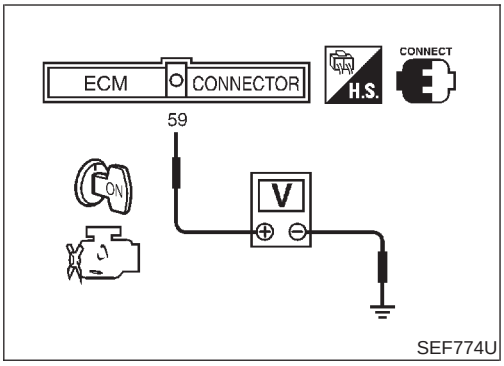
1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".
b) Select MODE 1 with GST.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2) Start engine.
3) Hold vehicle speed more than 70 km/h (43 MPH) for 100 consecutive seconds.
4) Select MODE 7 with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.

DTC Confirmation Procedure (Cont'd)



No Tools

1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".

b) Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.

Voltage: More than 1.0 (V)

c) If the voltage is not more than 1.0 (V), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before the voltage is below 1.0V.

2) Start engine.

3) Hold vehicle speed more than 70 km/h (43 MPH) for 100 consecutive seconds.

4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

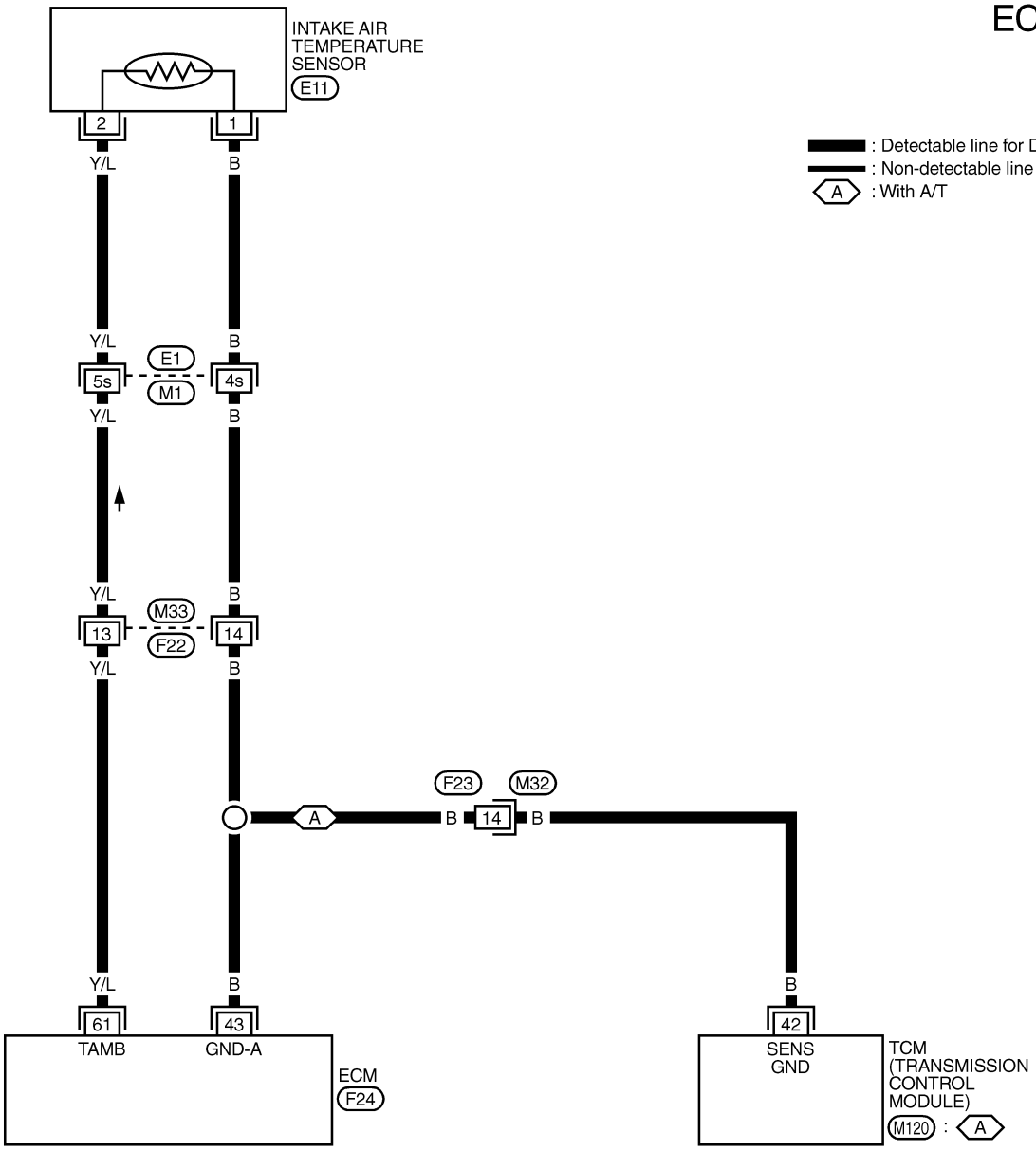
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

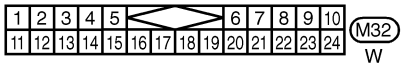
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-172.

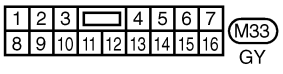
Wiring Diagram

NAEC0064

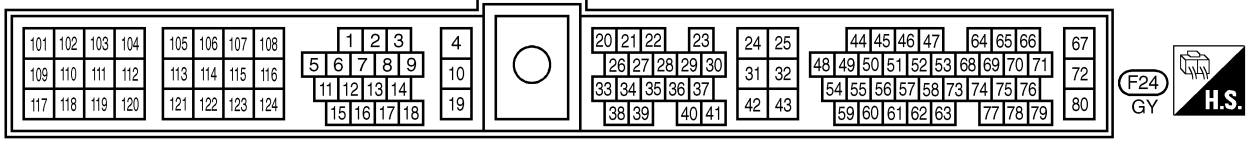
EC-IATS-01







Refer to last page (Foldout page).
M1 , E1
M120



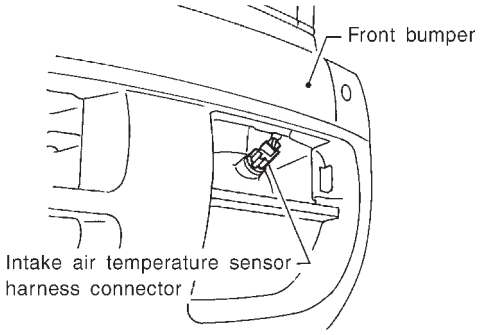
MEC663C

Diagnostic Procedure

NAEC0065

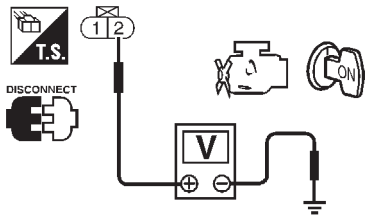
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect intake air temperature sensor harness connector.



SEF984R

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and ground.



SEF688U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

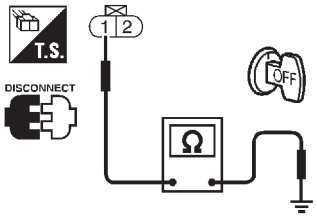
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness connectors M1, E1
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF689U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness connectors F23, M32
- Harness connectors M1, E1
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between TCM (Transmission control module) and intake air temperature sensor

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

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-174.

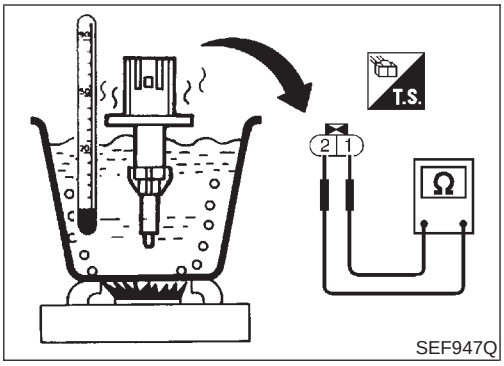
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

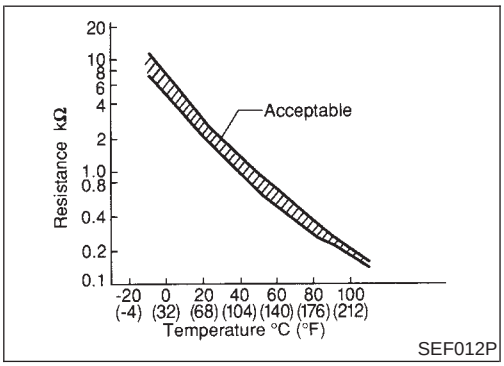
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF947Q



SEF012P

Component Inspection

=NAEC0066

INTAKE AIR TEMPERATURE SENSOR

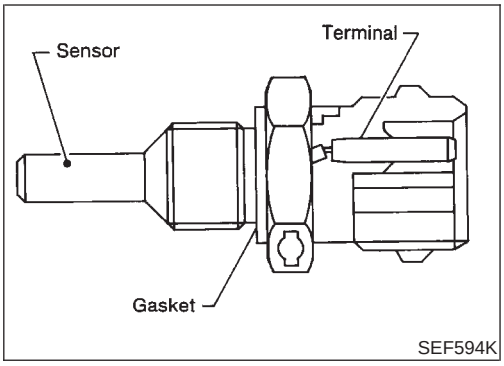
NAEC0066S01

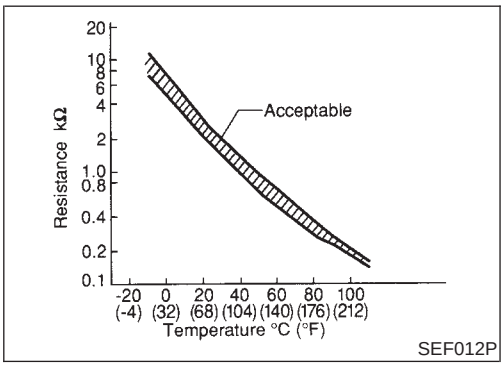
Check resistance as shown in the figure.

<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.





Component Description

NAEC0067

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

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

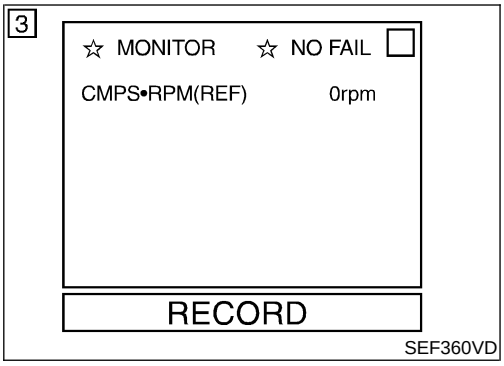
On Board Diagnosis Logic

NAEC0068

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115 0103	• An excessively high or low voltage from the sensor is sent to ECM.*	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor

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

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)



DTC Confirmation Procedure

=NAEC0069

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-178.

With GST

1) Turn ignition switch “ON” and wait at least 5 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-178.

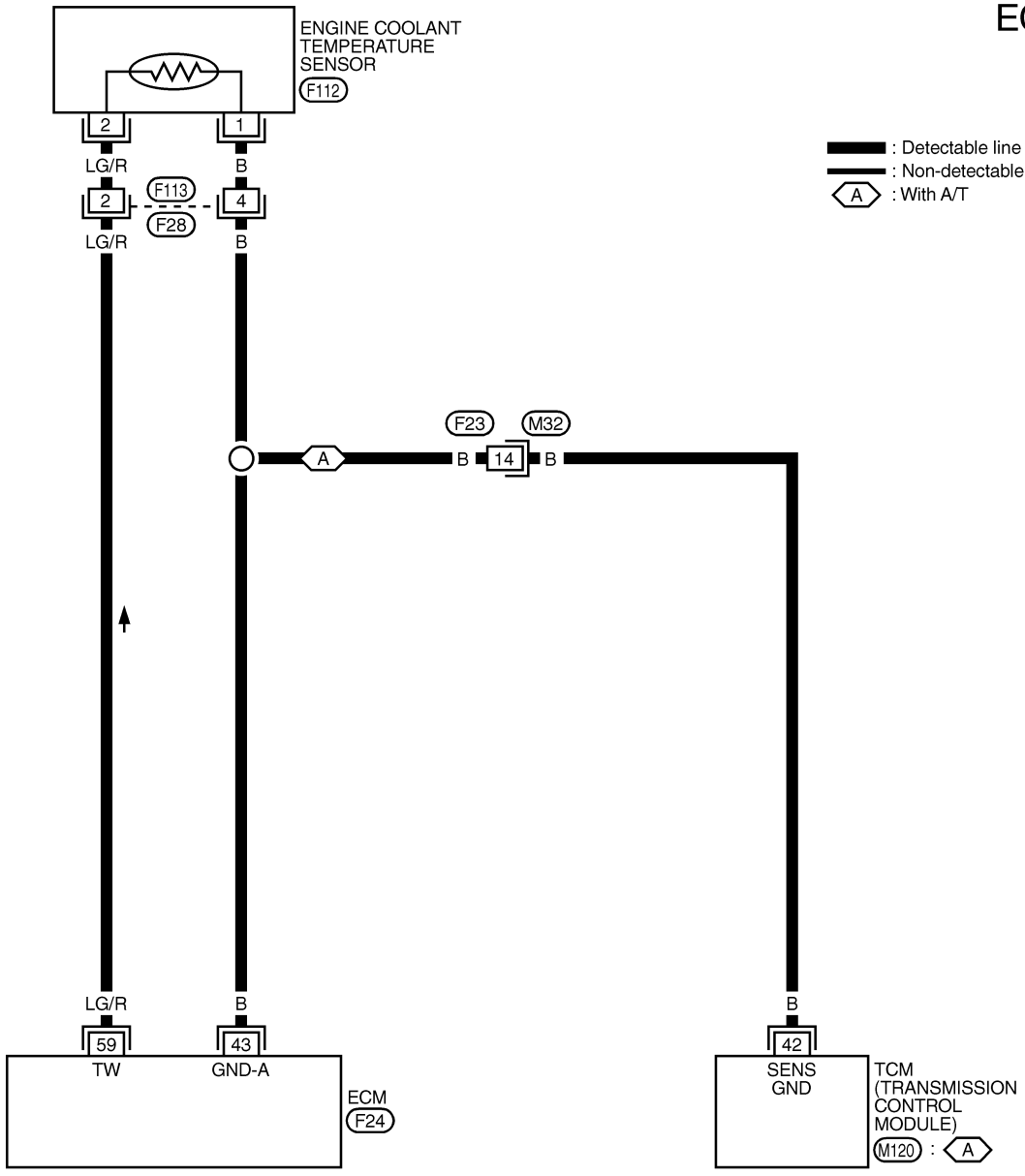
No Tools

1) Turn ignition switch “ON” and wait at least 5 seconds.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-178.

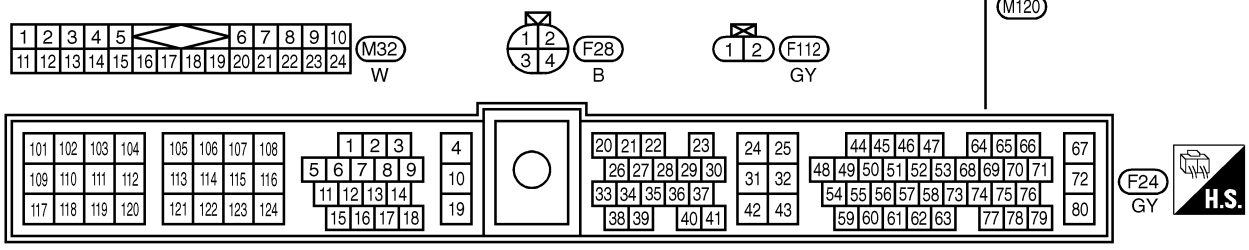
Wiring Diagram

NAEC0070

EC-ECTS-01



Refer to last page (Foldout page).
M120



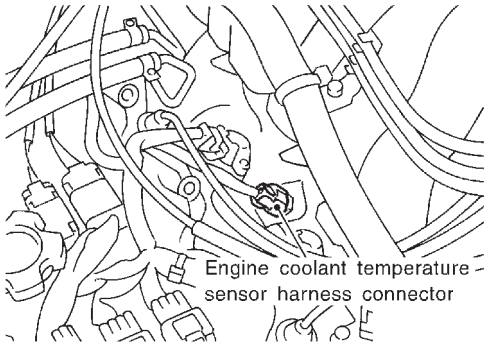
MEC664C

Diagnostic Procedure

NAEC0071

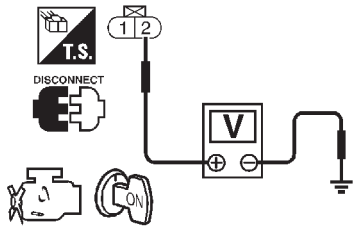
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor harness connector.



SEF750U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF690U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

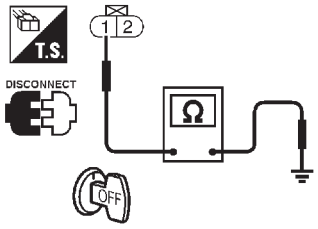
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, F113
- Harness for open or short between ECM and engine coolant temperature sensor

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

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF691U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, F113
- Harness connectors F23, M32
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor

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

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-180.

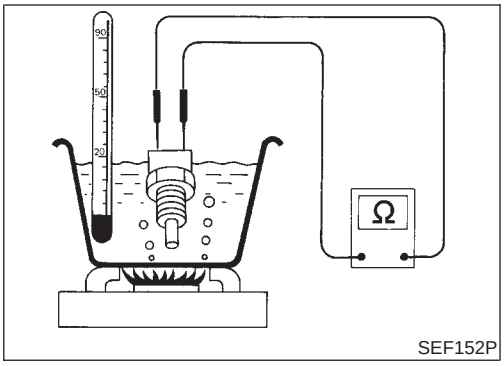
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

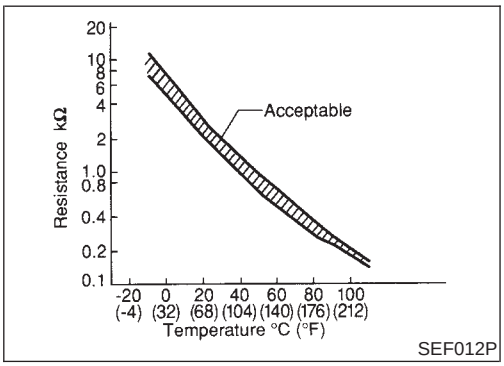
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NAEC0072

ENGINE COOLANT TEMPERATURE SENSOR

NAEC0072S01

Check resistance as shown in the figure.

<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

Description

NAEC0073

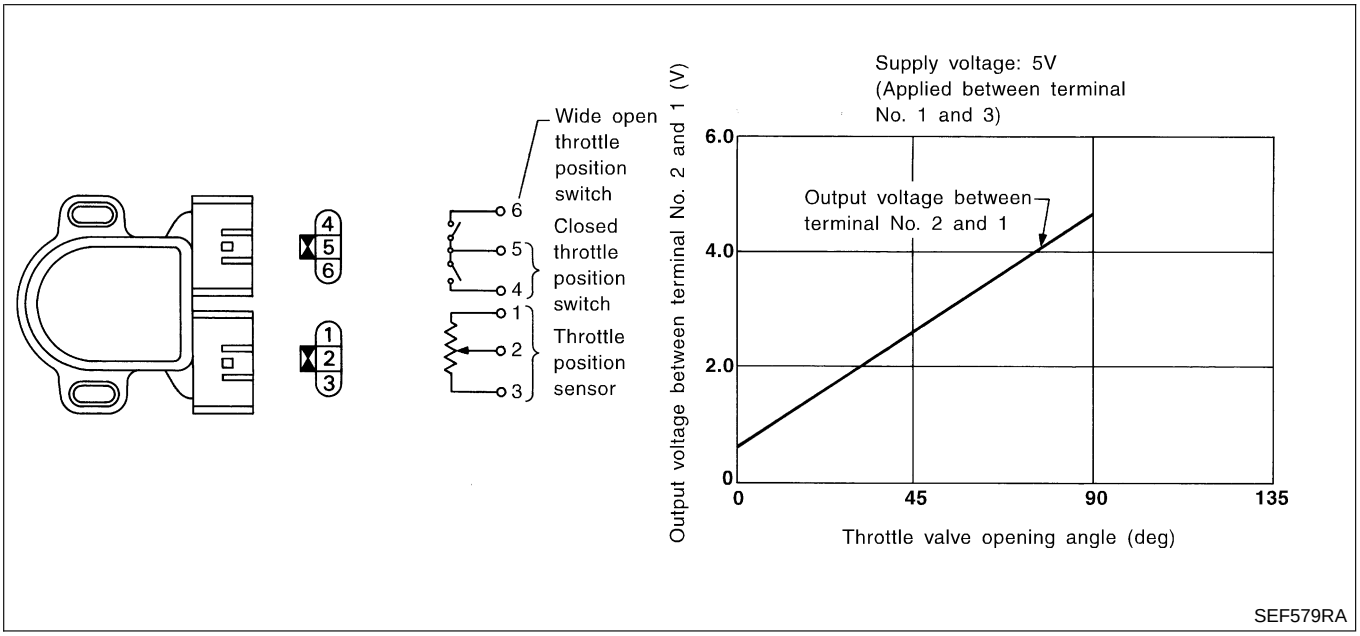
NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform "DTC P0510 CLOSED THROTTLE POSITION SWITCH", EC-424.

COMPONENT DESCRIPTION

NAEC0073S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



SEF579RA

CONSULT Reference Value in Data Monitor Mode

NAEC0074

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Engine: After warming up. • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed (a)	0.15 - 0.85V
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully opened (b)	3.5 - 4.7V
ABSOL TH·P/S	• Engine: After warming up. • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NAEC0075

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	W	Throttle position sensor	**[Ignition switch "ON"]** ● **Warm-up condition** ● More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
37	P	Throttle position sensor signal to TCM	**[Ignition switch "ON"]** ● **Warm-up condition** ● More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
42	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0076

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	A)	An excessively low or high voltage from the sensor is sent to ECM*.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving conditions.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving conditions.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

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

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

NAEC0077

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

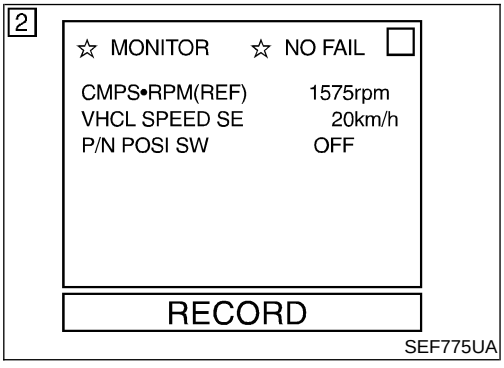
NAEC0077S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**



With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

With GST

1) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

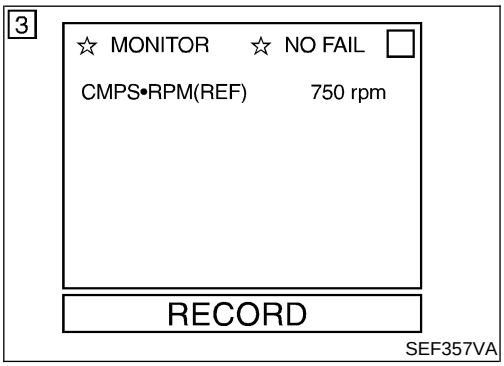
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

No Tools

1) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.



PROCEDURE FOR MALFUNCTION B

NAEC0077S02

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

With GST

1) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

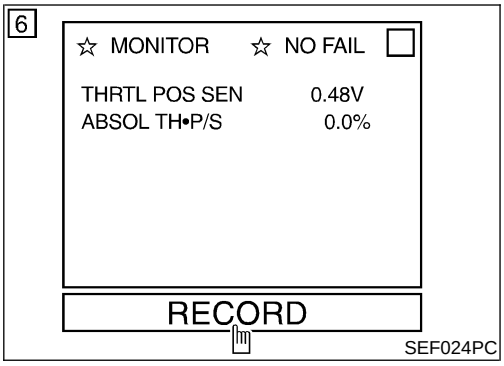
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

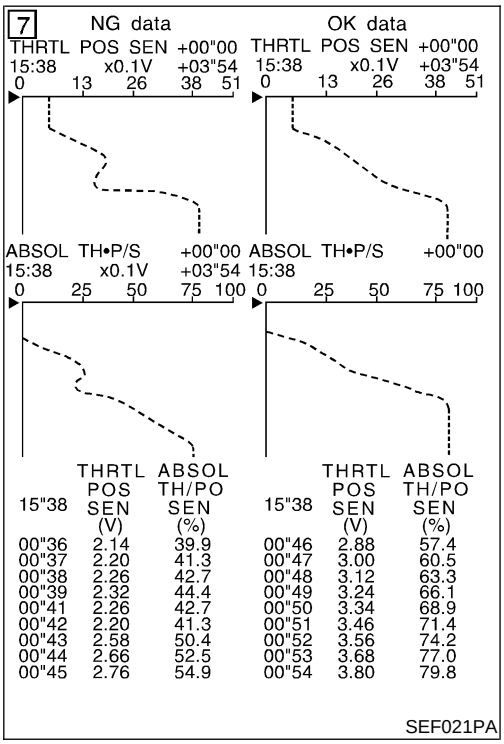
No Tools

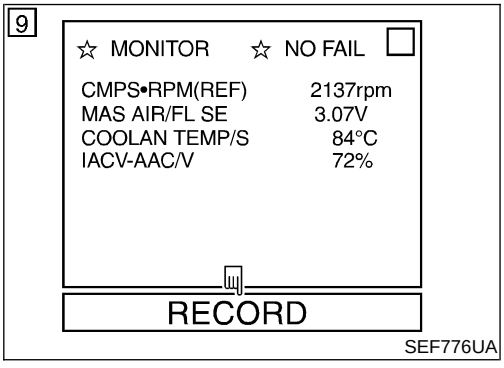
1) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.







PROCEDURE FOR MALFUNCTION C

NAEC0077S03

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT.
6) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
7) Print out the recorded graph and check the following:

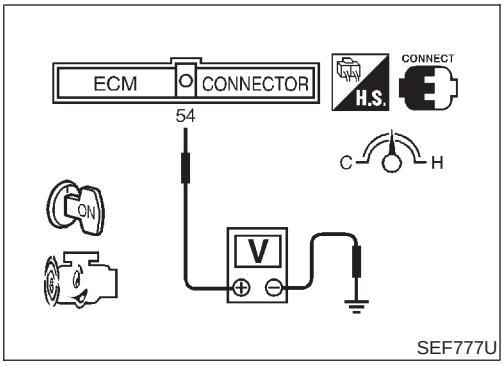
- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.
  If NG, go to "Diagnostic Procedure", EC-188.
  If OK, go to following step.

8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT.
9) Maintain the following conditions for at least 10 consecutive seconds.

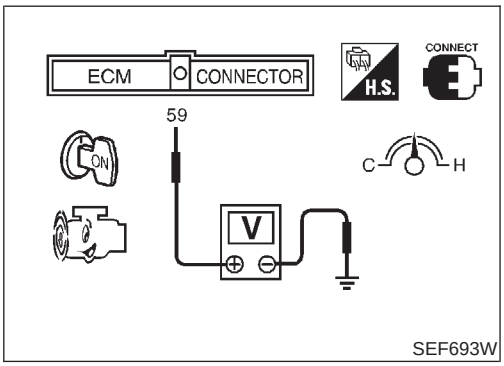
CMPS·RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

DTC Confirmation Procedure (Cont'd)



SEF777U



SEF693W

With GST

1) Start engine and warm it up to normal operating temperature.
2) Maintain the following conditions for at least 10 consecutive seconds.

Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 54 (Mass air flow sensor signal) and ground	More than 3V

3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Maintain the following conditions for at least 10 consecutive seconds.

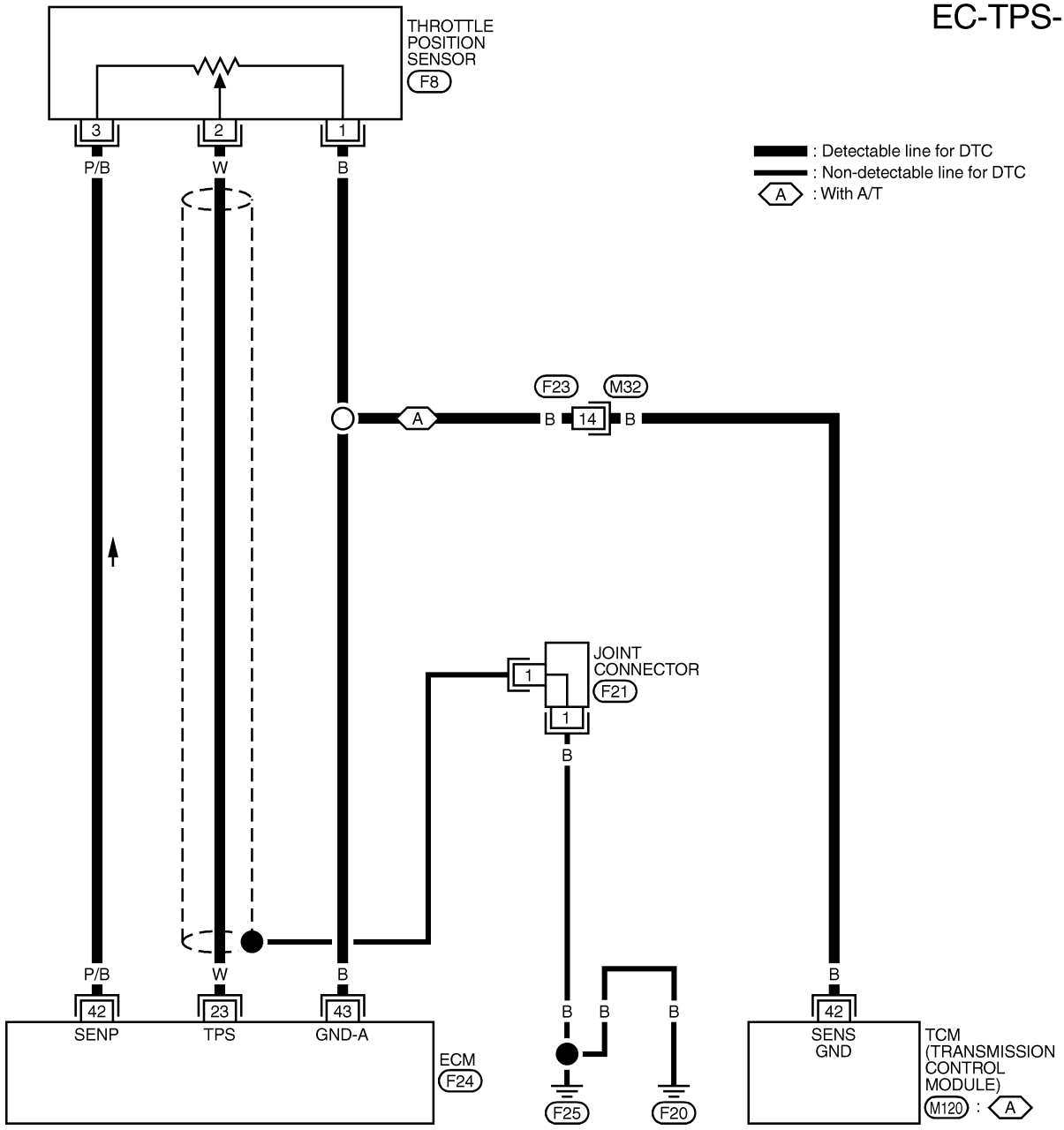
Gear position	Suitable position
Engine speed	More than 2,000 rpm
Voltage between ECM terminal 54 (Mass air flow sensor signal) and ground	More than 3V
Voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground	Less than 1.5V

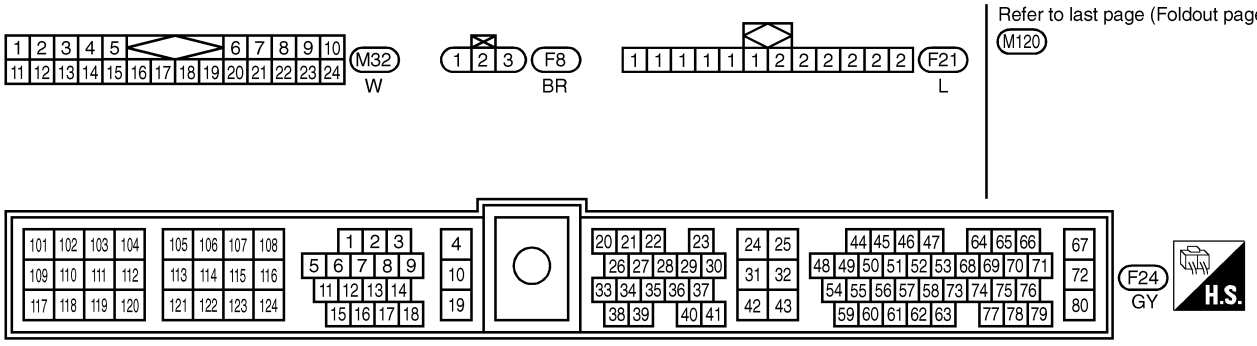
3) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

Wiring Diagram

NAEC0078

EC-TPS-01





MEC665C

Diagnostic Procedure

NAEC0079

1	INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

Type A or B	▶	GO TO 4.
Type C	▶	GO TO 2.

2	ADJUST THROTTLE POSITION SENSOR

Perform “Basic Inspection”, EC-99.

	▶	GO TO 3.

3	CHECK INTAKE SYSTEM

1. Turn ignition switch “OFF”.
2. Check the following for connection.

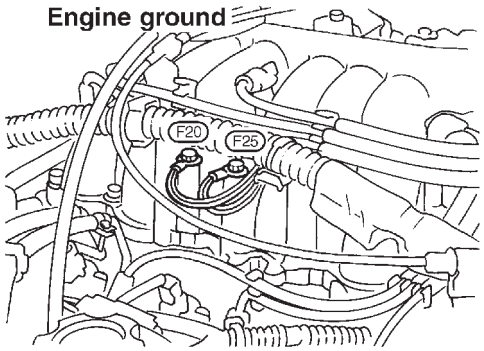
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

4	RETIGHTEN GROUND SCREWS

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

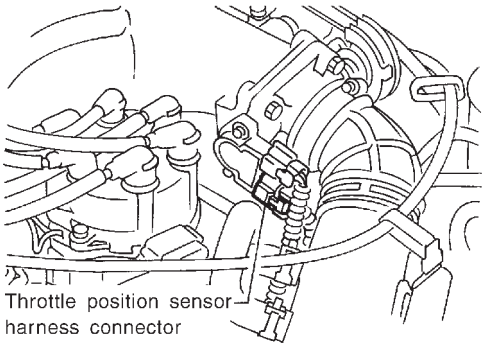


SEF031S

	▶	GO TO 5.

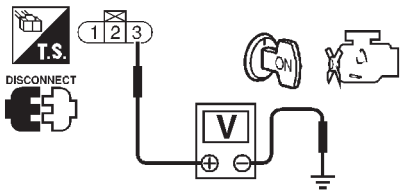
5	CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



SEF972R

2. Turn ignition switch "ON".
3. Check voltage between terminal 3 and ground with CONSULT or tester.



SEF692U

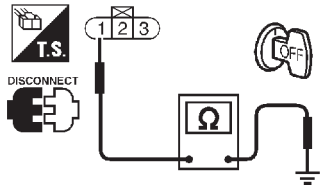
Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF693U

Continuity should exist.

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

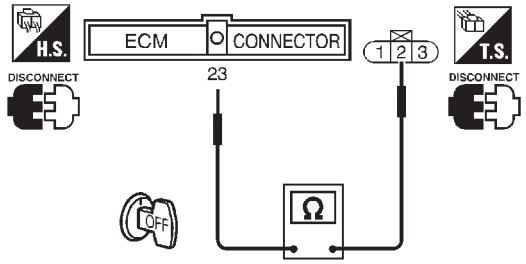
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F23, M32 ● Harness for open or short between ECM and throttle position sensor ● Harness for open or short between TCM (Transmission control module) and throttle position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 23 and terminal 2.	



SEF694U

Continuity should exist.

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

OK or NG

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

9	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-192.	

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-99.

10	CHECK MASS AIR FLOW SENSOR
Refer to "Component Inspection", EC-155.	

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

11	CHECK CAMSHAFT POSITION SENSOR
Refer to "Component Inspection", EC-345.	

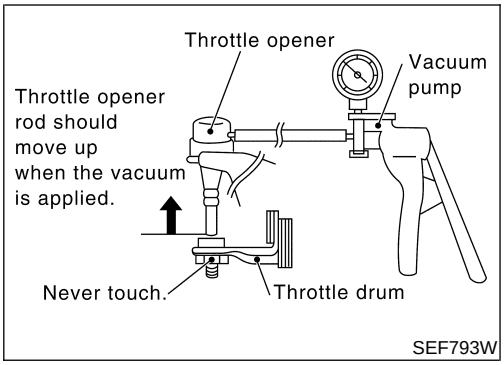
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace camshaft position sensor.

12	CHECK FUEL INJECTOR	
Refer to "Component Inspection", EC-561.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace fuel injector.

13	CHECK SHIELD CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal and ground ● Joint connector (Refer to EL-312, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**



Component Inspection

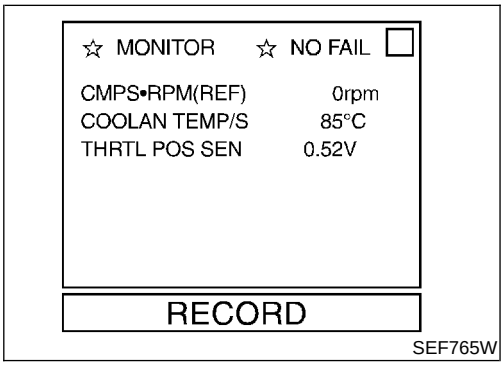
=NAEC0080

THROTTLE POSITION SENSOR

NAEC0080S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.

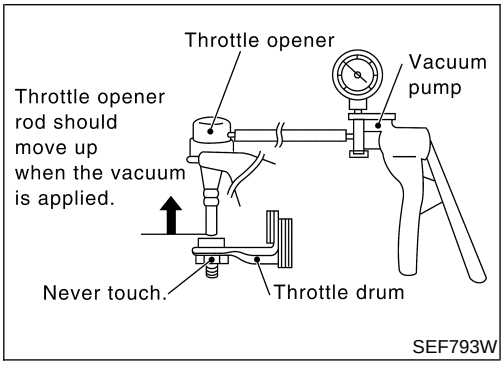


7) Select “DATA MONITOR” mode with CONSULT.
8) Check voltage of “THRTL POS SEN”.
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

If NG, adjust closed throttle position switch. Refer to “Basic Inspection”, EC-99.

9) If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.



Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine (ignition switch OFF).
3) Remove the vacuum hose connected to the throttle opener.
4) Connect suitable vacuum hose to the vacuum pump and the opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch ON.
7) Check voltage between ECM terminal 23 (Throttle position

sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-99.

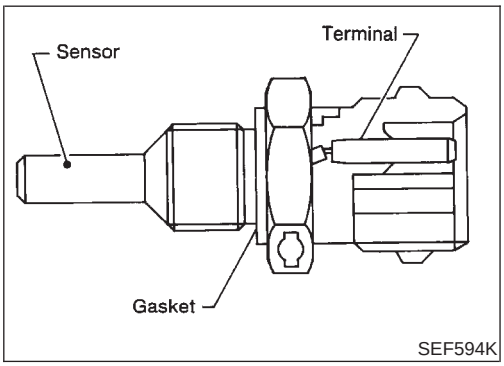
8) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

Description

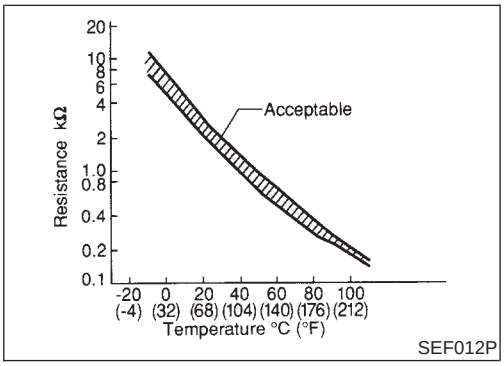
NAEC0081

NOTE:

- **If DTC P0125 (0908) is displayed with P0115 (0103), first perform "DTC P0115 ENGINE COOLANT TEMPERATURE (ECTS) SENSOR", EC-175.**



SEF594K



SEF012P

COMPONENT DESCRIPTION

NAEC0081S01

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

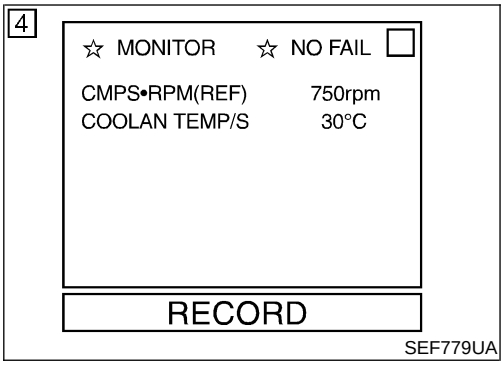
CAUTION:

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

On Board Diagnosis Logic

NAEC0082

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125 0908	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat



DTC Confirmation Procedure

NAEC0083

CAUTION:

Be careful not to overheat engine.

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

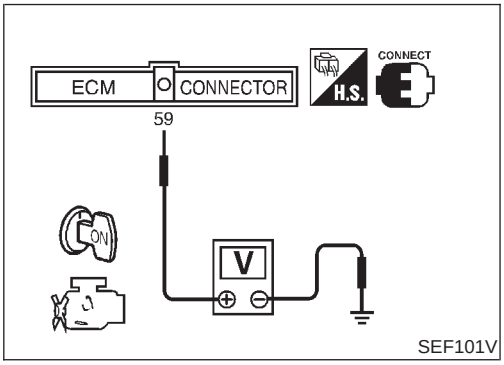
With CONSULT

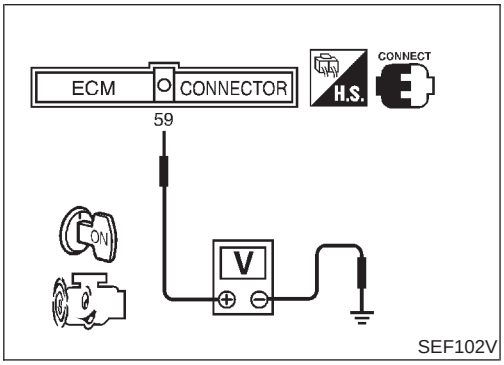
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-197.

If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

With GST

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Check that engine coolant temperature is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
   If engine coolant temperature increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-197.





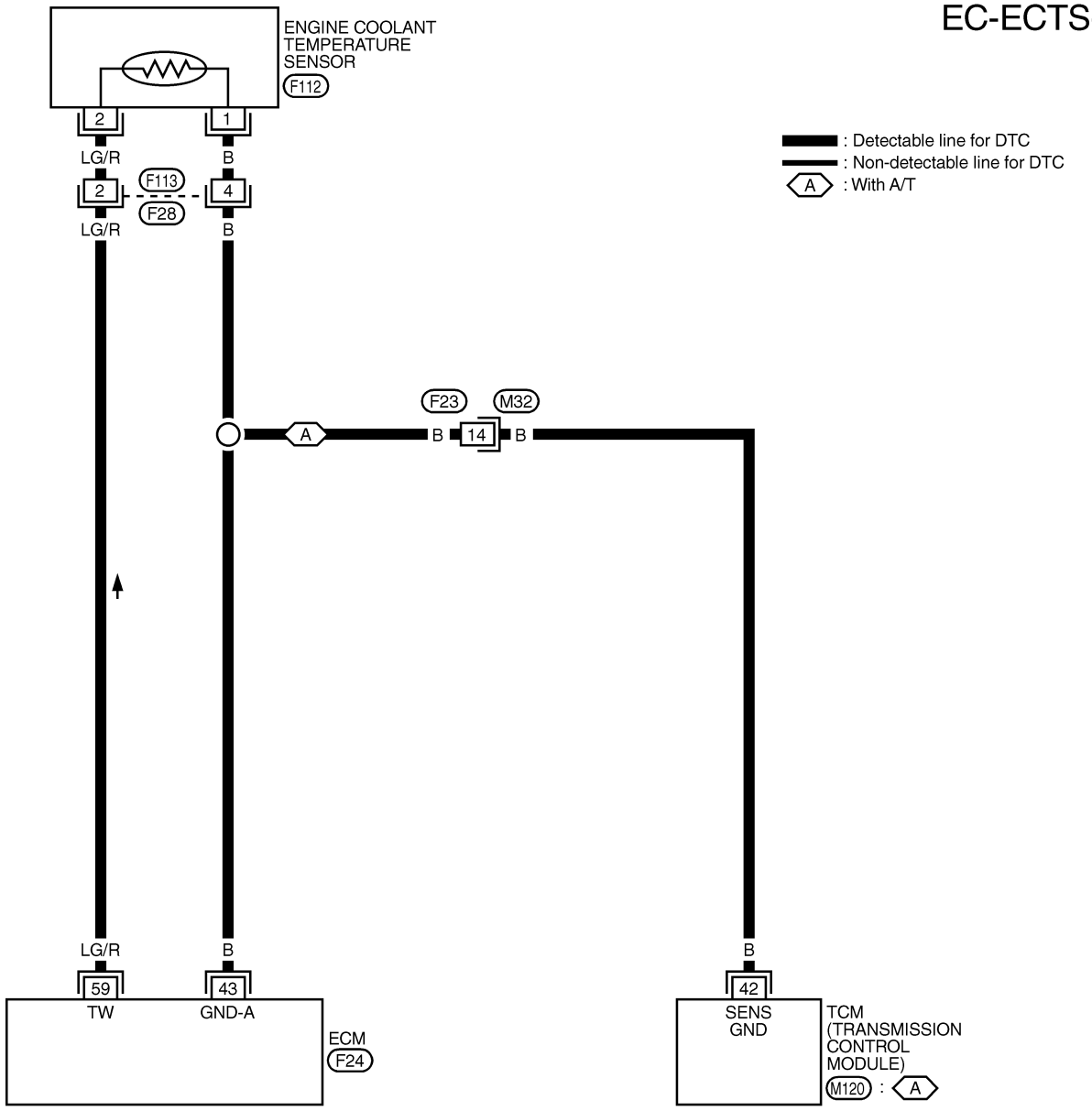
No Tools

1) Turn ignition switch "ON".
2) Check that voltage between ECN terminal 59 (Engine coolant temperature sensor signal) and ground is less than 3.8V.
   If it is less than 3.8V, the test result will be OK.
   If it is over 3.8V, go to following step.
3) Start engine and run it for 65 minutes at idle speed measuring voltage between ECM terminal 59 and ground.
   If the voltage decreases to less than 3.8V within 65 minutes, stop engine because the test result will be OK.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-197.

Wiring Diagram

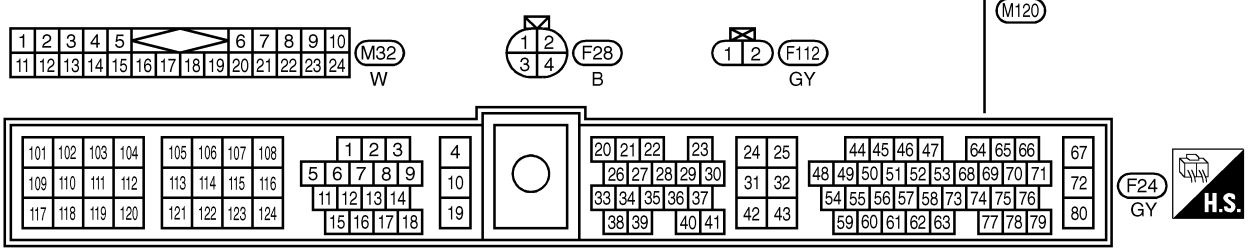
NAEC0084

EC-ECTS-01



Refer to last page (Foldout page).

M120



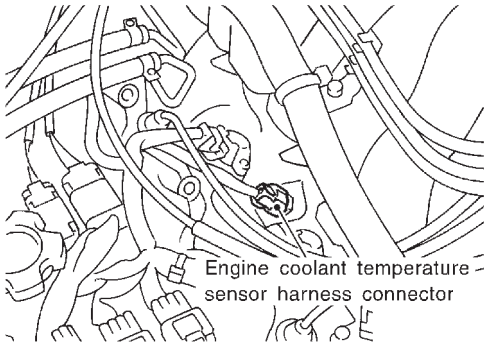
MEC664C

Diagnostic Procedure

NAEC0085

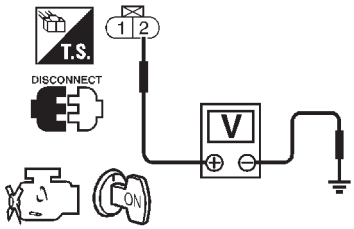
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor harness connector.



SEF750U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF690U

Voltage:
Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

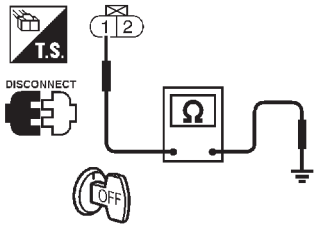
Check the following.
- Harness connectors F28 and F113
- Harness for open or short between ECM and engine coolant temperature sensor

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

Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF691U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, F113
- Harness connectors F23, M32
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor

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

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-199.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

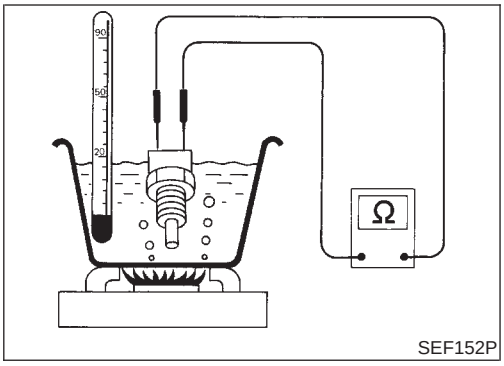
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to LC-10, "Thermostat", "ENGINE COOLING SYSTEM".

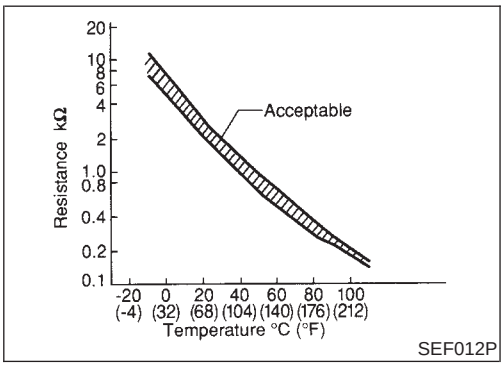
7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NAEC0086

ENGINE COOLANT TEMPERATURE SENSOR

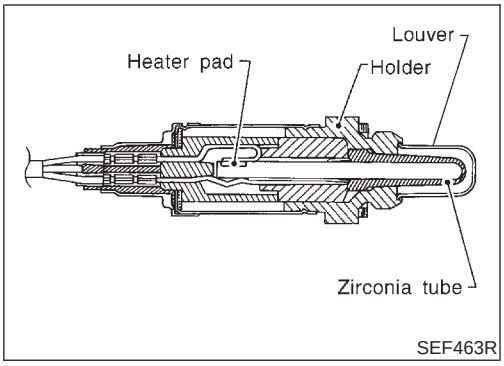
NAEC0086S01

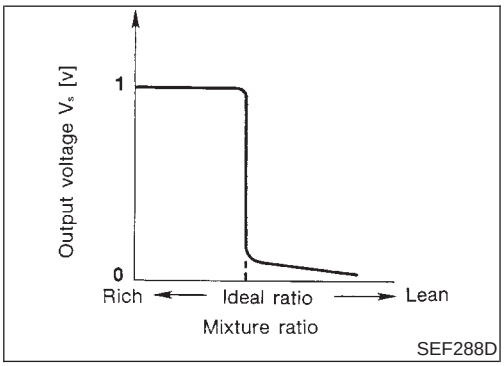
Check resistance as shown in the figure.

<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.





Component Description

NAEC0090

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT Reference Value in Data Monitor Mode

NAEC0091

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

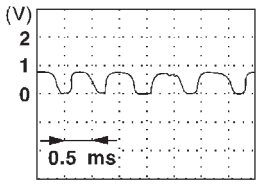
ECM Terminals and Reference Value

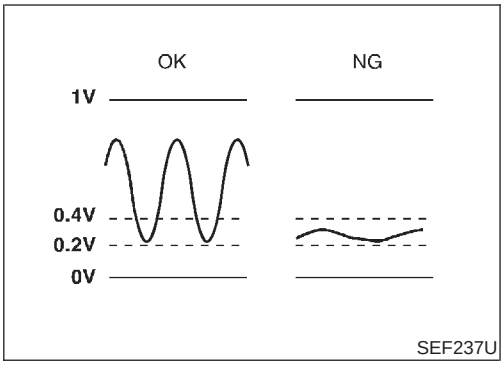
NAEC0092

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH		



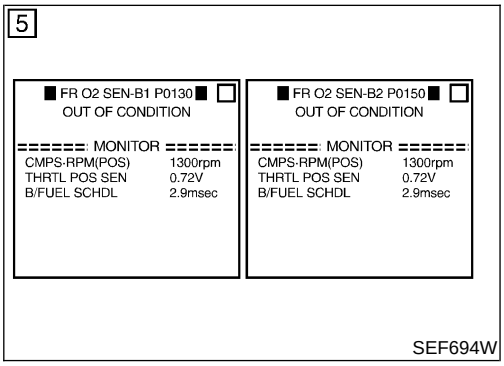
SEF237U

On Board Diagnosis Logic

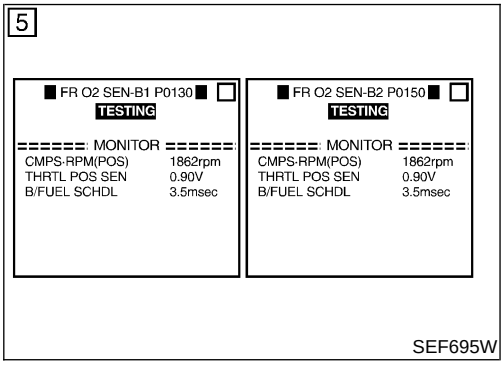
NAEC0093

Under the condition in which the front heated oxygen sensor signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

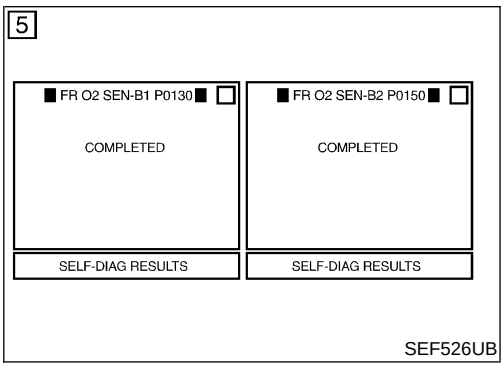
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0503 (Right bank)	• The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor
P0150 0303 (Left bank)		



SEF694W



SEF695W



SEF526UB

DTC Confirmation Procedure

NAEC0390

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

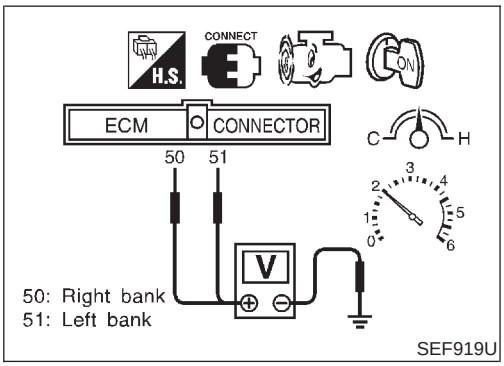
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "FR O2 SEN-B1 (-B2) P0130 (P0150)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
3) Touch "START".
4) Let it idle for at least 3.5 minutes.
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

CMPS·RPM (REF)	1,800 - 2,600 rpm (A/T models) 1,900 - 2,700 rpm (M/T models)
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
Selector lever	Suitable position

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

6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-205.
During this test, P1148 may be stored in ECM.



Overall Function Check

NAEC0094

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

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

4) If NG, go to "Diagnostic Procedure", EC-205.

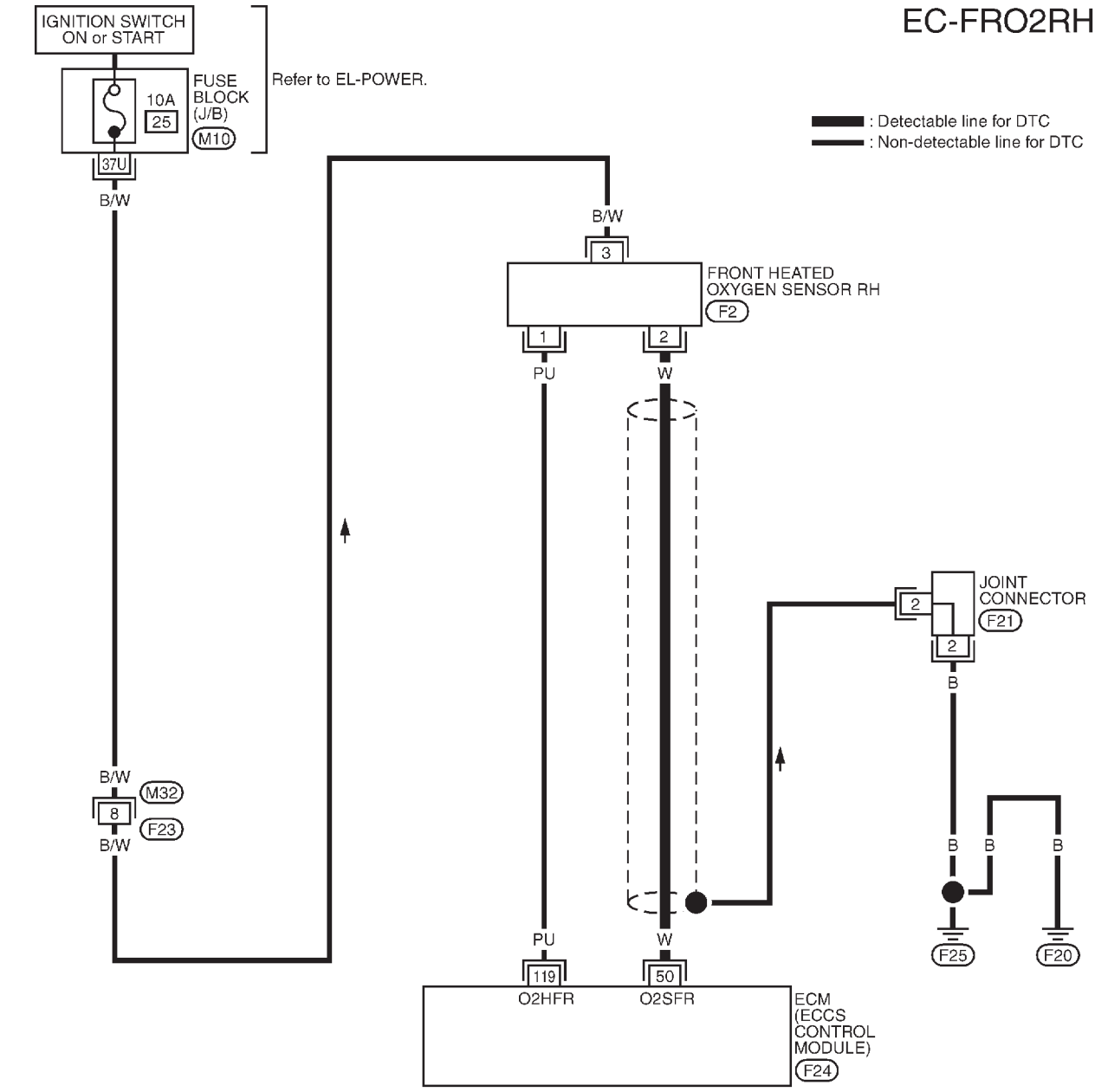
Wiring Diagram

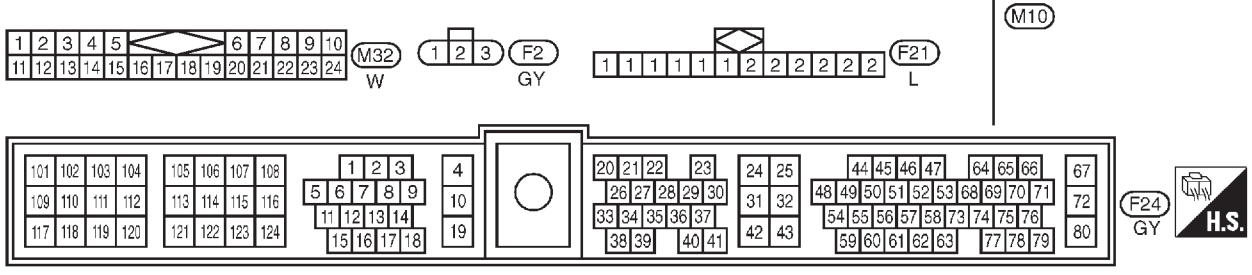
NAEC0095

RIGHT BANK

NAEC0095S01

EC-FRO2RH-01





Refer to last page (Foldout page).
M10

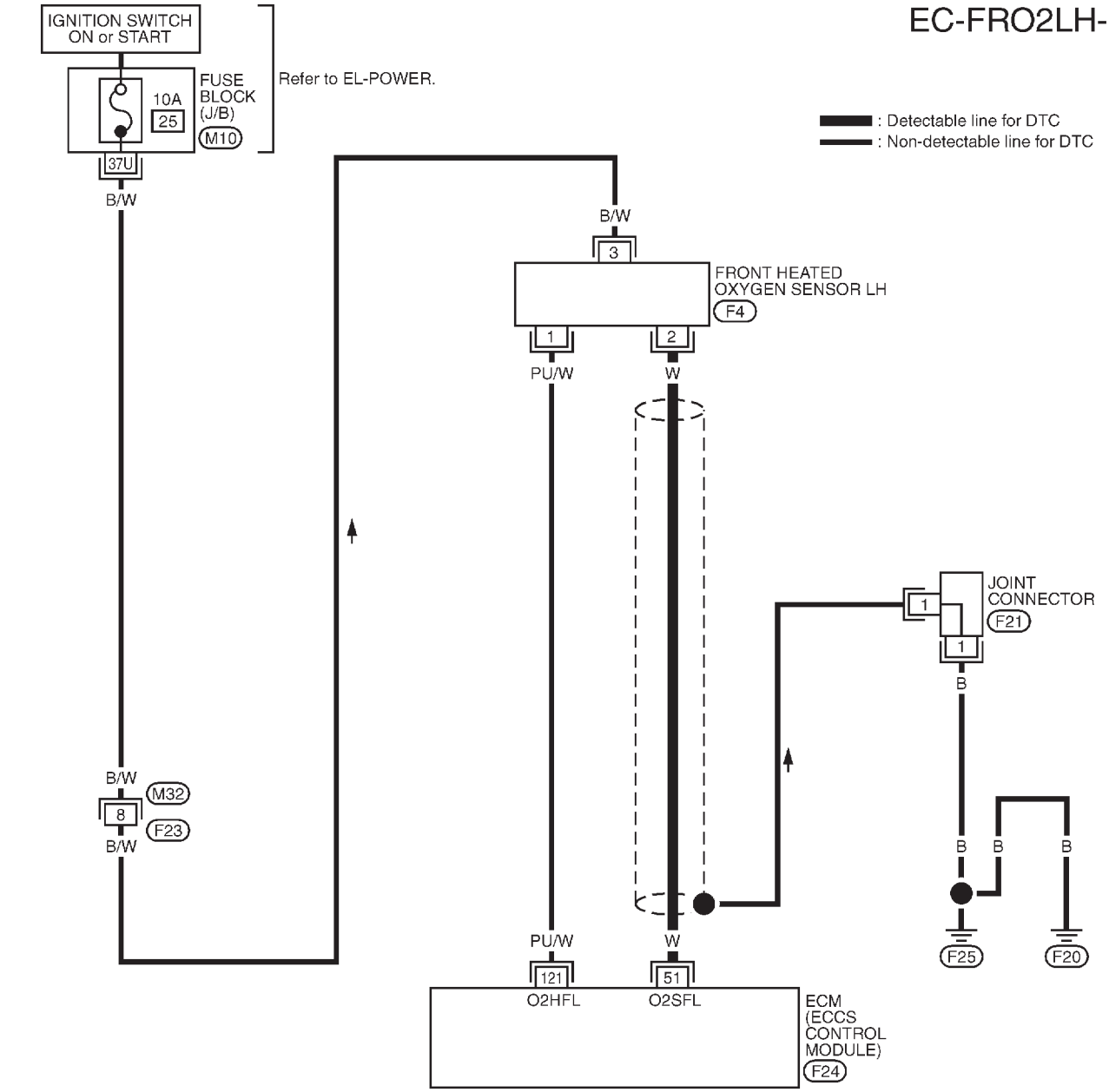
MEC048C

Wiring Diagram (Cont'd)

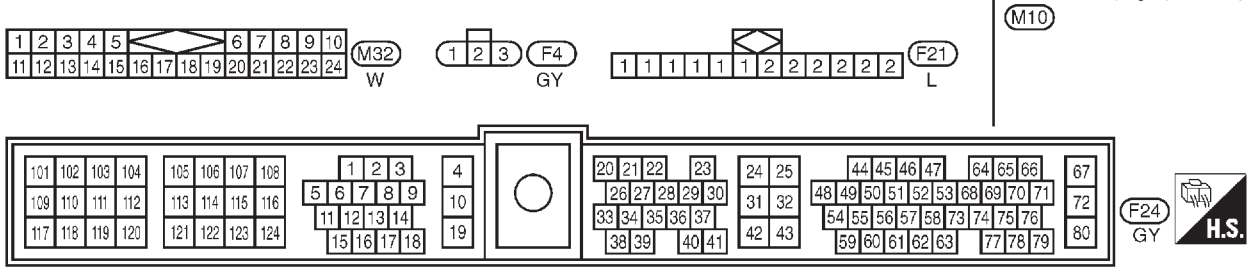
LEFT BANK

NAEC0095S02

EC-FRO2LH-01



Refer to last page (Foldout page).



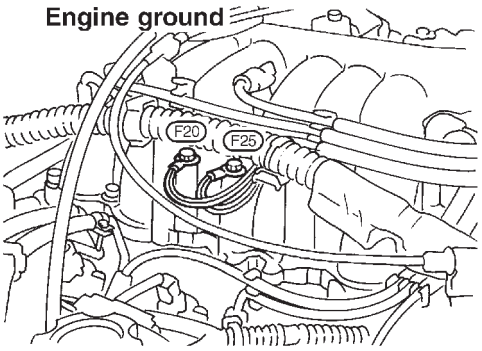
MEC052C

Diagnostic Procedure

NAEC0096

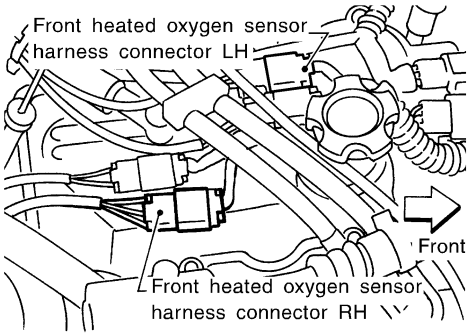
1	INSPECTION START

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



SEF031S

3. Disconnect corresponding front heated oxygen sensor harness connector.

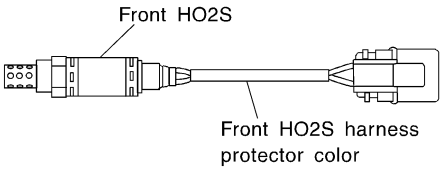


SEF870W

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and sensor terminal as follows.

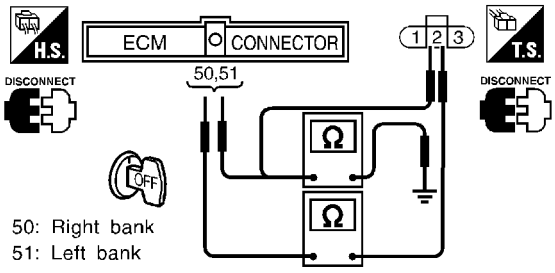


P0130 (-B1) Right bank: Black
P0150 (-B2) Left bank: Blue

SEF871W

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0130	50	2	Right (Black)
P0150	51	2	Left (Blue)

SEF872W



SEF695U

Continuity should exist.

3. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0130	50 or 2	Ground	Right (Black)
P0150	51 or 2	Ground	Left (Blue)

SEF873W

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3	CHECK FRONT HEATED OXYGEN SENSOR

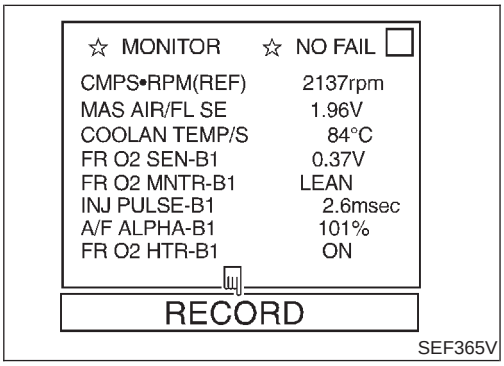
Refer to "Component Inspection", EC-207.

OK or NG

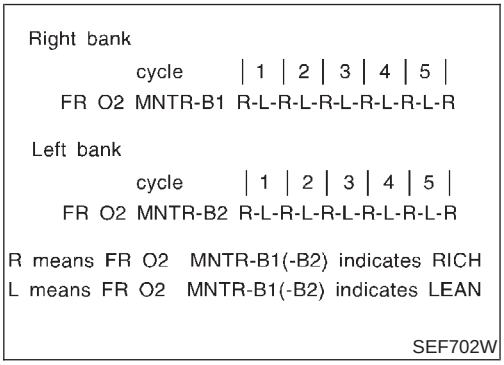
OK	▶	GO TO 4.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace front heated oxygen sensor.

4	CHECK SHIELD CIRCUIT
1. Turn ignition switch "OFF". 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal and ground ● Joint connector (Refer to EL-312, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF365V



SEF702W

Component Inspection

NAEC0391

FRONT HEATED OXYGEN SENSOR

NAEC0391S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

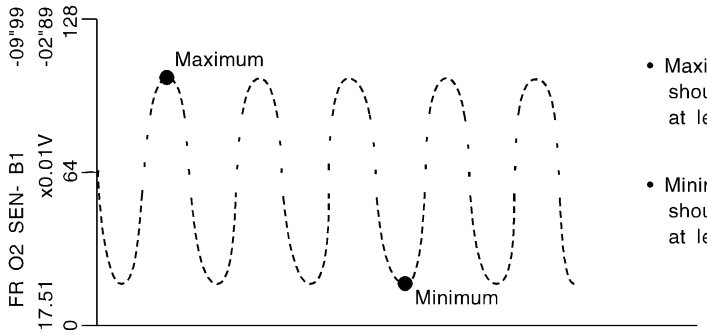
- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

CAUTION:

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

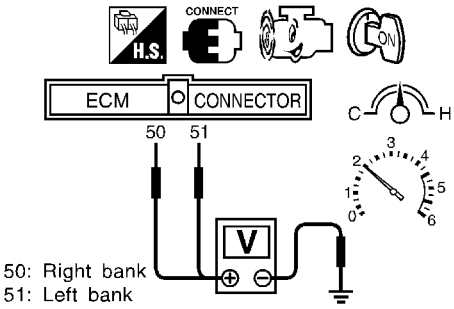
	CMPS •RPM (REF) (rpm)	FR O2 SEN -B1 (V)
17:51		
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

GRAPH



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.3V at least one time.

SEF366V



SEF919U

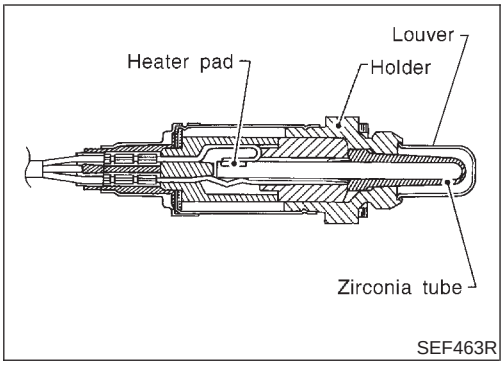
Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

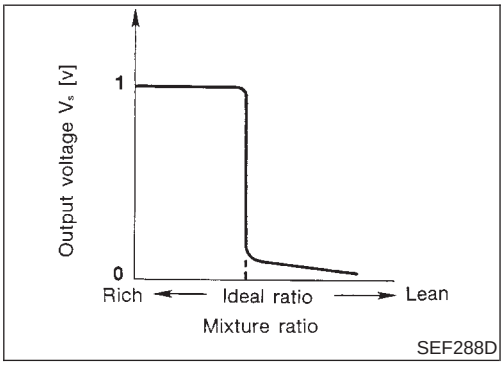
- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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



SEF463R



SEF288D

Component Description

NAEC0392

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT Reference Value in Data Monitor Mode

NAEC0393

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

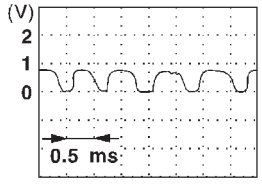
ECM Terminals and Reference Value

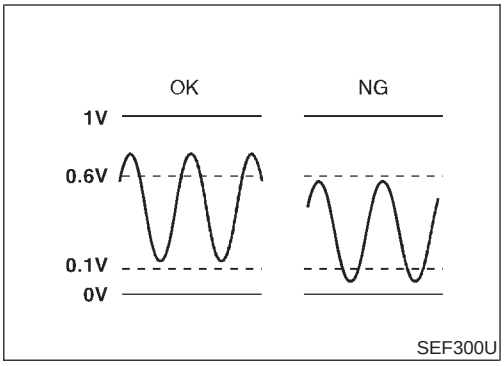
NAEC0394

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH		



On Board Diagnosis Logic

NAEC0395

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131 0415 (Right bank)	• The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors • Intake air leaks
P0151 0411 (Left bank)		

DTC Confirmation Procedure

NAEC0396

CAUTION:

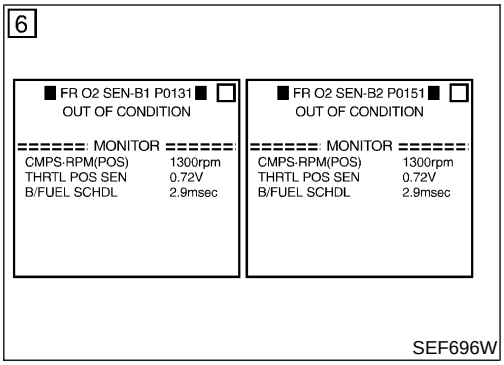
Always drive vehicle at a safe speed.

NOTE:

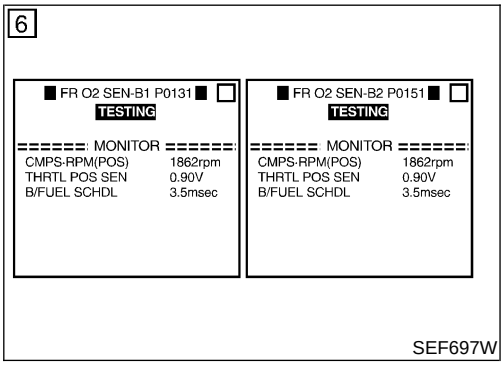
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

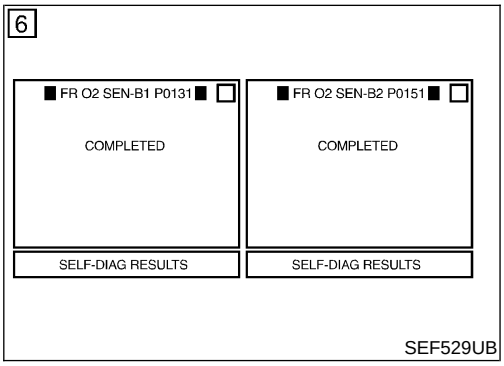
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**



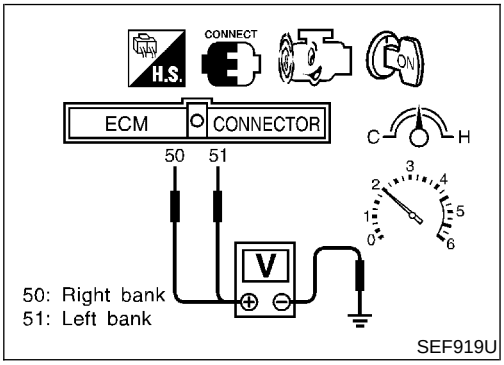
SEF696W



SEF697W



SEF529UB



SEF919U

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0131 (P0151)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:
Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

CMPS·RPM (REF)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,100 rpm (M/T models)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
Selector lever	Suitable position

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

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

Overall Function Check

NAEC0397

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

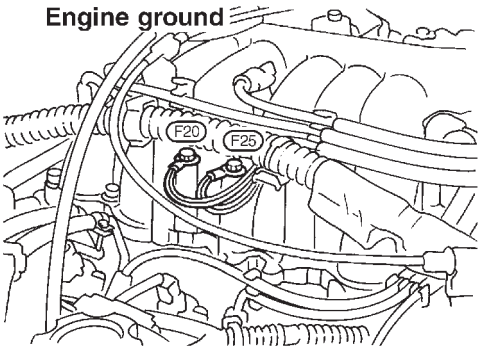
4) If NG, go to "Diagnostic Procedure", EC-212.

Diagnostic Procedure

NAEC0399

1	RETIGHTEN GROUND SCREWS

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



SEF031S

▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

Tightening torque:

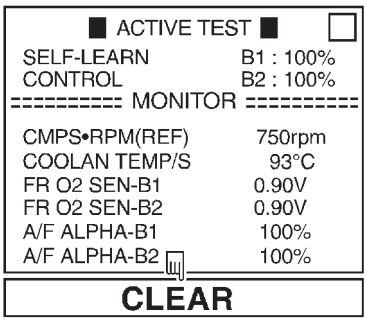
40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

▶	GO TO 3.

3	CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT

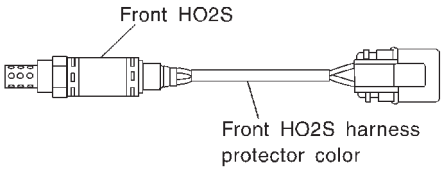
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Go to Trouble diagnosis for "DTC P0171, P0174", EC-297.
No	▶	GO TO 4.

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component inspection", EC-249.



P0131 (-B1) Right bank: Black
P0151 (-B2) Left bank: Blue

SEF194WA

OK or NG

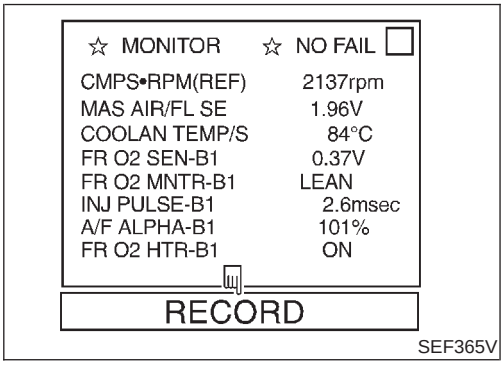
OK	▶	GO TO 5.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

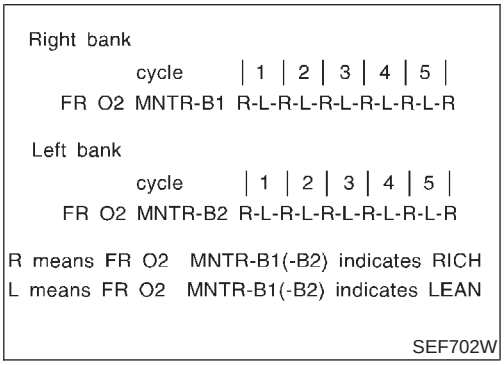
Diagnostic Procedure (Cont'd)

5	CHECK FRONT HEATED OXYGEN SENSOR	
Refer to "Component Inspection", EC-214.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

6	CHECK SHIELD CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect joint connector. 3. For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-200. 4. Check the following. ● Continuity between joint connector terminal and ground ● Joint connector (Refer to EL-312, "HARNESS LAYOUT".) **Continuity should exist.** 5. Also check harness for short to ground and short to power. 6. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136. For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-200.		
	▶	**INSPECTION END**





Component Inspection

NAEC0400

FRONT HEATED OXYGEN SENSOR

NAEC0400S01

With CONSULT

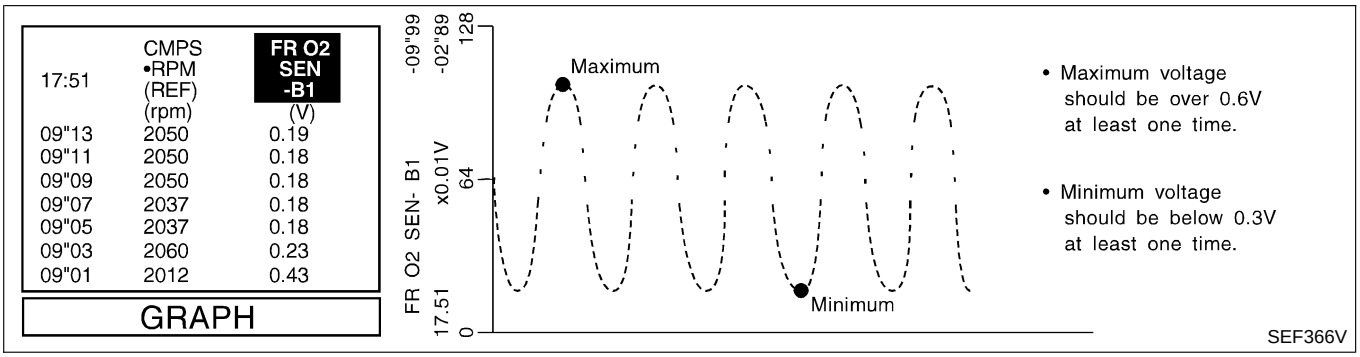
1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

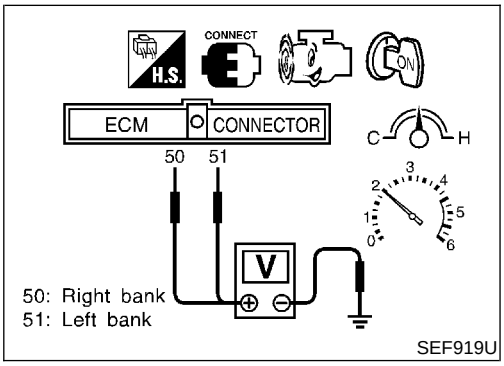
- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

CAUTION:

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

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





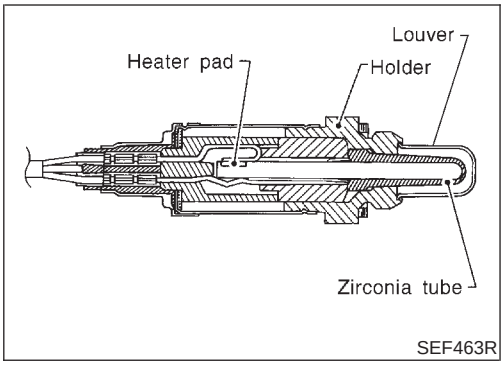
Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

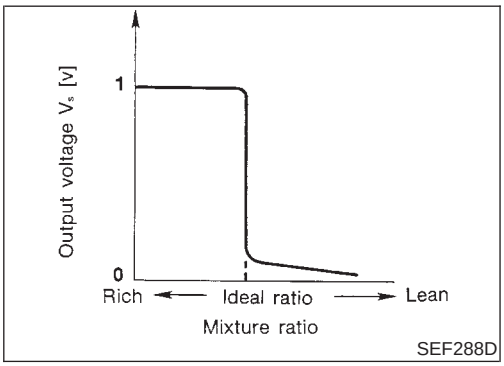
- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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



SEF463R



SEF288D

Component Description

NAEC0401

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT Reference Value in Data Monitor Mode

NAEC0402

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

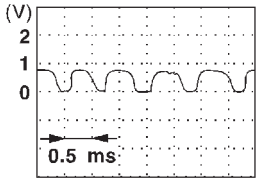
ECM Terminals and Reference Value

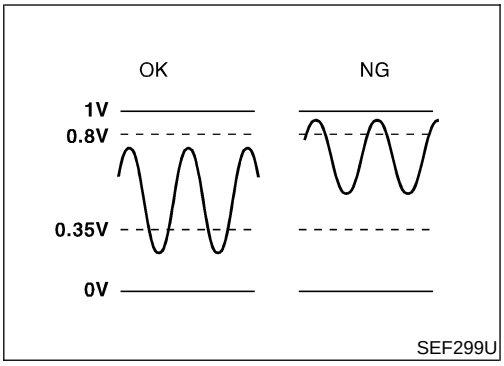
NAEC0403

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH		



On Board Diagnosis Logic

NAEC0404

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 0414 (Right bank)	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Front heated oxygen sensor • Fuel pressure • Injectors • Front heated oxygen sensor heater
P0152 0410 (Left bank)		

DTC Confirmation Procedure

NAEC0405

CAUTION:

Always drive vehicle at a safe speed.

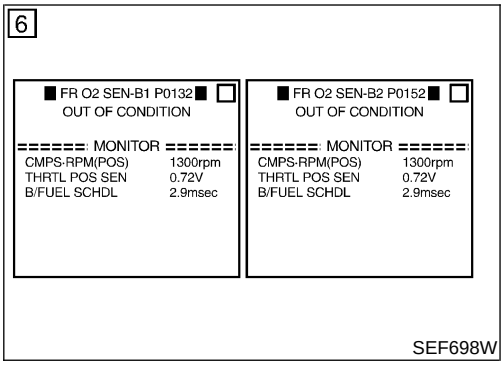
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

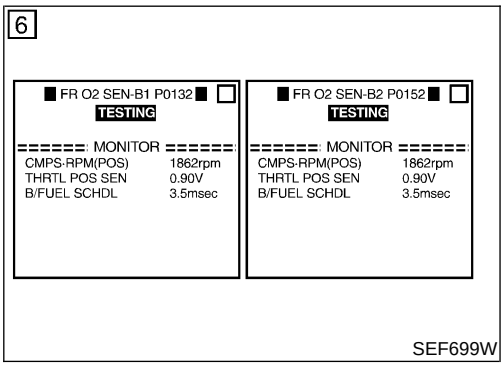
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

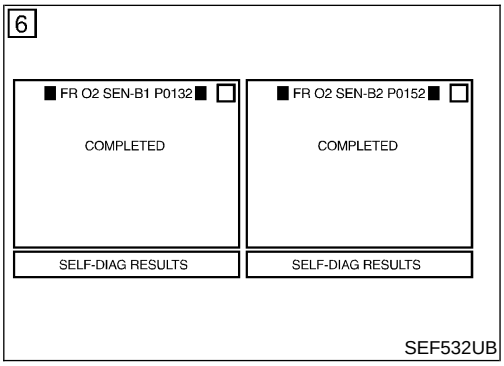
DTC Confirmation Procedure (Cont'd)



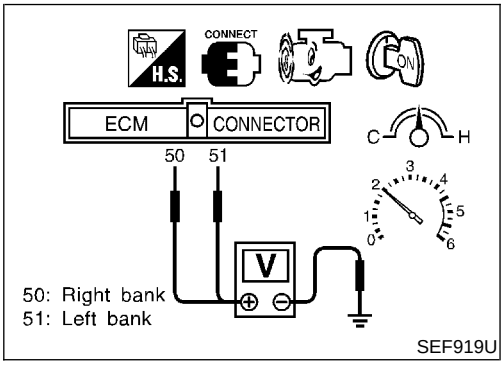
SEF698W



SEF699W



SEF532UB



SEF919U

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0132 (P0152)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:
Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

CMPS·RPM (REF)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,100 rpm (M/T models)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-219.

Overall Function Check

NAEC0406

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is below 0.8V at least one time.
- The minimum voltage is below 0.35V at least one time.

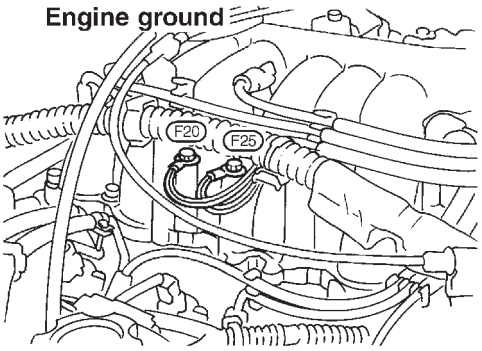
4) If NG, go to "Diagnostic Procedure", EC-219.

Diagnostic Procedure

NAEC0408

1	RETIGHTEN GROUND SCREWS

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



SEF031S

▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

Tightening torque:

40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

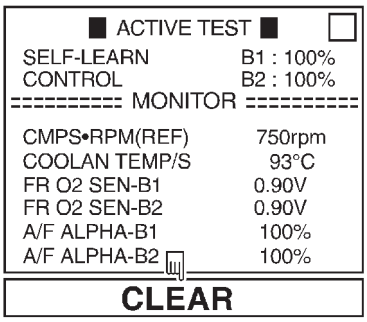
▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0209 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Go to Trouble Diagnosis for "DTC P0172, P0175", EC-306.
No	▶	GO TO 4.

4	CHECK CONNECTOR FOR WATER

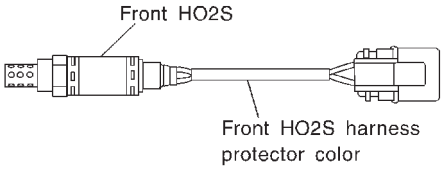
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector.
3. Check connectors for water.
   Water should not exist.

OK or NG

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

5	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-249.



P0132 (-B1) Right bank: Black
P0152 (-B2) Left bank: Blue

SEF194WD

OK or NG

OK	▶	GO TO 6.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

6	CHECK FRONT HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-222.

OK or NG

OK	▶	GO TO 7.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

7	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector.
   For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-200.
3. Check the following.

- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to EL-312, "HARNESS LAYOUT".)
  Continuity should exist.

4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

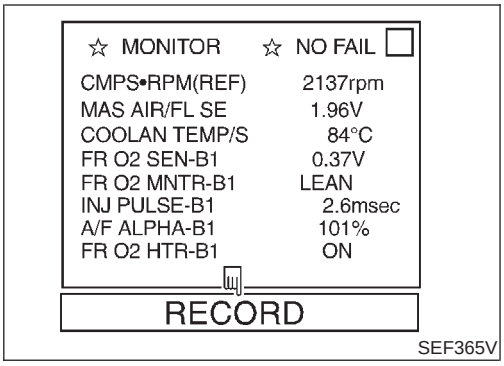
OK or NG

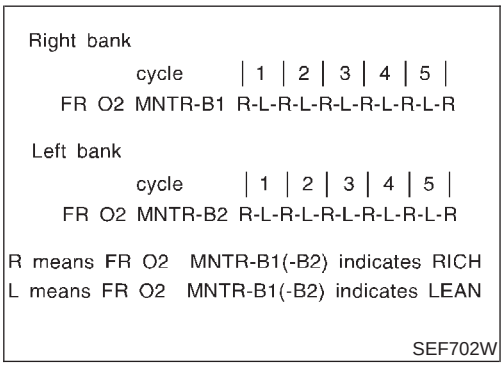
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-200.

	▶	**INSPECTION END**





Component Inspection

NAEC0409

FRONT HEATED OXYGEN SENSOR

NAEC0409S01

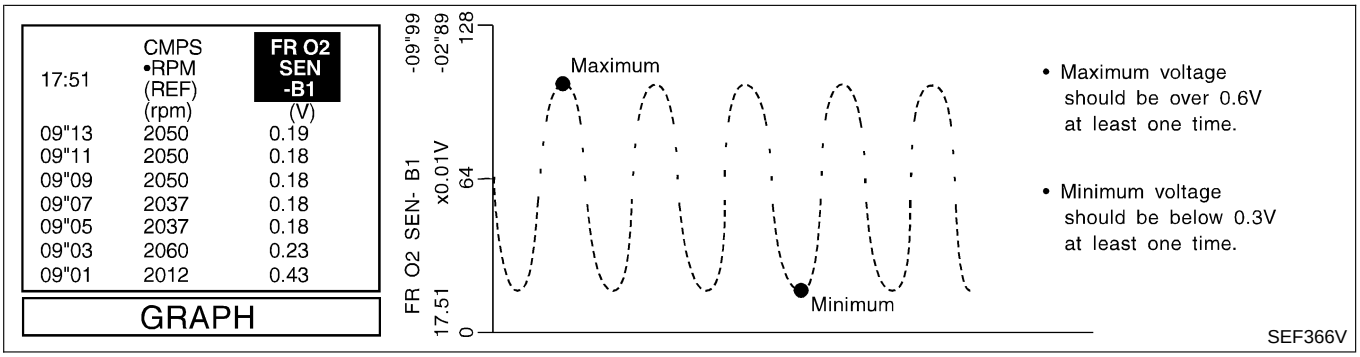
With CONSULT

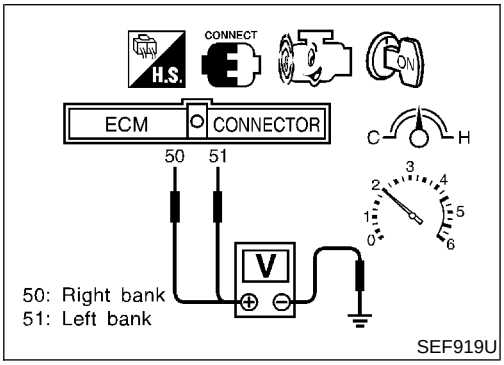
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT, and select “FR O2 SEN-B1 (-B2)” and “FR O2 MNTR-B1 (-B2)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT screen.
5) Check the following.

- “FR O2 MNTR-B1 (-B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- “FR O2 SEN-B1 (-B2)” voltage goes above 0.6V at least once.
- “FR O2 SEN-B1 (-B2)” voltage goes below 0.3V at least once.
- “FR O2 SEN-B1 (-B2)” voltage never exceeds 1.0V.

CAUTION:

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





Without CONSULT

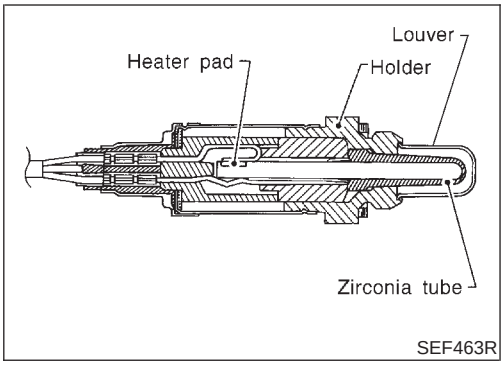
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

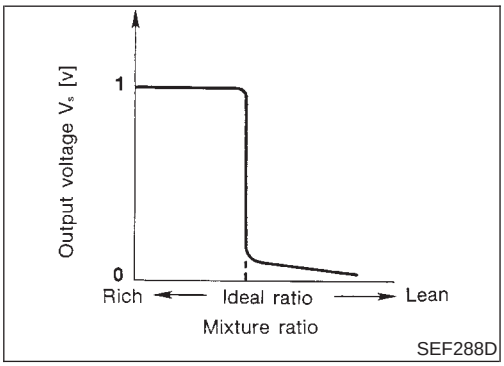
- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.

- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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





Component Description

NAEC0410

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT Reference Value in Data Monitor Mode

NAEC0411

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

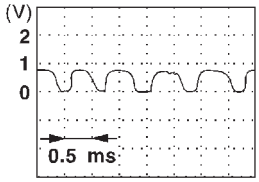
ECM Terminals and Reference Value

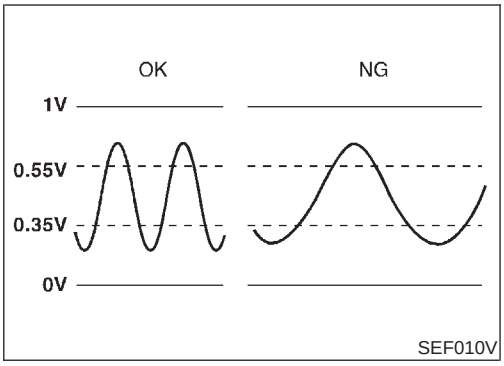
NAEC0412

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH		



On Board Diagnosis Logic

NAEC0413

To judge the malfunction of front heated oxygen sensor, this diagnosis measures front heated oxygen sensor cycling time. The time is compensated by engine operating (speed and load), fuel feedback control constant, and front heated oxygen sensor temperature index. Judgment is based on whether the compensated time (front heated oxygen sensor cycling time index) is inordinately long or not.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 0413 (Right bank) P0153 0409 (Left bank)	• The cycle of the voltage signal from the sensor is more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor

DTC Confirmation Procedure

NAEC0414

CAUTION:

Always drive vehicle at a safe speed.

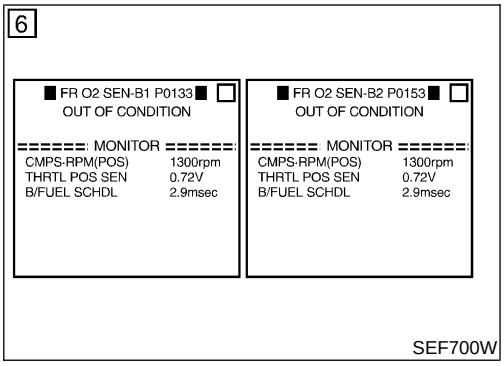
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

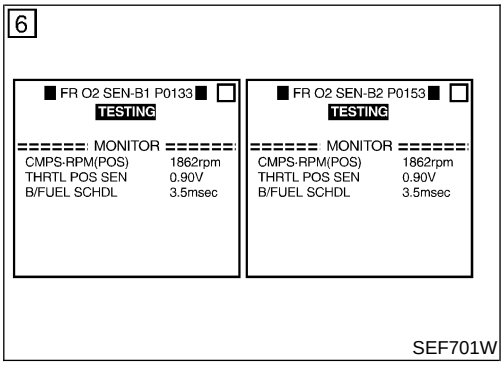
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

DTC Confirmation Procedure (Cont'd)



SEF700W



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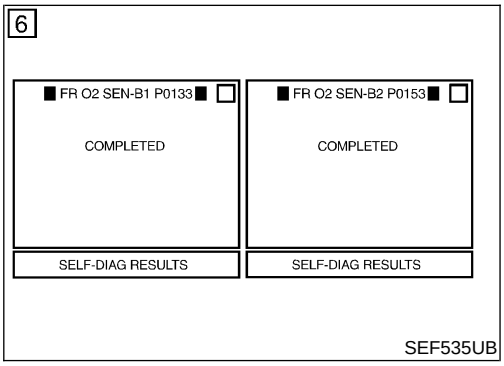
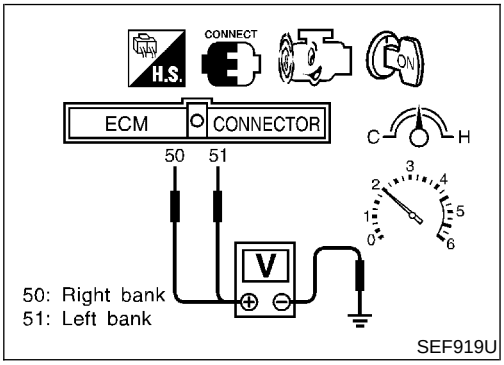


SEF535UB



SEF919U

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0133 (P0153)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:
Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

CMPS·RPM (REF)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,300 rpm (M/T models)
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-229.

Overall Function Check

NAEC0415

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).

4) If NG, go to "Diagnostic Procedure", EC-229.

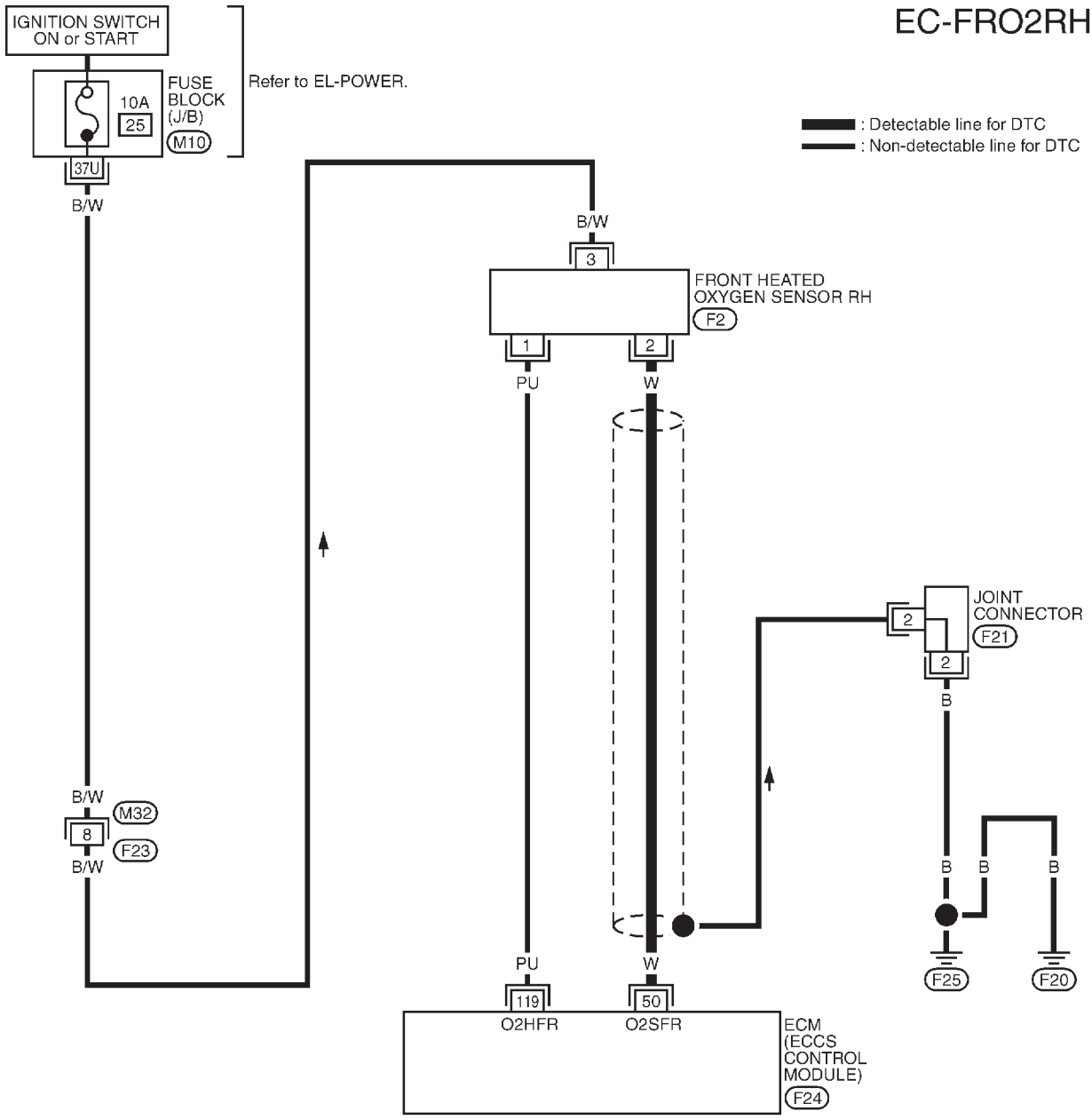
Wiring Diagram

NAEC0416

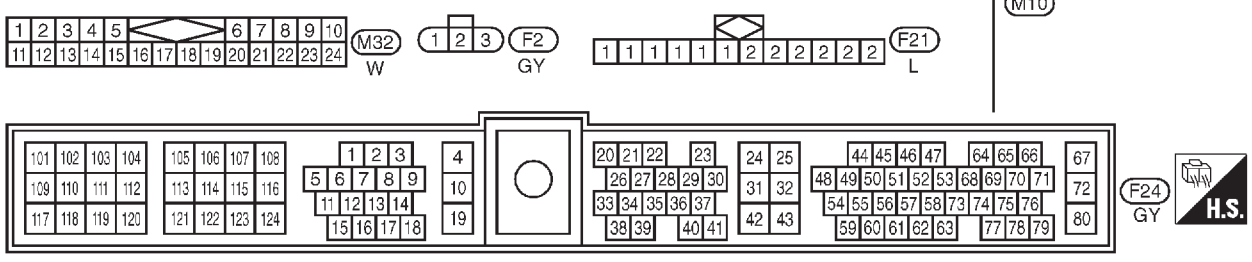
RIGHT BANK

NAEC0416S01

EC-FRO2RH-01



Refer to last page (Foldout page).



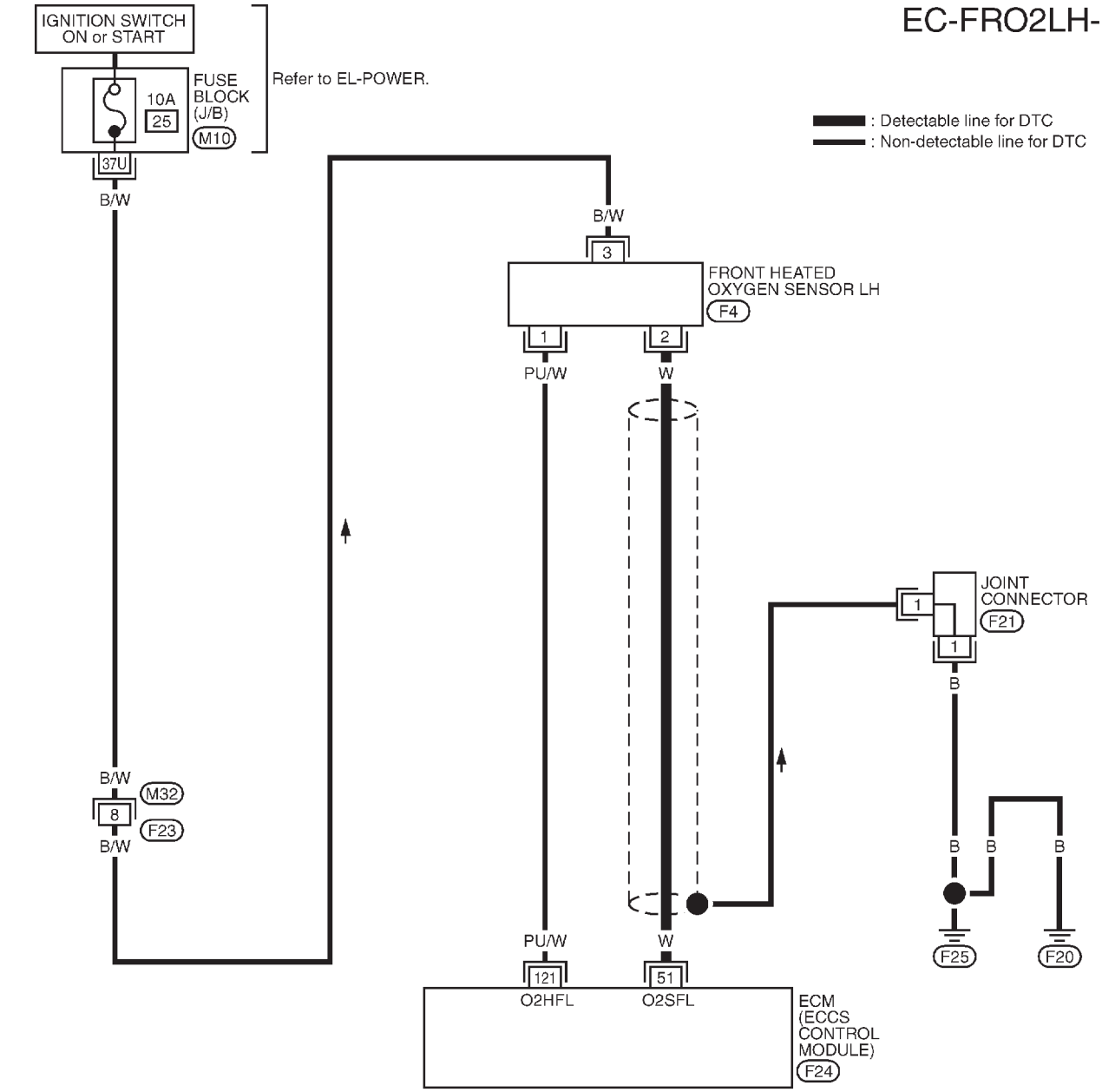
MEC048C

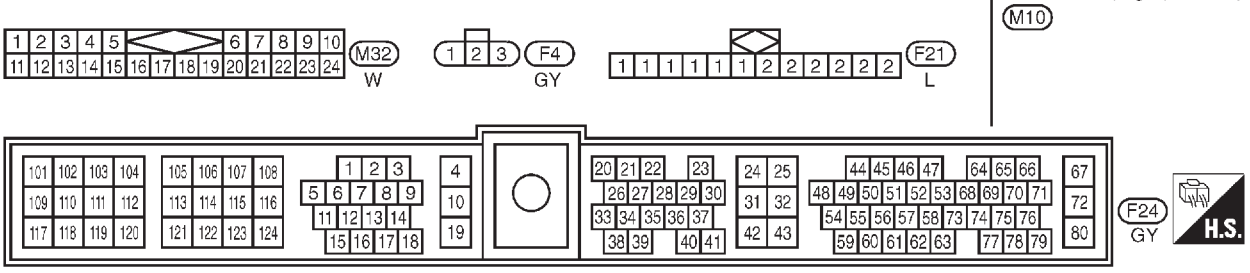
Wiring Diagram (Cont'd)

LEFT BANK

NAEC0416S02

EC-FRO2LH-01





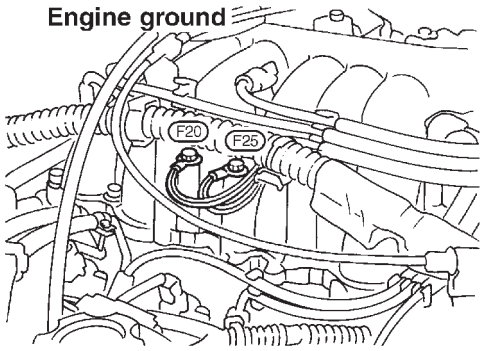
MEC052C

Diagnostic Procedure

NAEC0417

1	RETIGHTEN GROUND SCREWS

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



SEF031S

▶ GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

Loosen and retighten corresponding front heated oxygen sensor.

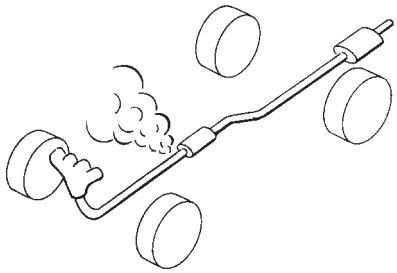
Tightening torque:

40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

▶ GO TO 3.

3	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

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

OK or NG

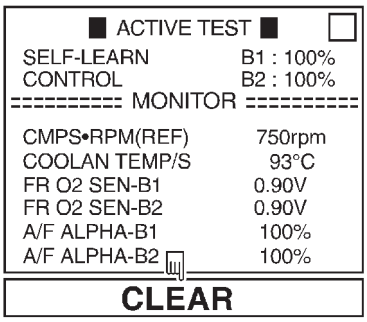
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT

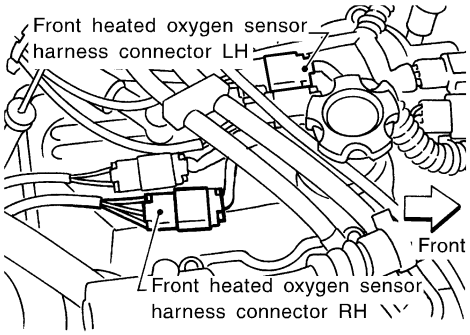
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114, 0115, 0209 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Go to Trouble Diagnosis for "DTC P0171, P0174" or "P0172, P0175", EC-297, 306.
No	▶	GO TO 6.

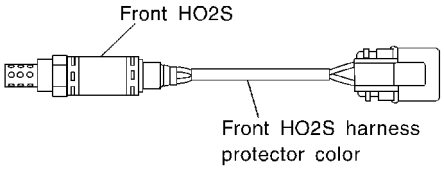
6	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect corresponding front heated oxygen sensor harness connector.



SEF870W

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and sensor terminal as follows.

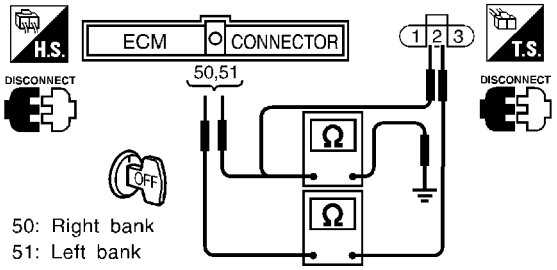


P0133 (-B1) Right bank: Black
P0153 (-B2) Left bank: Blue

SEF194WF

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0133	50	2	Right (Black)
P0153	51	2	Left (Blue)

SEF874W



SEF695U

Continuity should exist.

5. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Right (Black)
P0153	51 or 2	Ground	Left (Blue)

SEF875W

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

7	CHECK FRONT HEATED OXYGEN SENSOR HEATER	
Refer to "Component Inspection", EC-249.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

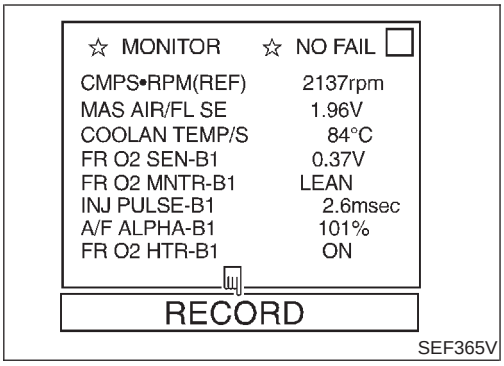
8	CHECK MASS AIR FLOW SENSOR	
Refer to "Component Inspection", EC-155.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

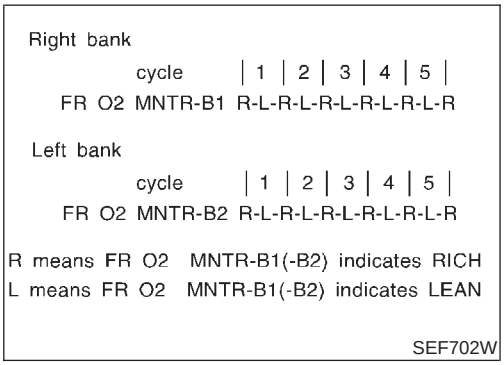
9	CHECK PCV VALVE	
Refer to "Positive Crankcase Ventilation", EC-36.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace PCV valve.

10	CHECK FRONT HEATED OXYGEN SENSOR	
Refer to "Component Inspection", EC-233.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

11	CHECK SHIELD CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal and ground ● Joint connector (Refer to EL-312, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**





Component Inspection

NAEC0418

FRONT HEATED OXYGEN SENSOR

NAEC0418S01

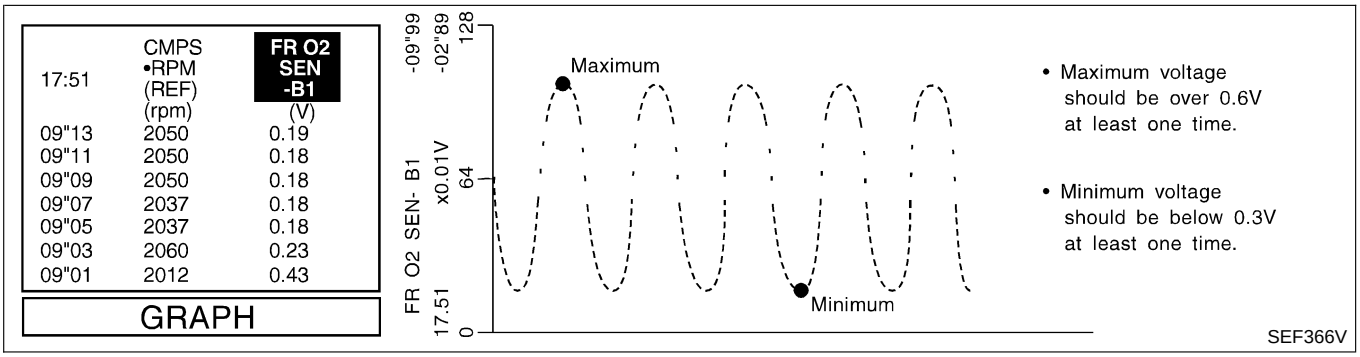
With CONSULT

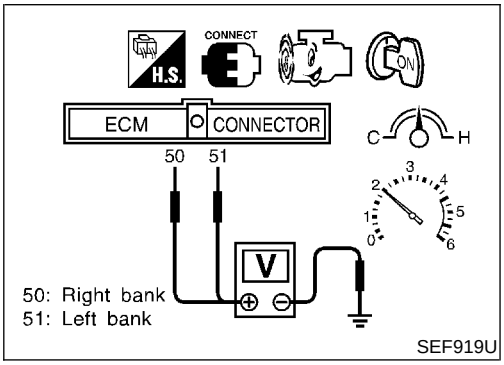
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT, and select “FR O2 SEN-B1 (-B2)” and “FR O2 MNTR-B1 (-B2)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT screen.
5) Check the following.

- “FR O2 MNTR-B1 (-B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- “FR O2 SEN-B1 (-B2)” voltage goes above 0.6V at least once.
- “FR O2 SEN-B1 (-B2)” voltage goes below 0.3V at least once.
- “FR O2 SEN-B1 (-B2)” voltage never exceeds 1.0V.

CAUTION:

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





Without CONSULT

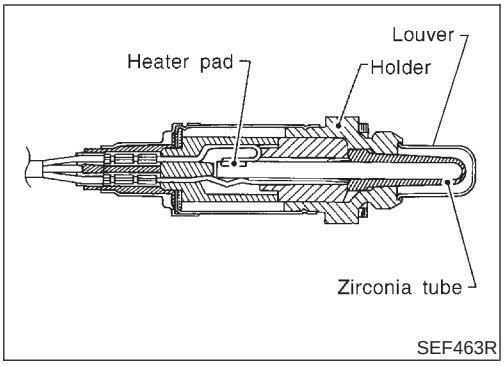
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

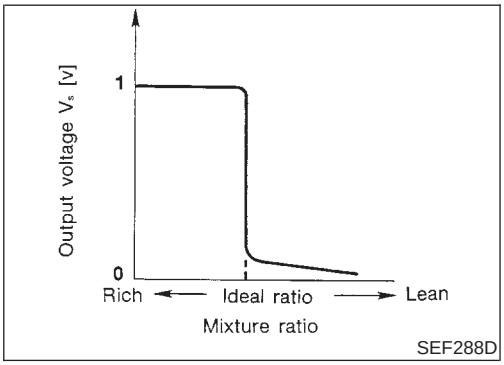
- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.

- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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





Component Description

NAEC0419

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT Reference Value in Data Monitor Mode

NAEC0420

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

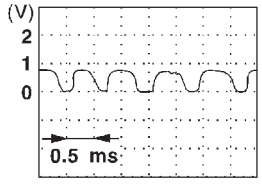
ECM Terminals and Reference Value

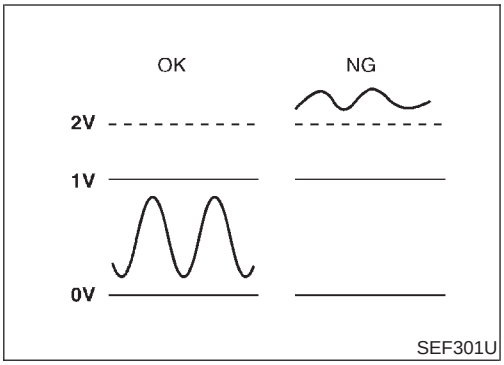
NAEC0421

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	W	Front heated oxygen sensor LH		

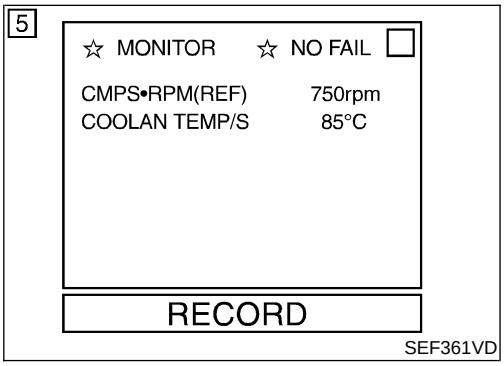


On Board Diagnosis Logic

NAEC0422

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 0509 (Right bank)	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor
P0154 0412 (Left bank)		



DTC Confirmation Procedure

NAEC0423

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT.
5) Restart engine and let it idle for 20 seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-240.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Restart engine and let it idle for 20 seconds.
4) Turn ignition switch “OFF” and wait at least 5 seconds.
5) Restart engine and let it idle for 20 seconds.
6) Select “MODE 3” with GST.
7) If DTC is detected, go to “Diagnostic Procedure”, EC-240.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Restart engine and let it idle for 20 seconds.
4) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
5) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-240.

- **When using GST, “DTC Confirmation Procedure” should**

be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.

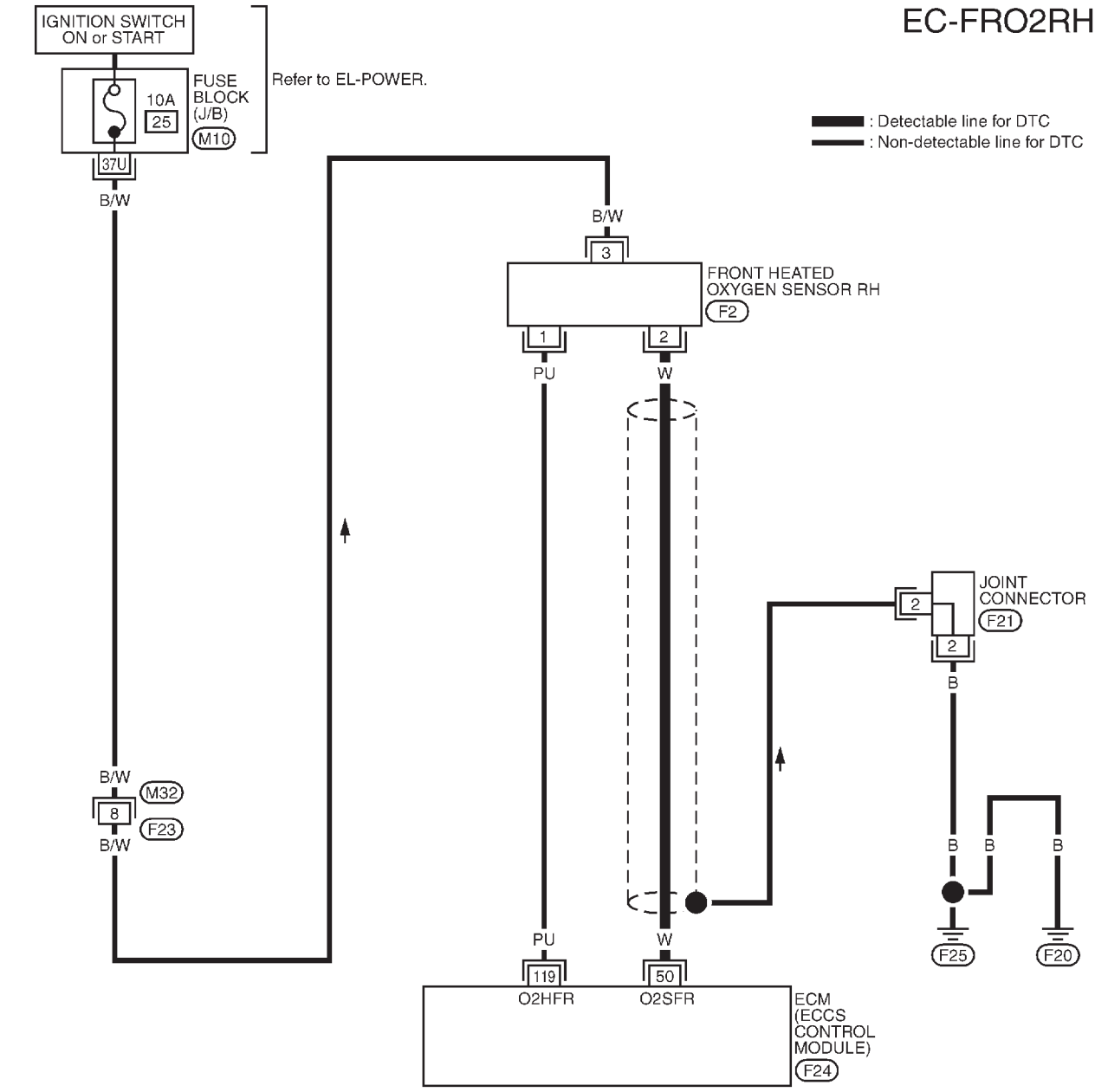
Wiring Diagram

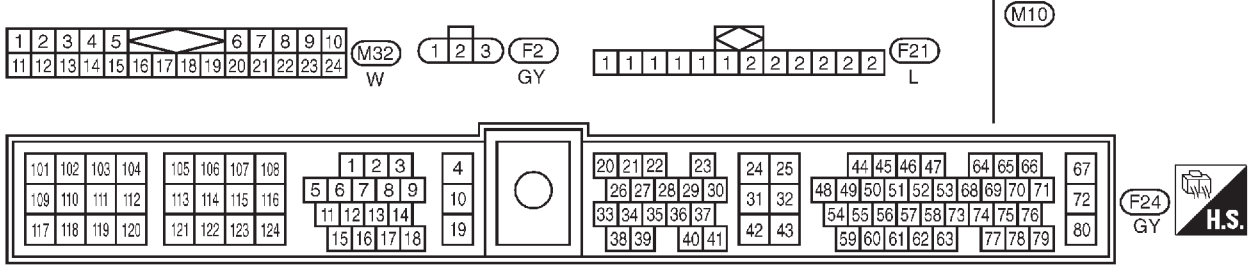
NAEC0424

RIGHT BANK

NAEC0424S01

EC-FRO2RH-01





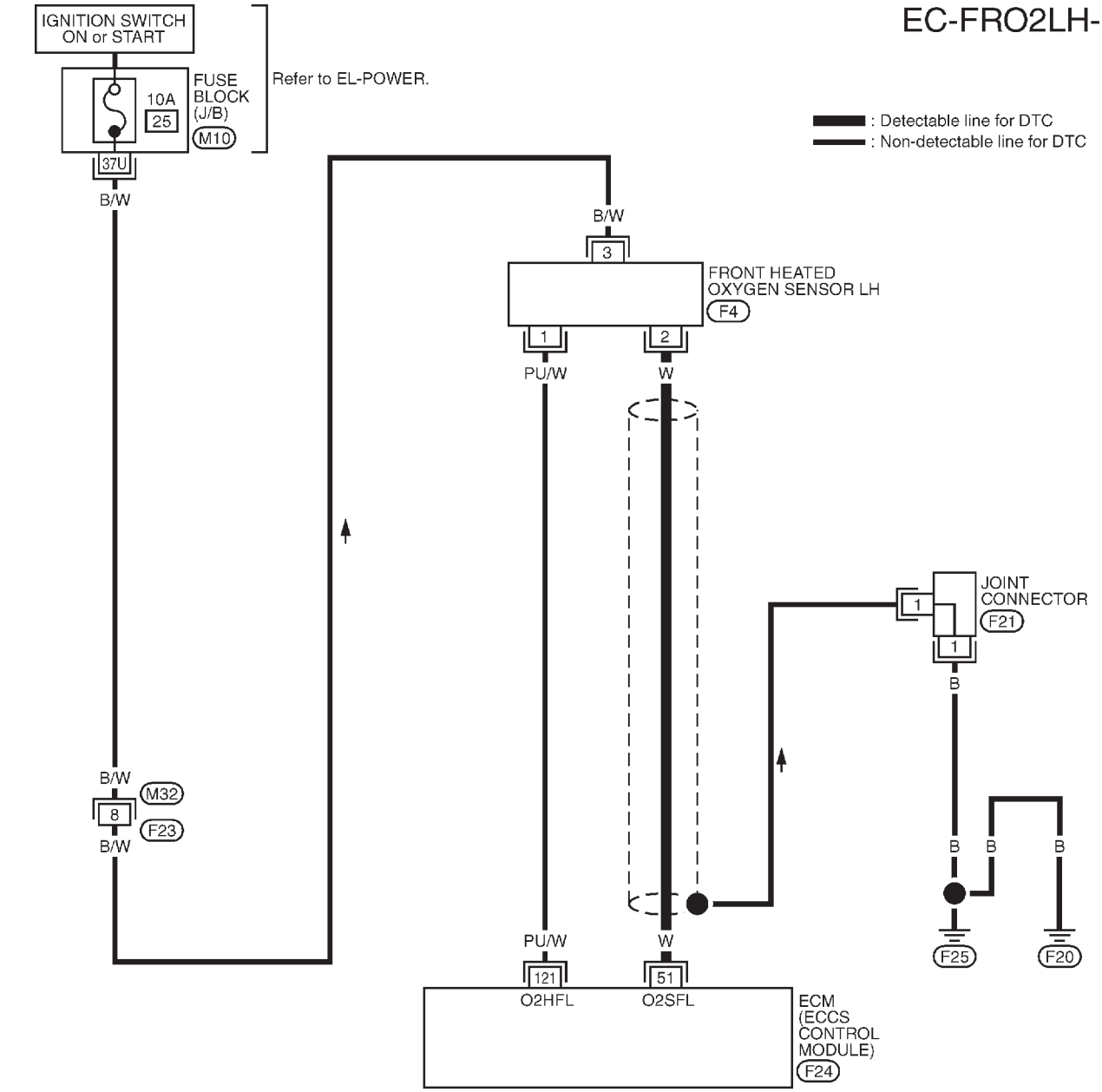
Refer to last page (Foldout page).
M10

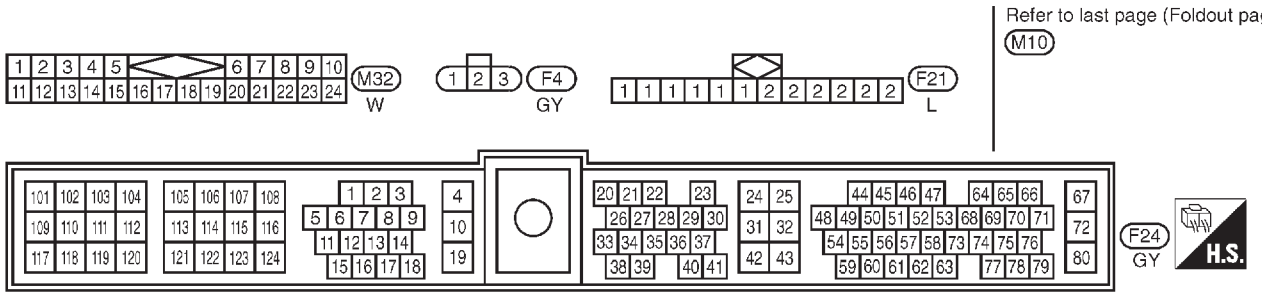
MEC048C

LEFT BANK

NAEC0424S02

EC-FRO2LH-01





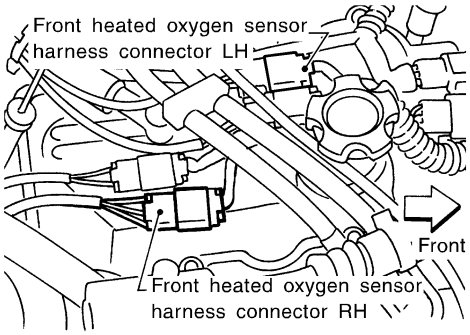
MEC052C

Diagnostic Procedure

NAEC0425

1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.



SEF870W

▶	GO TO 2.

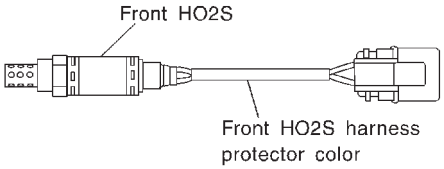
2	RETIGHTEN FRONT HEATED OXYGEN SENSOR

1. Loosen and retighten corresponding front heated oxygen sensor.
   Tightening torque:
   40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and sensor terminal as follows.

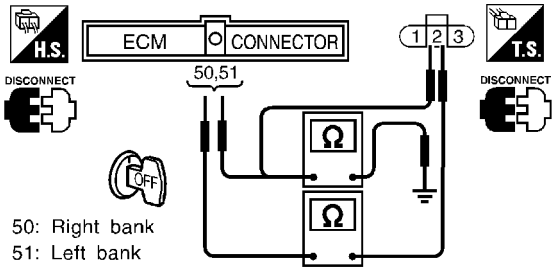


P0134 (-B1) Right bank: Black
P0154 (-B2) Left bank: Blue

SEF194WB

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0134	50	2	Right (Black)
P0154	51	2	Left (Blue)

SEF876W



SEF695U

Continuity should exist.

3. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0134	50 or 2	Ground	Right (Black)
P0154	51 or 2	Ground	Left (Blue)

SEF877W

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

4	CHECK CONNECTOR FOR WATER

1. Disconnect front heated oxygen sensor harness connector.
2. Check connectors for water.

Water should not exist.

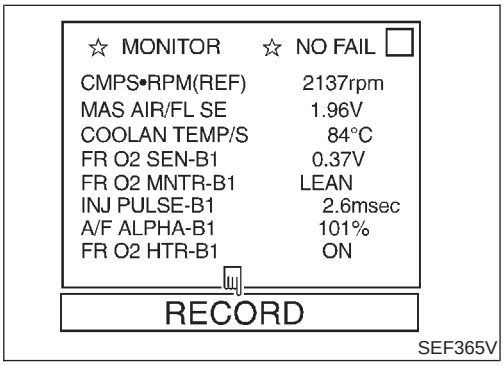
OK or NG

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

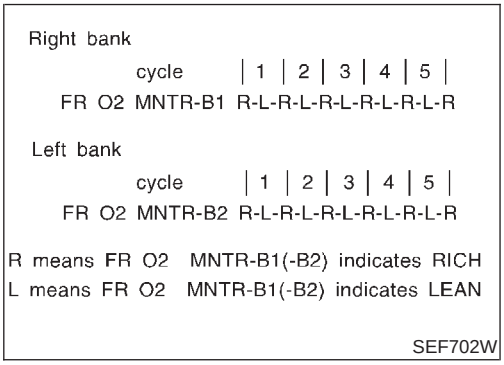
Diagnostic Procedure (Cont'd)

5	CHECK FRONT HEATED OXYGEN SENSOR
Refer to "Component Inspection", EC-242.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF365V



SEF702W

Component Inspection

NAEC0426

FRONT HEATED OXYGEN SENSOR

NAEC0426S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

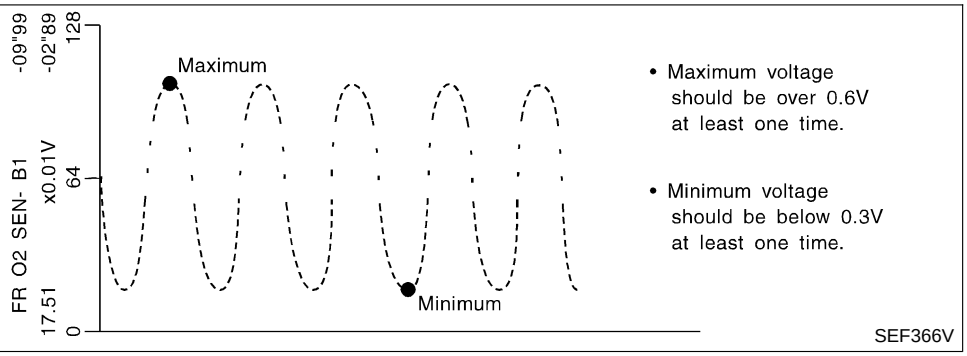
- "FR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.3V at least once.
- "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

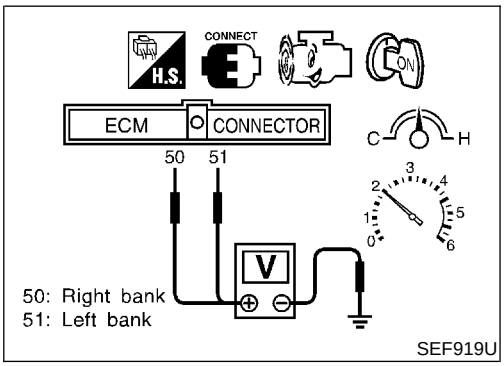
CAUTION:

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

17:51	CMPS •RPM (REF) (rpm)	FR O2 SEN -B1 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

GRAPH





Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

Description

Description

NAEC0427

SYSTEM DESCRIPTION

NAEC0427S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Front heated oxygen sensor heater control	Front heated oxygen sensor heaters

The ECM performs ON/OFF control of the front heated oxygen sensor heaters corresponding to the engine speed.

OPERATION

NAEC0427S02

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT Reference Value in Data Monitor Mode

NAEC0428

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 HTR-B1 FR O2 HTR-B2	• Engine speed: Idle	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NAEC0429

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

CAUTION:

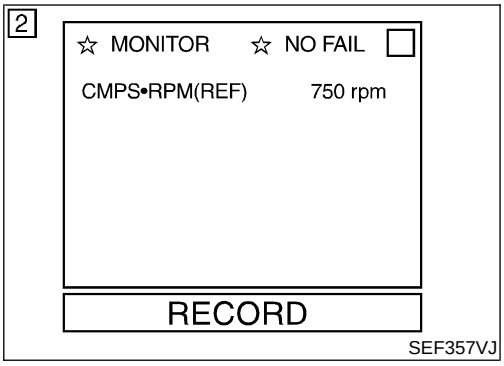
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119 (Right bank)	PU	Front heated oxygen sensor heater	**[Engine is running]** • Engine speed is below 3,200 rpm	Approximately 0.4V
121 (Left bank)	PU/W		**[Engine is running]** • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0430

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135 0901 (Right bank)	• The current amperage in the front heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater
P0155 1001 (Left bank)		



DTC Confirmation Procedure

NAEC0431

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 6 seconds at idle speed.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-248.

With GST

1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 6 seconds at idle speed.
4) Select "MODE 3" with GST.
5) If DTC is detected, go to "Diagnostic Procedure", EC-248.

No Tools

1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-248.

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

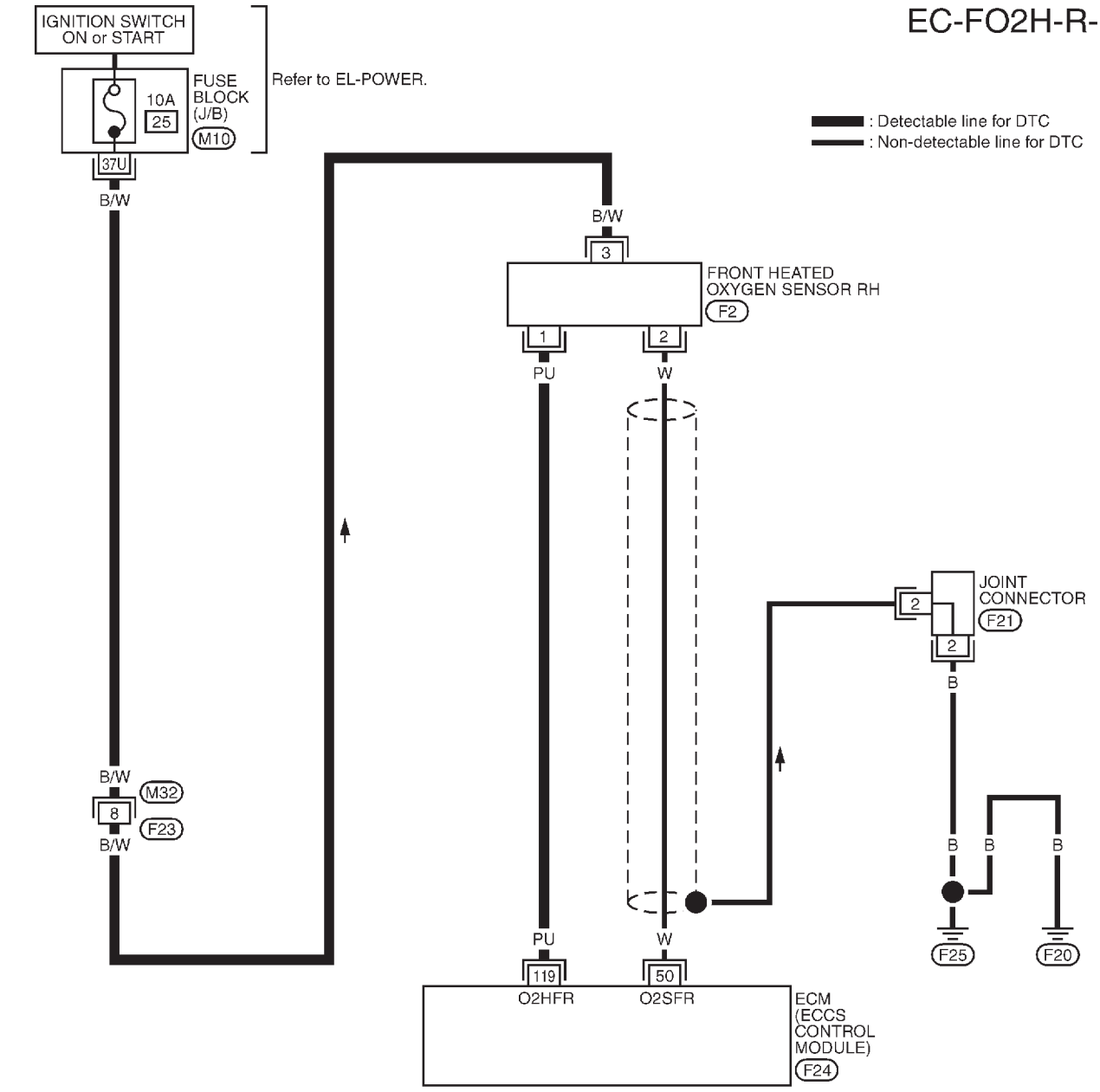
Wiring Diagram

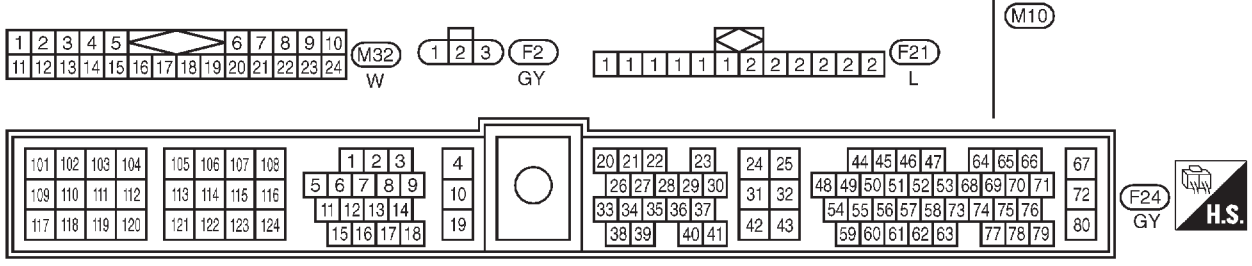
NAEC0432

RIGHT BANK

NAEC0432S01

EC-FO2H-R-01





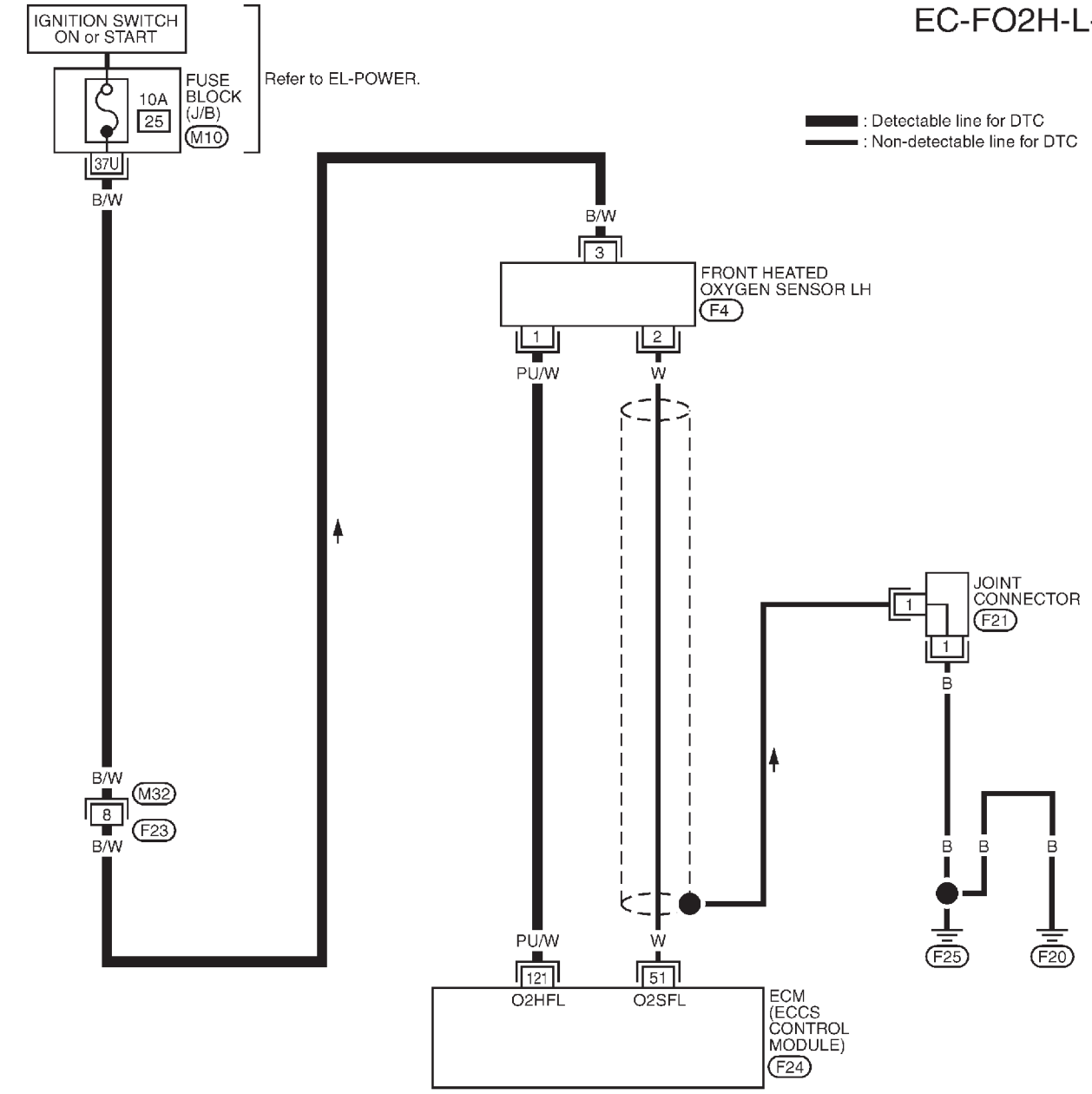
Refer to last page (Foldout page).
M10

MEC049C

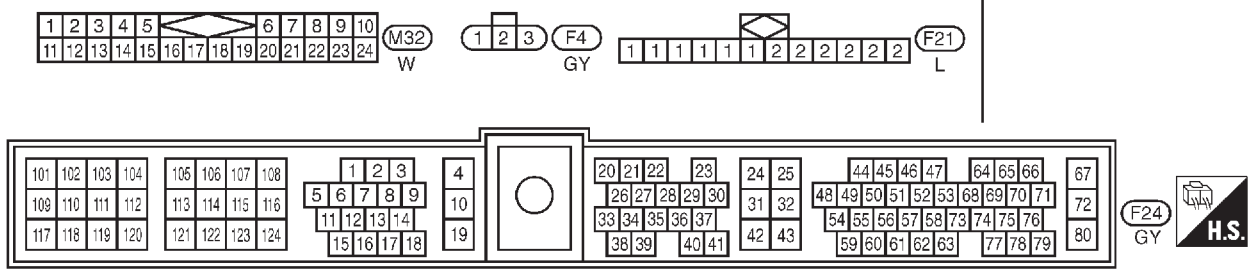
LEFT BANK

NAEC0432S02

EC-FO2H-L-01



Refer to last page (Foldout page).
M10



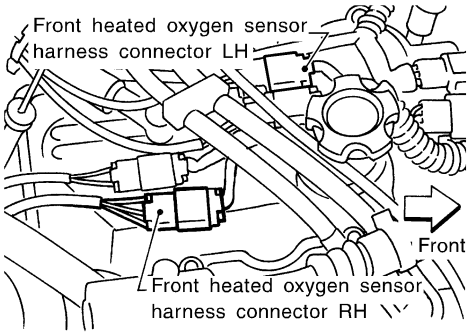
MEC053C

Diagnostic Procedure

NAEC0433

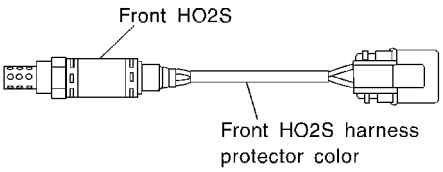
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.



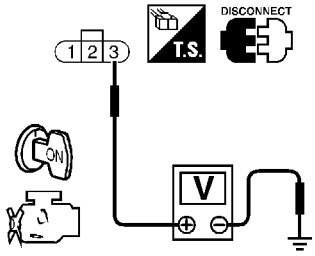
SEF870W

3. Turn ignition switch “ON”.
4. Check voltage between terminal 3 and ground with CONSULT or tester.



P0135 (-B1) Right bank: Black
P0155 (-B2) Left bank: Blue

SEF194WC



SEF696U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M32
- Harness connector M10
- 10A fuse
- Harness for open or short between front heated oxygen sensor and fuse

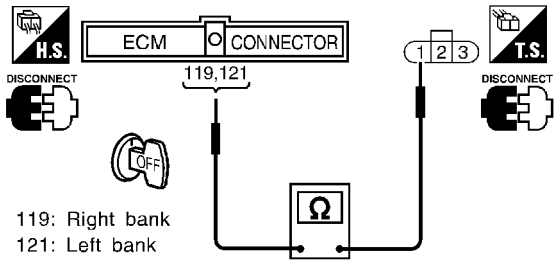
	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal and ECM terminal as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0135	119	1	Right (Black)
P0155	121	1	Left (Blue)

SEF878W



SEF697U

Continuity should exist.

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

OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-249.

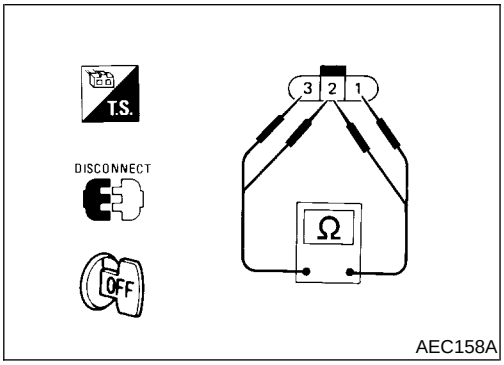
OK or NG

OK	▶	GO TO 5.
NG	▶	Check harness protector color. Black; Right bank (-B1) Blue; Left bank (-B2) Replace corresponding front heated oxygen sensor.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

▶ **INSPECTION END**



AEC158A

Component Inspection

NAEC0434

FRONT HEATED OXYGEN SENSOR HEATER

NAEC0434S01

Check resistance between terminals 3 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.

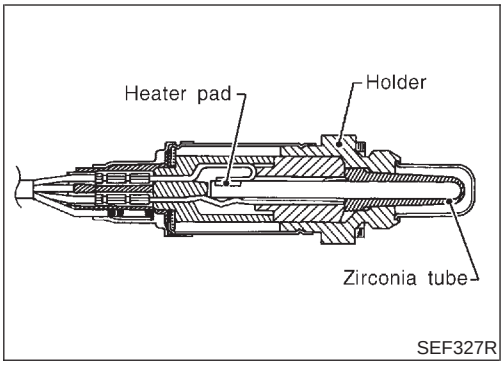
If NG, replace the front heated oxygen sensor.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a**

hard surface such as a concrete floor; use a new one.

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



Component Description

NAEC0105

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NAEC0106

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

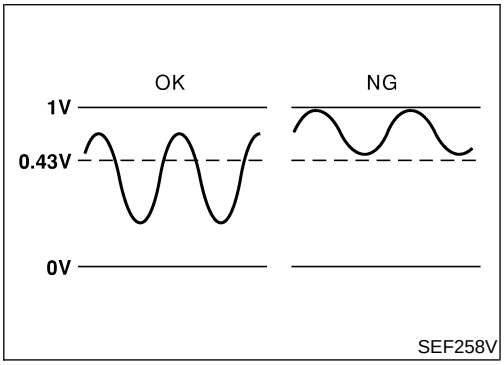
NAEC0107

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	L/W	Rear heated oxygen sensor	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	W			



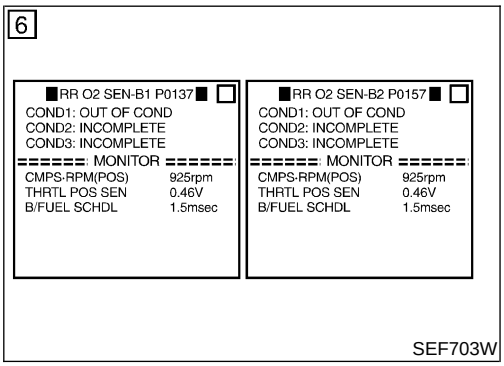
On Board Diagnosis Logic

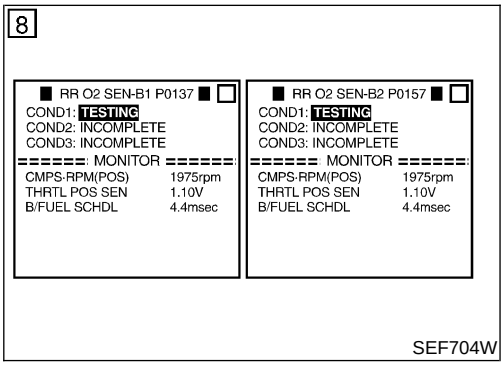
NAEC0108

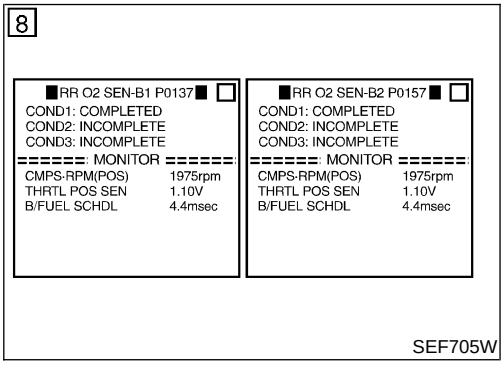
The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

On Board Diagnosis Logic (Cont'd)

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137 0511 (Right bank)	• The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors
P0157 0314 (Left bank)		







DTC Confirmation Procedure

NAEC0435

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Never stop engine during this test. If the engine is stopped, reperform this test from step 2 in "Procedure for COND1".

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**

With CONSULT

Procedure for COND1

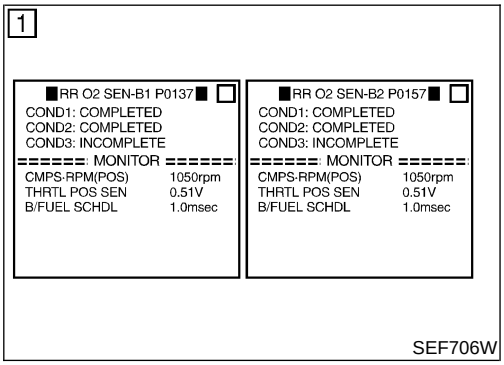
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SEN-B1 (-B2) P0137 (P0157)" of "REAR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

CMPS·RPM (POS)	1,300 - 3,100 rpm (A/T) 1,500 - 3,600 rpm (M/T)
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec (A/T) 0.5 - 5.9 msec (M/T)
Selector lever	Suitable position

NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**

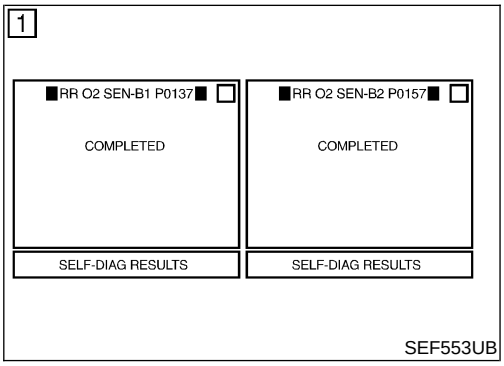
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted, it is unnecessary to conduct "Procedure for COND2".**



SEF706W

Procedure for COND2

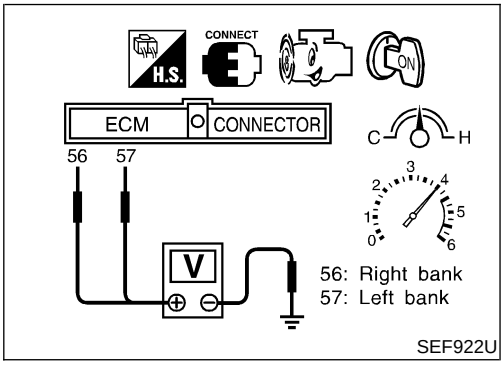
1) While driving, release accelerator pedal completely with "OD" OFF from the above condition (step 8) until "INCOMPLETE" at "COND2" on CONSULT screen has turned to "COMPLETED". (It will take approximately 4 seconds.)



SEF553UB

Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure".



SEF922U

Overall Function Check

NAEC0109

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

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be below 0.54V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.

6) If NG, go to "Diagnostic Procedure", EC-257.

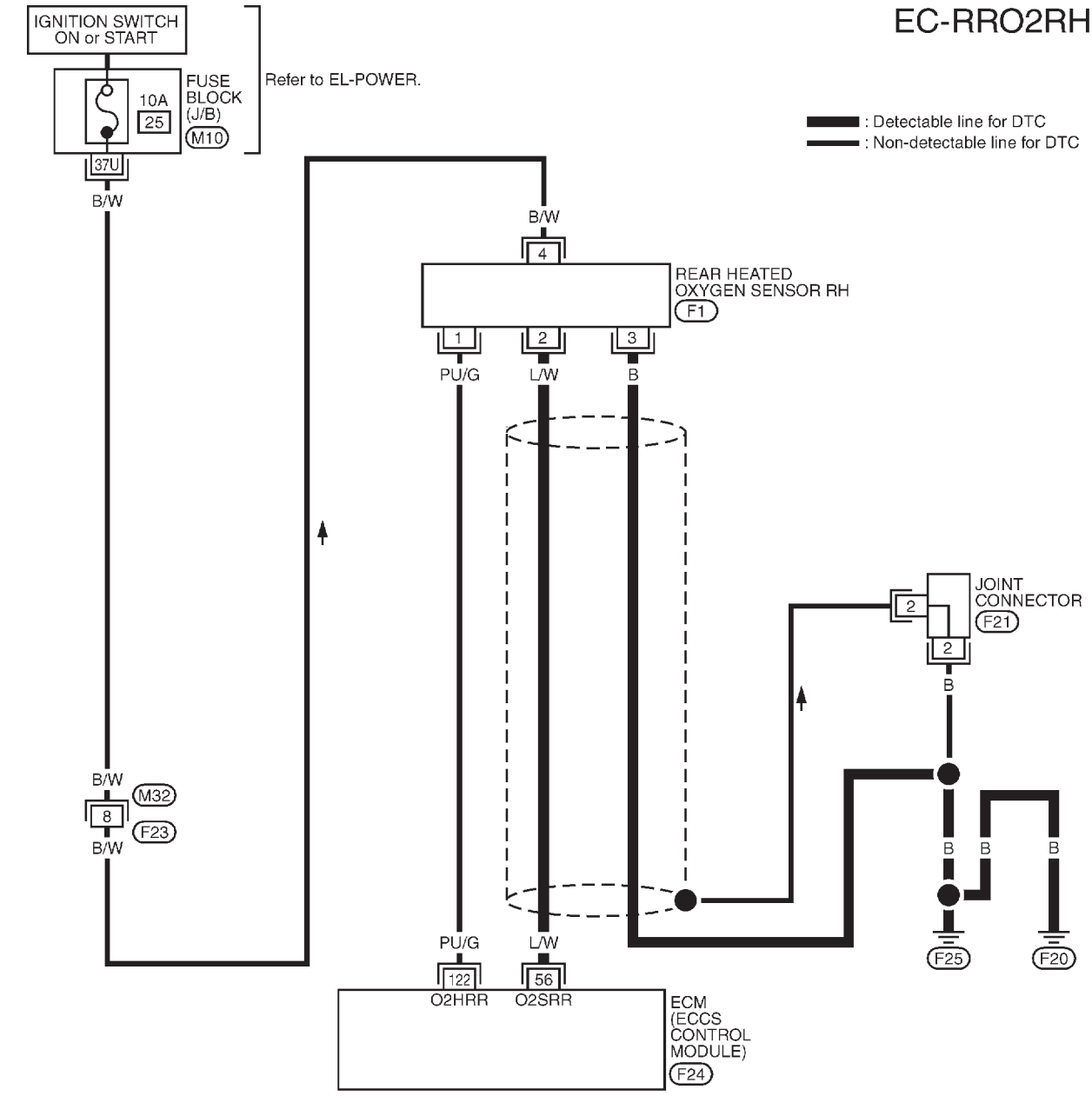
Wiring Diagram

NAEC0110

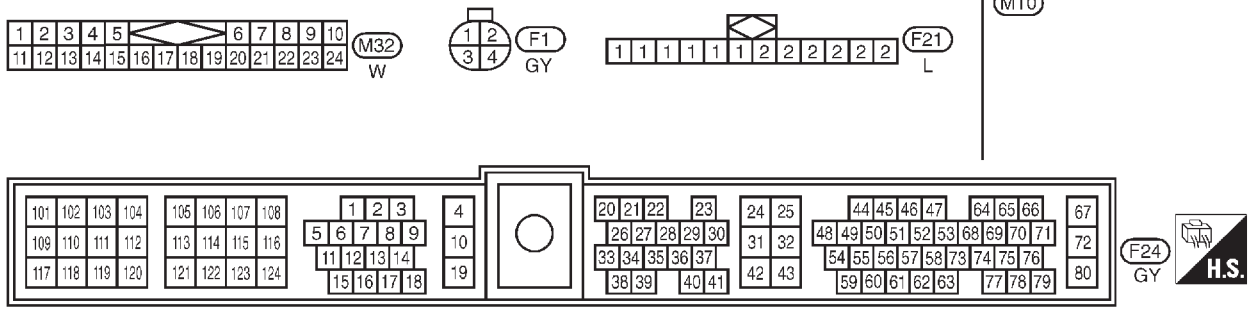
RIGHT BANK

NAEC0110S01

EC-RRO2RH-01



Refer to last page (Foldout page).
M10



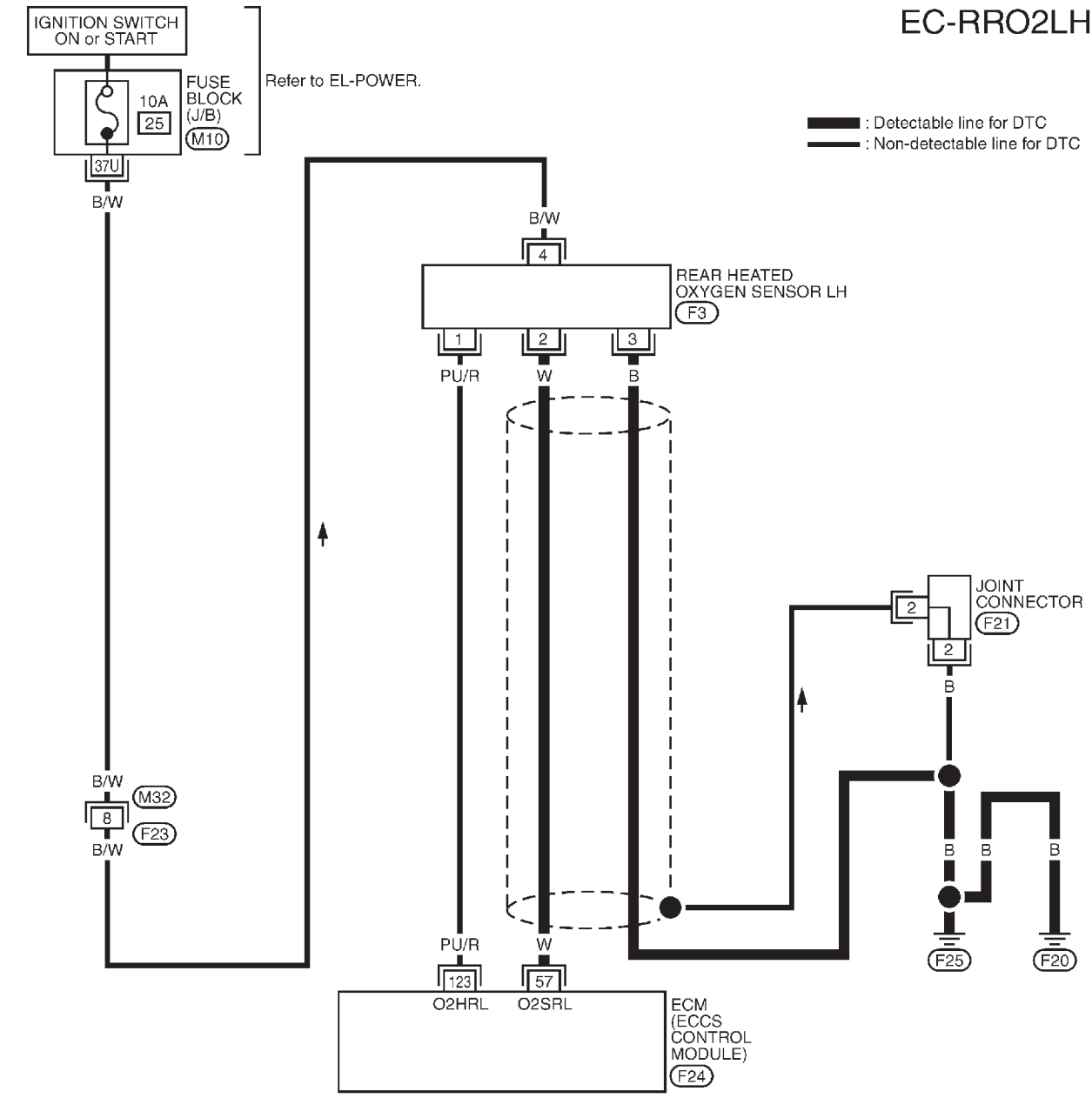
MEC050C

Wiring Diagram (Cont'd)

LEFT BANK

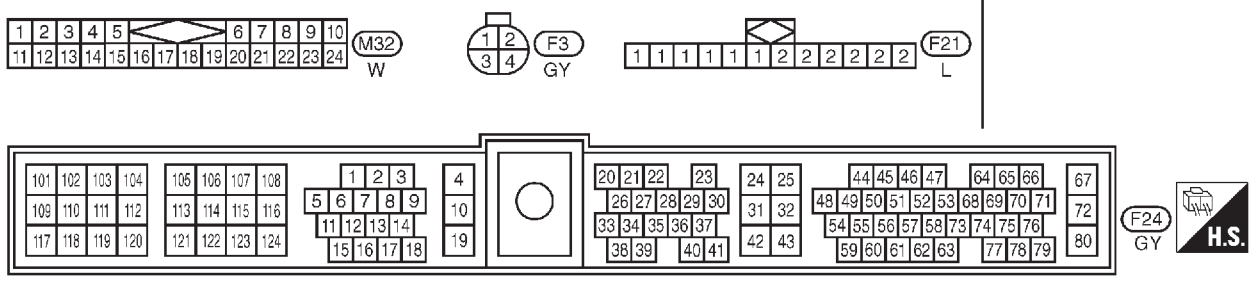
NAEC0110S02

EC-RRO2LH-01



Refer to last page (Foldout page).

M10



MEC054C

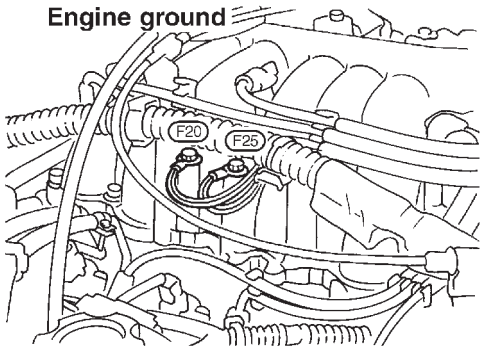
Diagnostic Procedure

NAEC0111

1	RETIGHTEN GROUND SCREWS

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

Engine ground



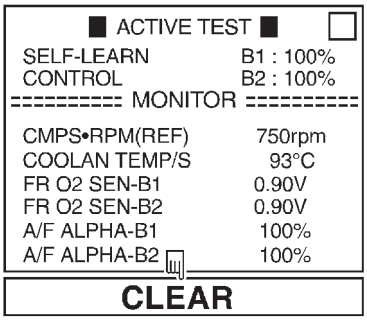
SEF031S

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

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



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0209 detected?
   Is it difficult to start engine?

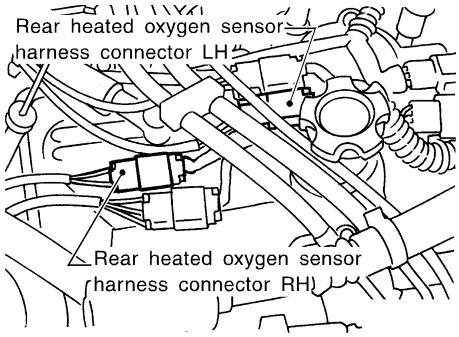
Yes or No

Yes	▶	Go to Trouble Diagnosis for “DTC P0172, P0175”, EC-306.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

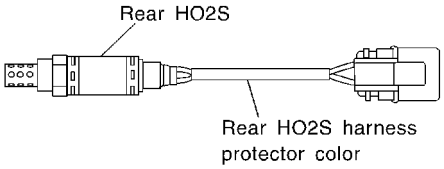
3 **CHECK INPUT SIGNAL CIRCUIT**

1. Turn ignition switch "OFF".
2. Disconnect corresponding rear heated oxygen sensor harness connector and ECM harness connector.



SEF879W

3. Check harness continuity between ECM terminal and sensor as follows.

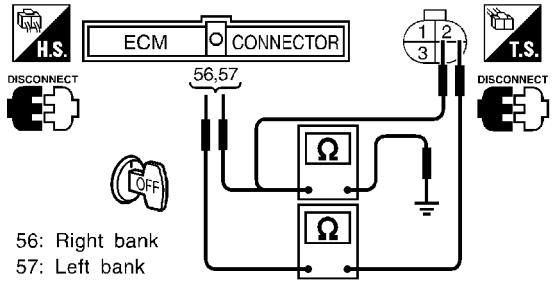


P0137 (-B1) Right bank: White
P0157 (-B2) Left bank: Red

SEF194WH

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0137	56	2	Right (White)
P0157	57	2	Left (Red)

SEF881W



SEF698U

Continuity should exist.

4. Check harness continuity between ECM terminal or sensor and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0137	56 or 2	Ground	Right (White)
P0157	57 or 2	Ground	Left (Red)

SEF880W

Continuity should not exist.

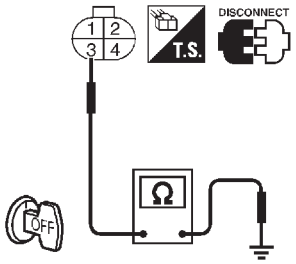
5. Also check harness for short to power.

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.
   Continuity should exist.



SEF699U

If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK REAR HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-260.

OK or NG

OK	▶	GO TO 6.
NG	▶	Check harness protector color. White; Right bank (-B1) Red; Left bank (-B2) Replace corresponding rear front heated sensor.

6	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect joint connector.
3. Check the following.
- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to EL-312, "HARNESS LAYOUT".)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

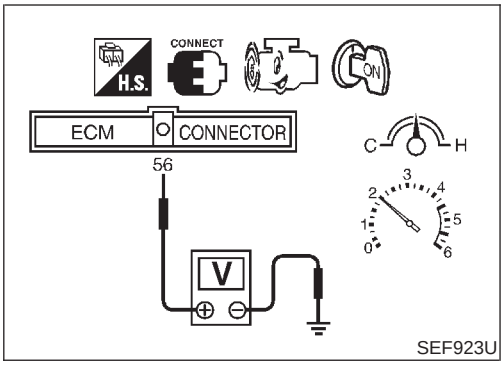
OK or NG

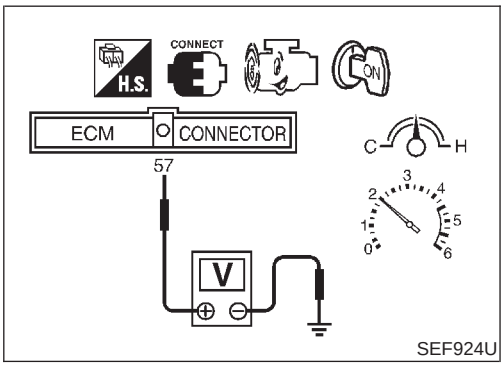
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**





Component Inspection

NAEC0436

REAR HEATED OXYGEN SENSOR

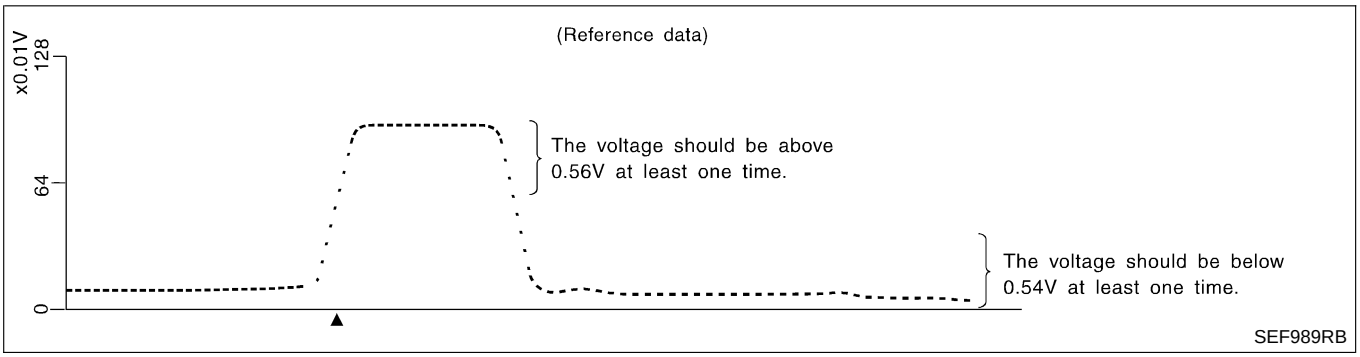
NAEC0436S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SEN-B1 (-B2)” as the monitor item with CONSULT.
4) Check “RR O2 SEN-B1 (-B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “RR O2 SEN-B1 (-B2)” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.
   “RR O2 SEN-B1 (-B2)” should be below 0.54V at least once when the “FUEL INJECTION” is −25%.

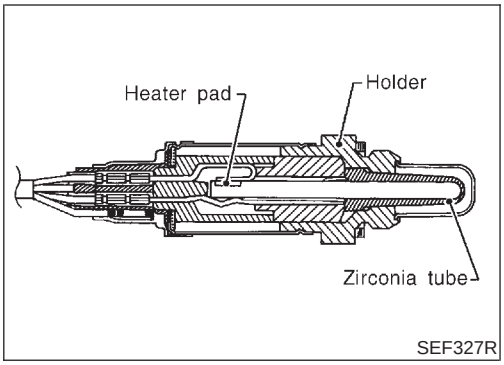
Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.



CAUTION:

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



Component Description

NAEC0437

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NAEC0438

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

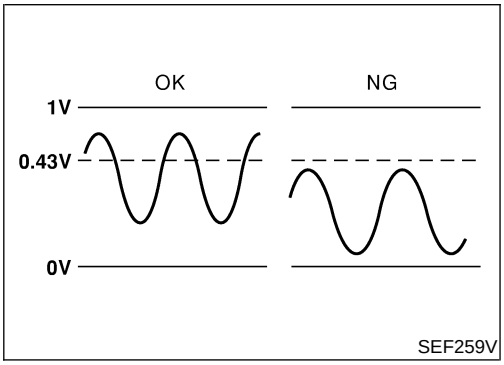
NAEC0439

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	L/W	Rear heated oxygen sensor	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	W			



On Board Diagnosis Logic

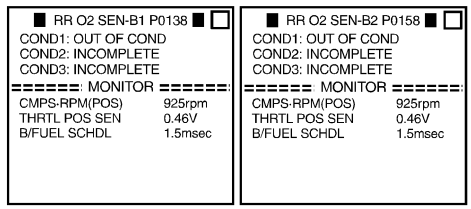
NAEC0440

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

On Board Diagnosis Logic (Cont'd)

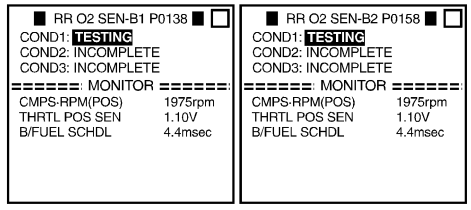
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138 0510 (Right bank)	• The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
P0158 0313 (Left bank)		

6



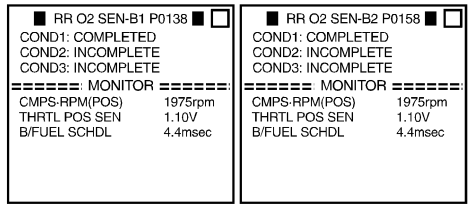
SEF708W

8



SEF709W

8



SEF710W

DTC Confirmation Procedure

NAEC0441

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this test. If the engine is stopped, reperform this test from step 2 in "Procedure for COND 1".

With CONSULT

Procedure for COND1

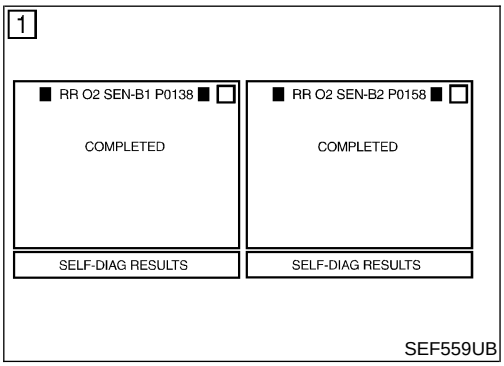
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SEN-B1 (-B2) P0138 (P0158)" of "RR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

CMPS·RPM (POS)	1,300 - 3,100 rpm (A/T) 1,500 - 3,600 rpm (M/T)
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec (A/T) 0.5 - 5.9 msec (M/T)
Selector lever	Suitable position

NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted,**

it is unnecessary to conduct "Procedure for COND2".



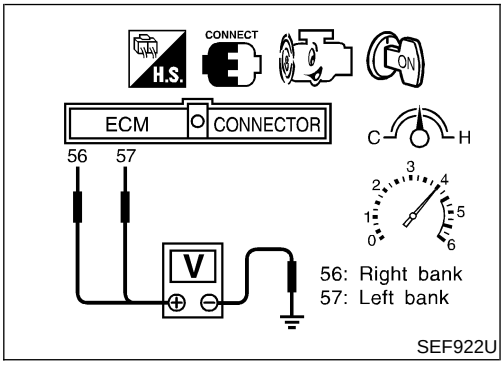
Procedure for COND2

1) While driving, release accelerator pedal completely with "OD" OFF from the above condition (step 8) until "INCOMPLETE" at "COND2" on CONSULT screen is turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:
If "COMPLETED" already appears at "COND3" on CONSULT screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".

Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to "Diagnostic Procedure".



Overall Function Check

NAEC0442

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

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
   The voltage should be above 0.56V at least once during this procedure.

Overall Function Check (Cont'd)

6) If NG, go to "Diagnostic Procedure".

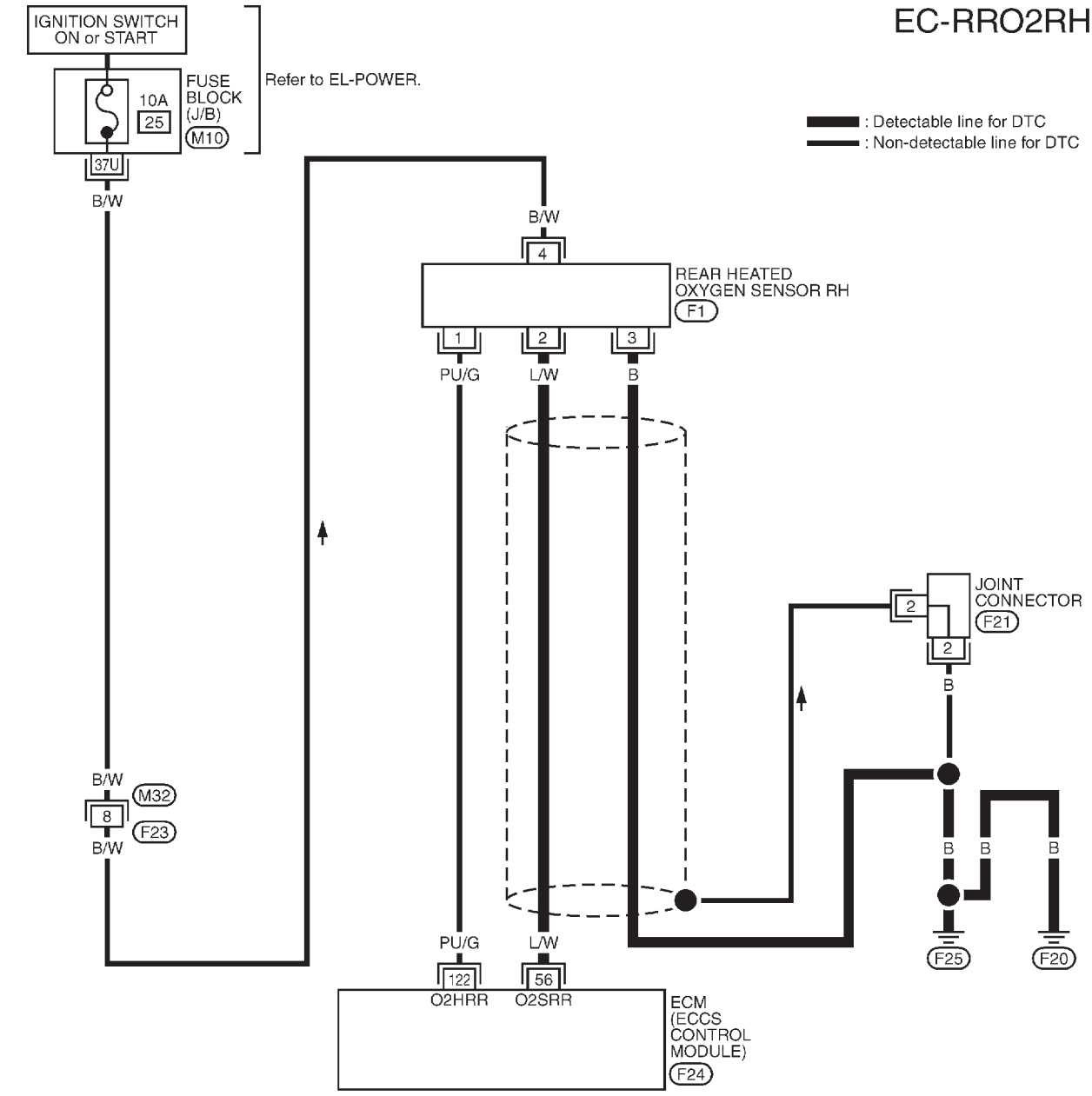
Wiring Diagram

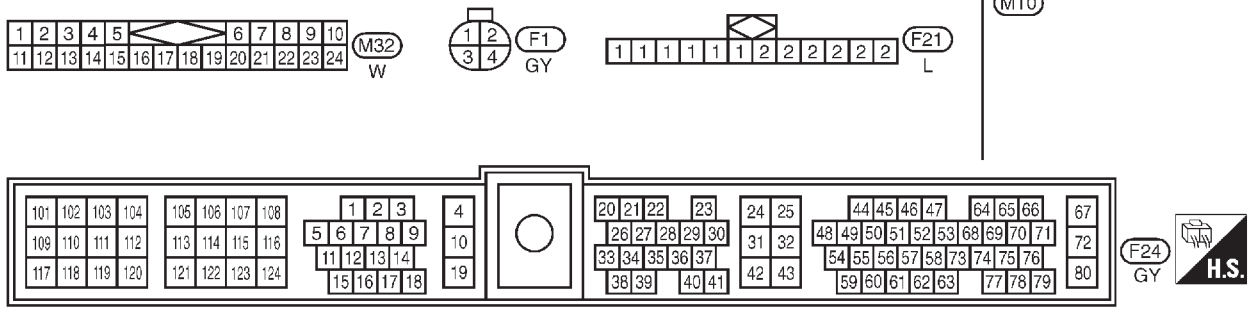
NAEC0443

RIGHT BANK

NAEC0443S01

EC-RRO2RH-01





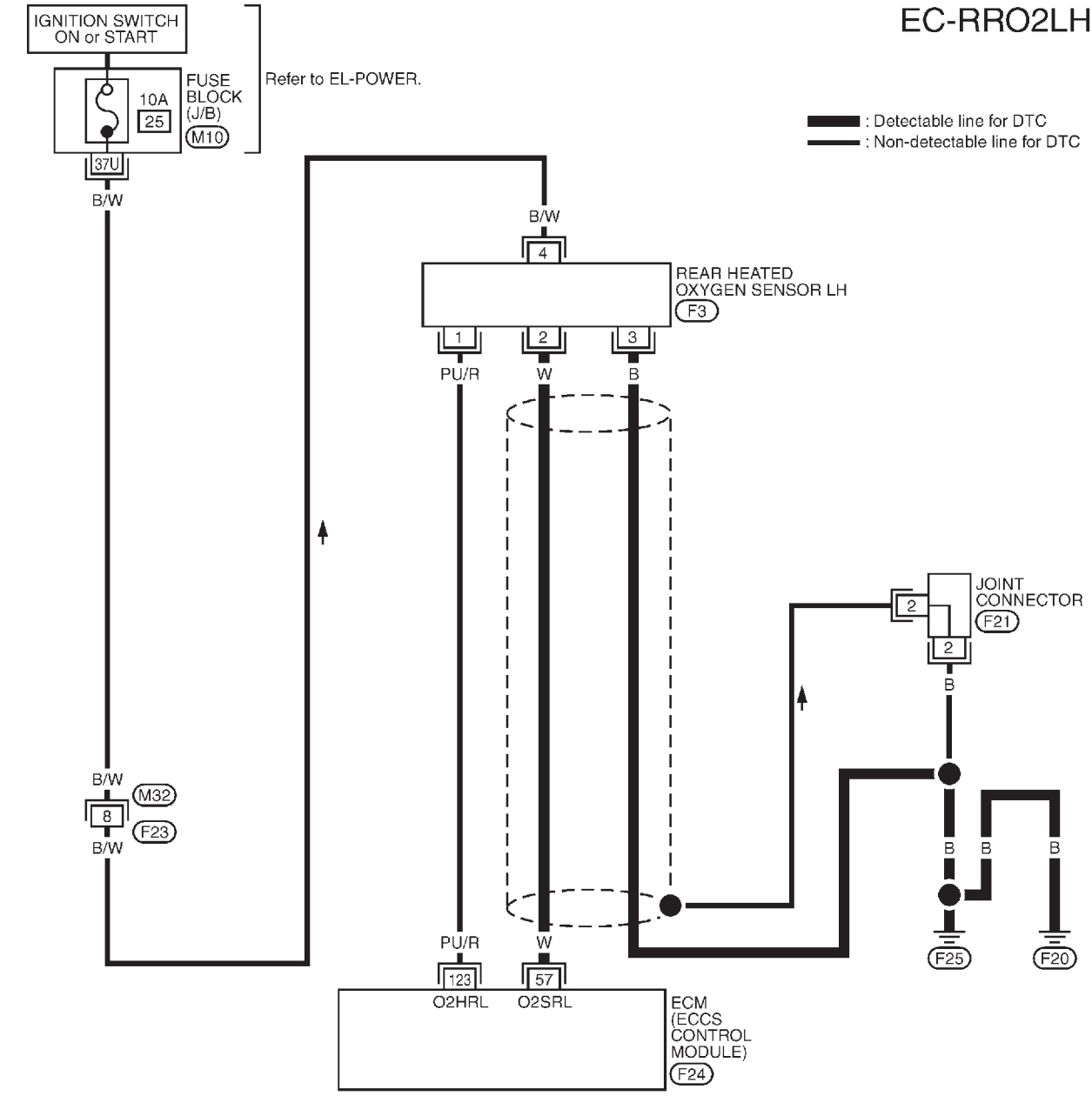
MEC050C

Wiring Diagram (Cont'd)

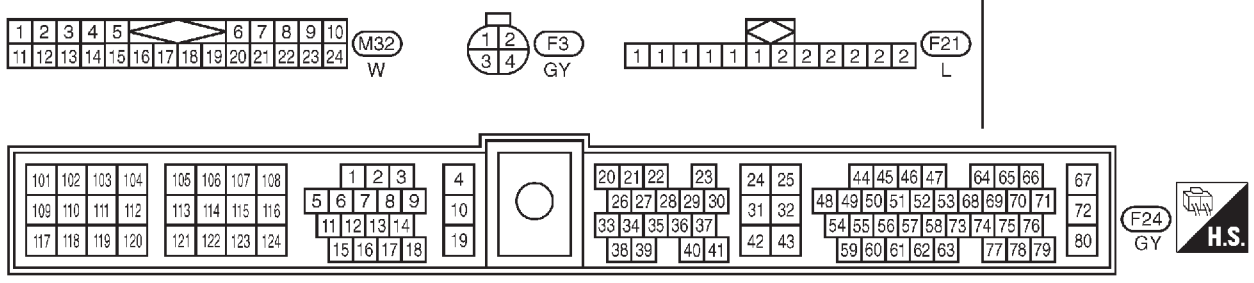
LEFT BANK

NAEC0443S02

EC-RRO2LH-01



Refer to last page (Foldout page).



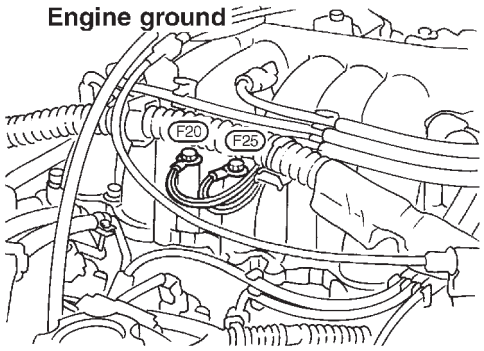
MEC054C

Diagnostic Procedure

NAEC0444

1	RETIGHTEN GROUND SCREWS

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



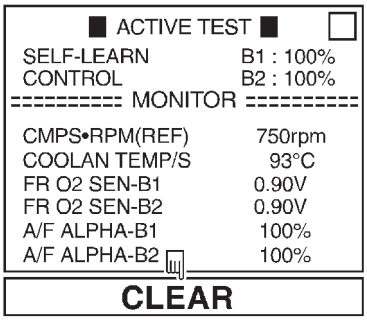
SEF031S

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

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



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 or 0210 detected?
   Is it difficult to start engine?

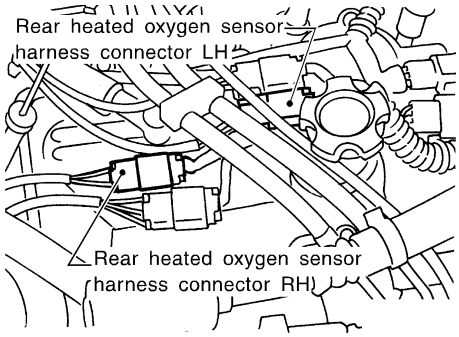
Yes or No

Yes	▶	Go to Trouble Diagnosis for “DTC P0171, P0174”, EC-297.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

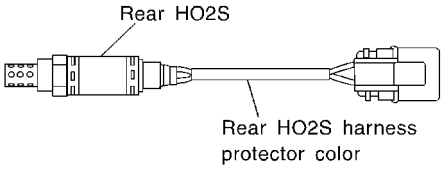
3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect corresponding rear heated oxygen sensor harness connector and ECM harness connector.



SEF879W

3. Check harness continuity between ECM terminal and sensor terminal as follows.

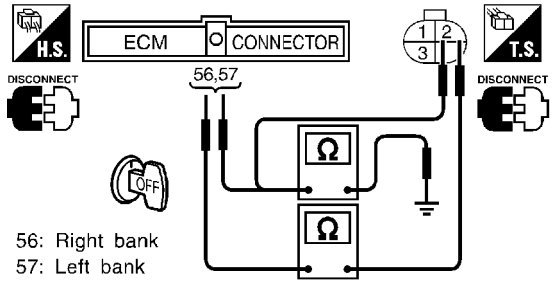


P0138 (-B1) Right bank: White
P0158 (-B2) Left bank: Red

SEF194WI

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0138	56	2	Right (White)
P0158	57	2	Left (Red)

SEF883W



SEF698U

Continuity should exist.

4. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0138	56 or 2	Ground	Right (White)
P0158	57 or 2	Ground	Left (Red)

SEF882W

Continuity should not exist.

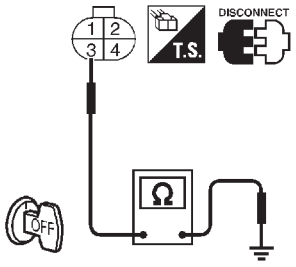
5. Also check harness for short to power.

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF699U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK REAR HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-270.

OK or NG

OK	▶	GO TO 6.
NG	▶	Check harness protector color. White; Right bank (-B1) Red; Left bank (-B2) Replace corresponding rear front heated sensor.

6	CHECK SHIELD CIRCUIT

1. Remove joint connector.
2. Check the following.

- Continuity between joint connector terminal and ground
- Joint connector

(Refer to EL-312, "HARNESS LAYOUT".)

Continuity should exist.

3. Also check harness for short to ground and short to power.
4. Then reconnect joint connector.

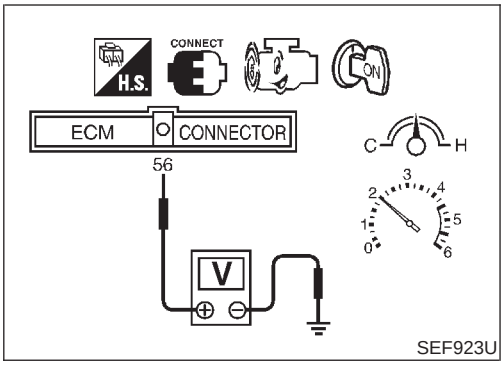
OK or NG

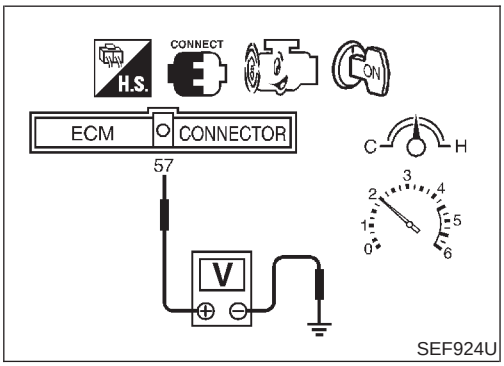
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**





Component Inspection

NAEC0445

REAR HEATED OXYGEN SENSOR

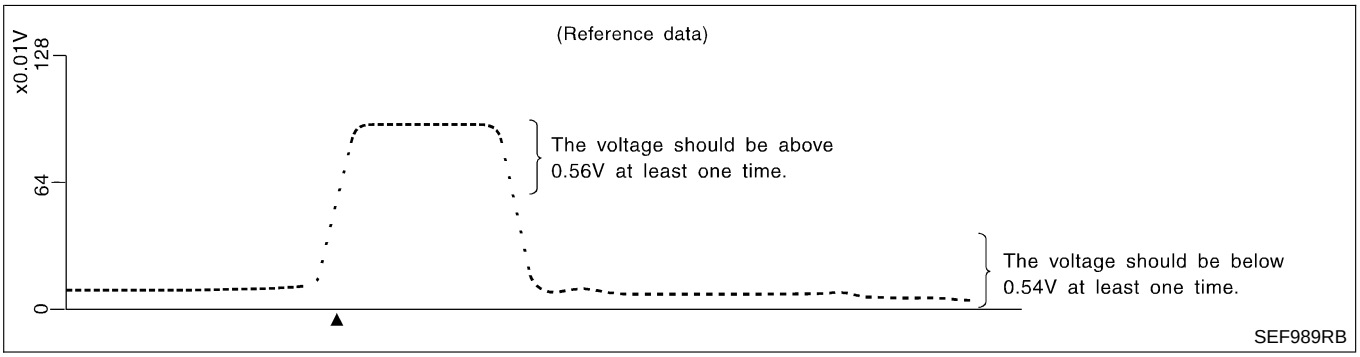
NAEC0445S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SEN-B1 (-B2)” as the monitor item with CONSULT.
4) Check “RR O2 SEN-B1 (-B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “RR O2 SEN-B1 (-B2)” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.
   “RR O2 SEN-B1 (-B2)” should be below 0.54V at least once when the “FUEL INJECTION” is −25%.

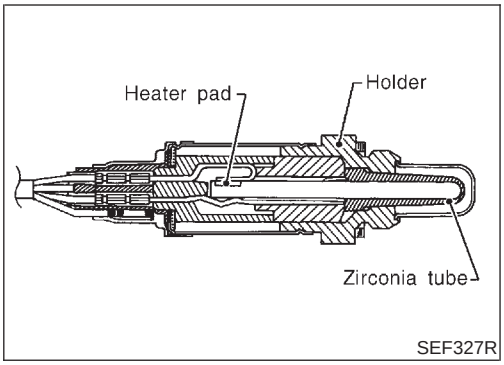
Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.



CAUTION:

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



Component Description

NAEC0446

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NAEC0447

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

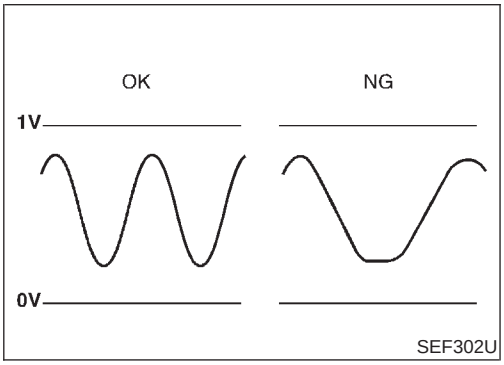
NAEC0448

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	L/W	Rear heated oxygen sensor	**[Engine is running]** • Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	W			



On Board Diagnosis Logic

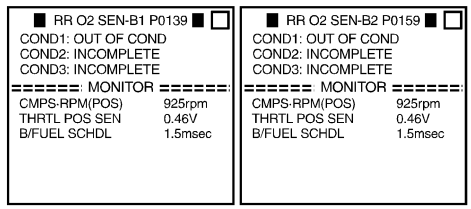
NAEC0449

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

On Board Diagnosis Logic (Cont'd)

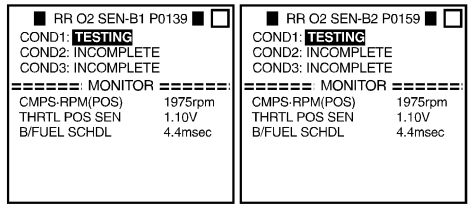
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139 0707 (Right bank)	• It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
P0159 0708 (Left bank)		

6



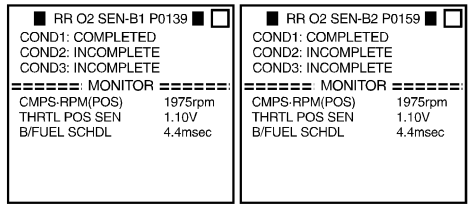
SEF712W

8



SEF713W

8



SEF714W

DTC Confirmation Procedure

NAEC0450

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- **"COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Never stop engine during this test. If the engine is stopped, reperform this test from step 2.

With CONSULT

Procedure for COND1

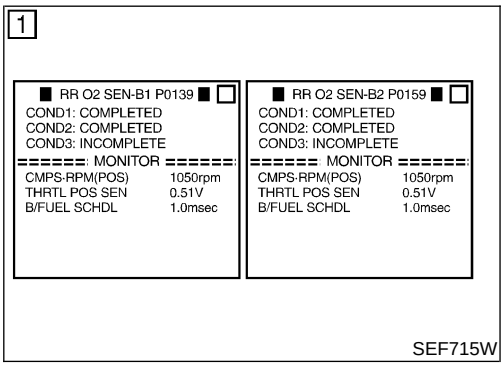
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "RR O2 SEN-B1 (-B2) P0139 (P0159)" of "REAR O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT.
4) Touch "START".
5) Start engine and let it idle for at least 30 seconds.
6) Rev engine up to 2,000 rpm 2 or 3 times quickly under no load.
   If "COMPLETED" appears on CONSULT screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
8) When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

CMPS·RPM (POS)	1,300 - 3,100 rpm (A/T) 1,500 - 3,600 rpm (M/T)
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec (A/T) 0.5 - 5.9 msec (M/T)
Selector lever	Suitable position

NOTE:

- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in "Procedure for COND1".**
- **If "COMPLETED" already appears at "COND2" on CONSULT screen before "Procedure for COND2" is conducted,**

it is unnecessary to conduct "Procedure for COND2".

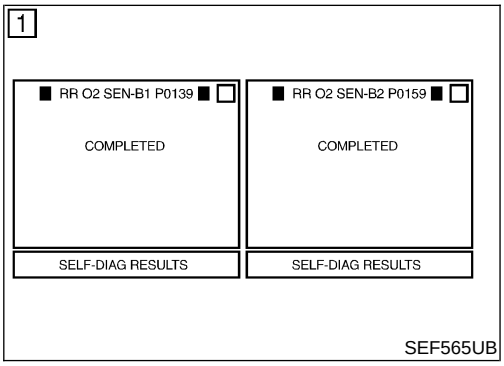


SEF715W

Procedure for COND2

1) While driving, release accelerator pedal completely with "OD" OFF from the above condition (step 8) until "INCOMPLETE" at "COND2" on CONSULT screen is turned to "COMPLETED". (It will take approximately 4 seconds.)

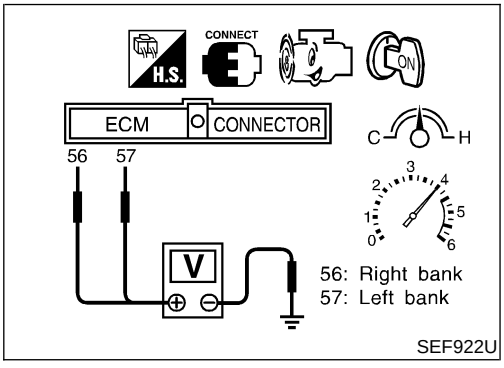
NOTE:
If "COMPLETED" is already appears at "COND3" on CONSULT screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 1 in "Procedure for COND3".



SEF565UB

Procedure for COND3

1) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COMPLETED". (It will take maximum of approximately 6 minutes.)
2) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to "Diagnostic Procedure".



SEF922U

Overall Function Check

NAEC0451

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

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
   The voltage should change at more than 0.06V for 1 second during this procedure.

Overall Function Check (Cont'd)

6) If NG, go to "Diagnostic Procedure".

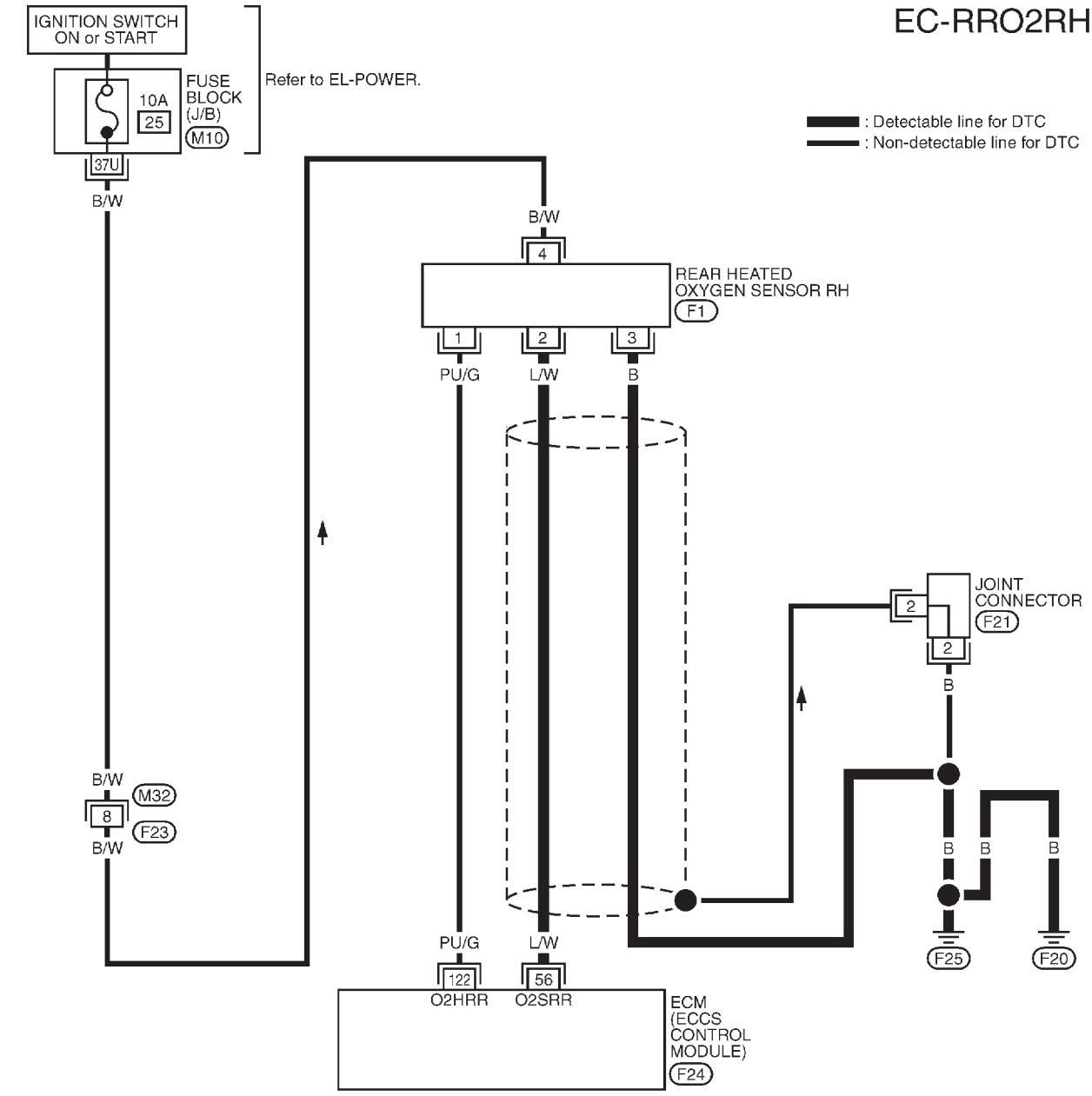
Wiring Diagram

NAEC0452

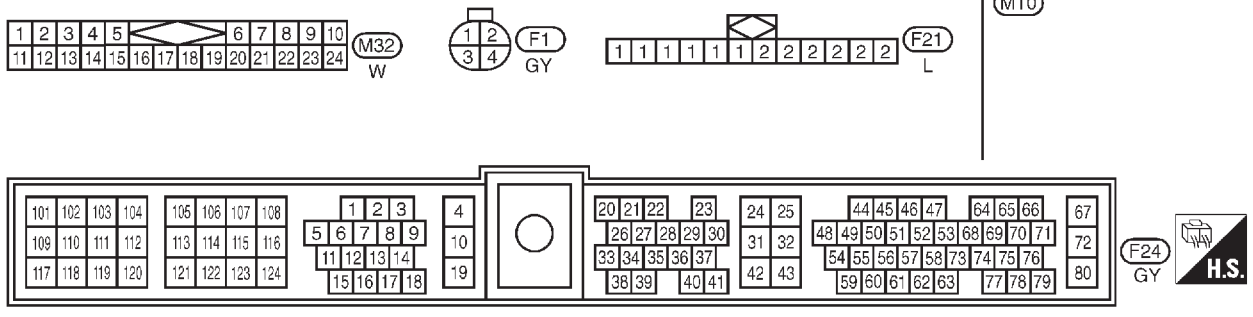
RIGHT BANK

NAEC0452S01

EC-RRO2RH-01



Refer to last page (Foldout page).
M10



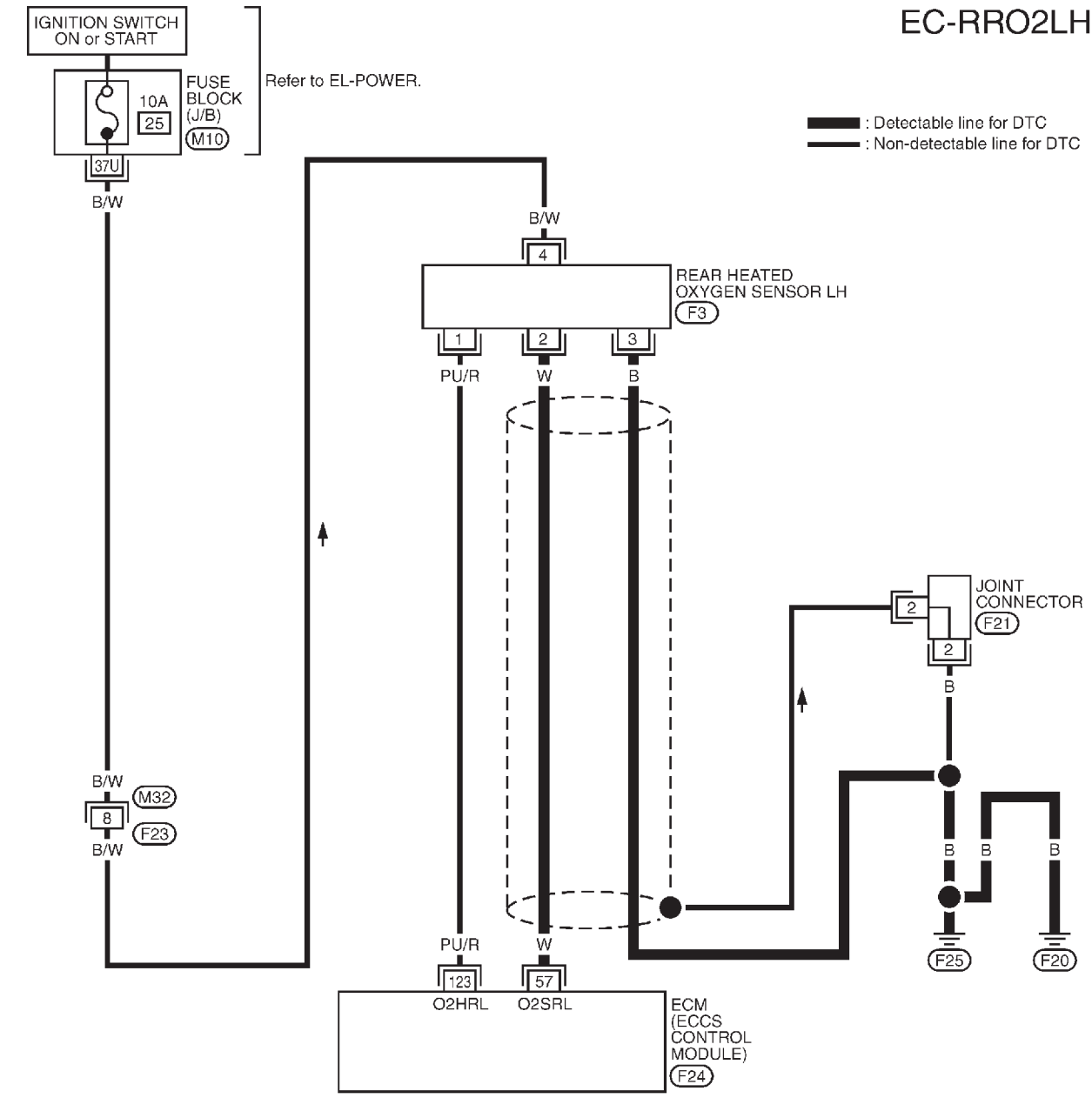
MEC050C

Wiring Diagram (Cont'd)

LEFT BANK

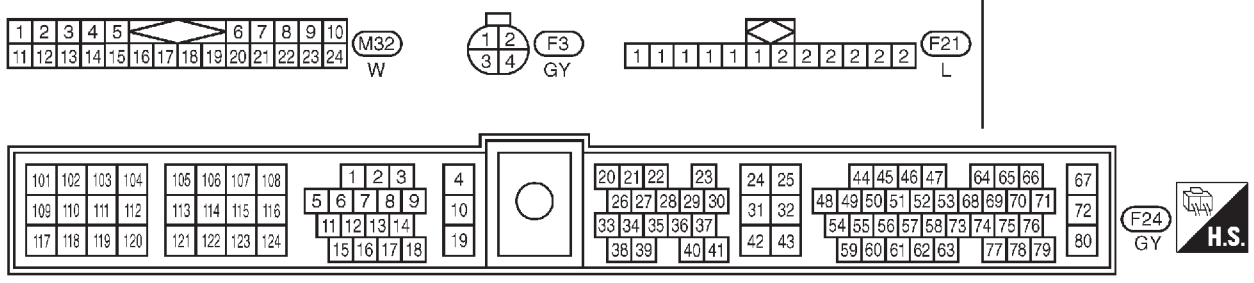
NAEC0452S02

EC-RRO2LH-01



Refer to last page (Foldout page).

M10



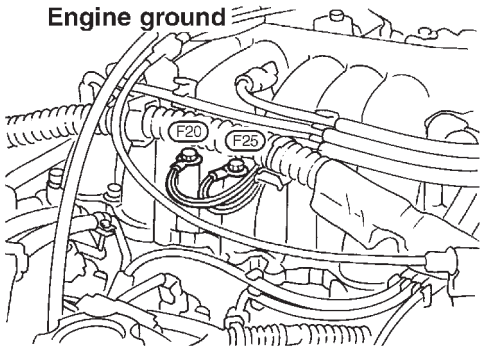
MEC054C

Diagnostic Procedure

NAEC0453

1	RETIGHTEN GROUND SCREWS

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



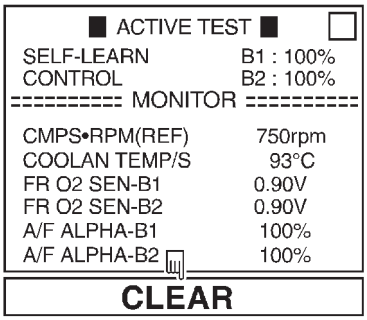
SEF031S

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT

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



SEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-68.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114, 0115, 0209 or 0210 detected?
   Is it difficult to start engine?

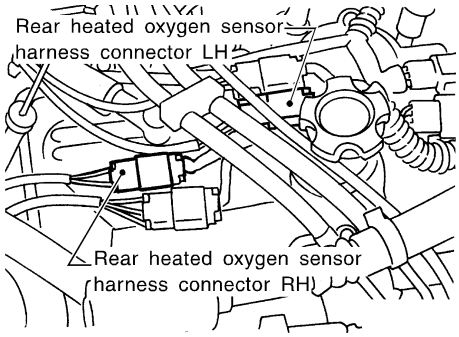
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-297, 306.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

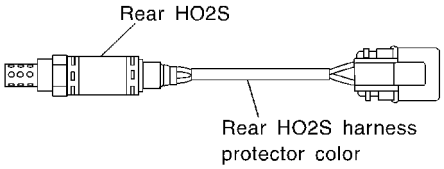
3 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect corresponding rear heated oxygen sensor harness connector and ECM harness connector.



SEF879W

3. Check harness continuity between ECM terminal and sensor terminal as follows.

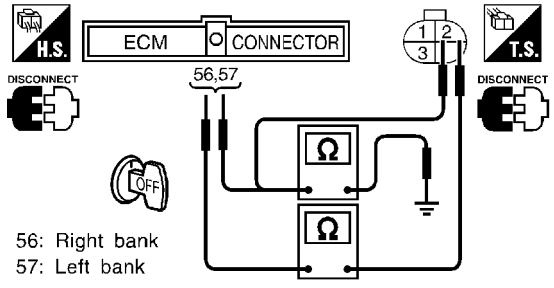


P0139 (-B1) Right bank: White
P0159 (-B2) Left bank: Red

SEF194WK

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0139	56	2	Right (White)
P0159	57	2	Left (Red)

SEF885W



SEF698U

Continuity should exist.

4. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0139	56 or 2	Ground	Right (White)
P0159	57 or 2	Ground	Left (Red)

SEF884W

Continuity should not exist.

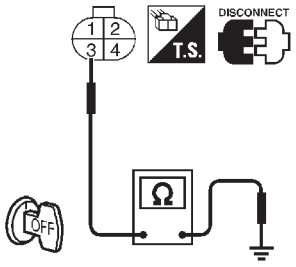
5. Also check harness for short to power.

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF699U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector
- Harness for open or short between rear heated oxygen sensor and engine ground.

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

6	CHECK REAR HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-280.

OK or NG

OK	▶	GO TO 7.
NG	▶	Check harness protector color. White; Right bank (-B1) Red; Left bank (-B2) Replace corresponding rear heated oxygen sensor.

7	CHECK SHIELD CIRCUIT

1. Turn ignition switch "OFF".
2. Remove joint connector.
3. Check the following.
- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to EL-312, "HARNESS LAYOUT".)

  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

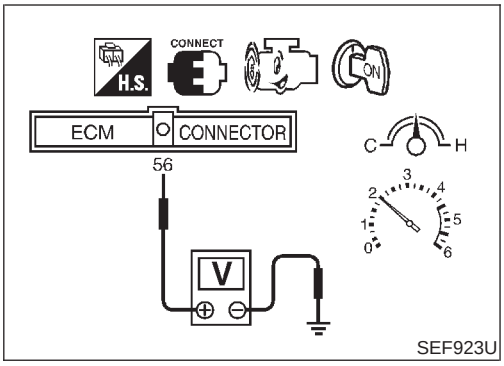
OK or NG

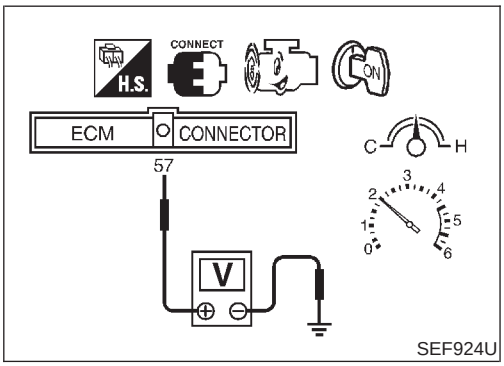
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**





Component Inspection

NAEC0454

REAR HEATED OXYGEN SENSOR

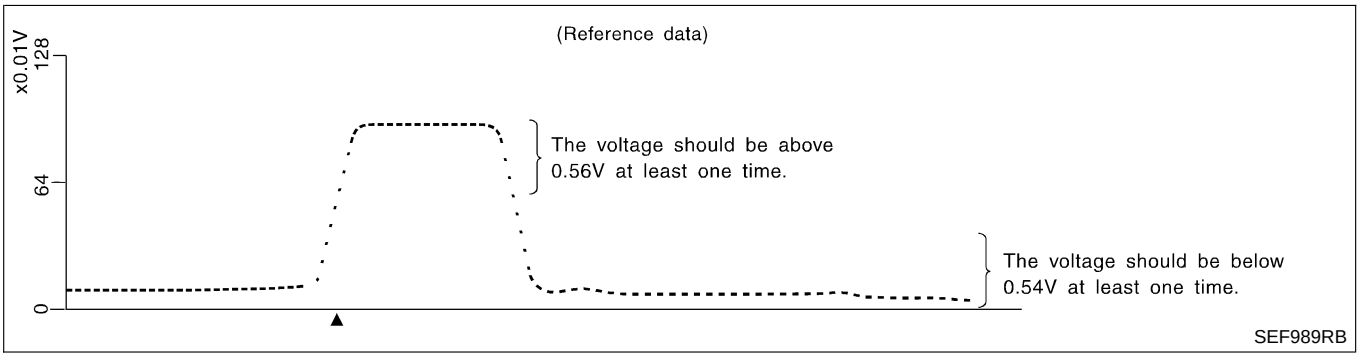
NAEC0454S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SEN-B1 (-B2)” as the monitor item with CONSULT.
4) Check “RR O2 SEN-B1 (-B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “RR O2 SEN-B1 (-B2)” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.
   “RR O2 SEN-B1 (-B2)” should be below 0.54V at least once when the “FUEL INJECTION” is −25%.

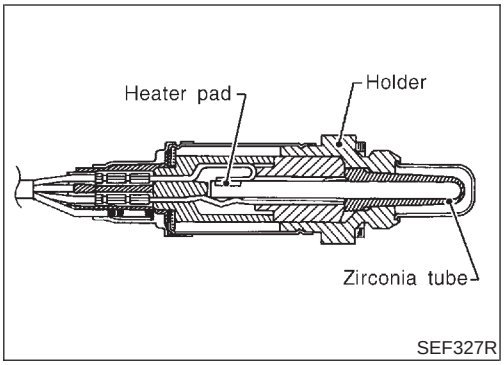
Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and ECM terminal 32 (engine ground).
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.



CAUTION:

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



Component Description

NAEC0455

The rear heated oxygen sensor, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT Reference Value in Data Monitor Mode

NAEC0456

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

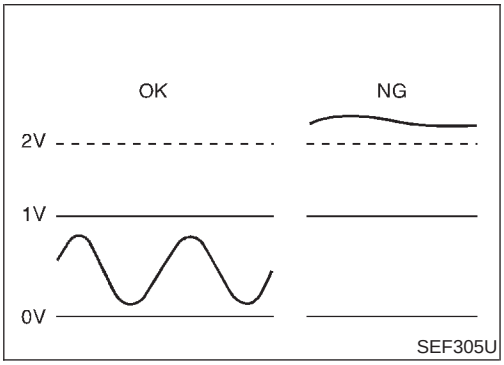
ECM Terminals and Reference Value

NAEC0457

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	L/W	Rear heated oxygen sensor	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	W			

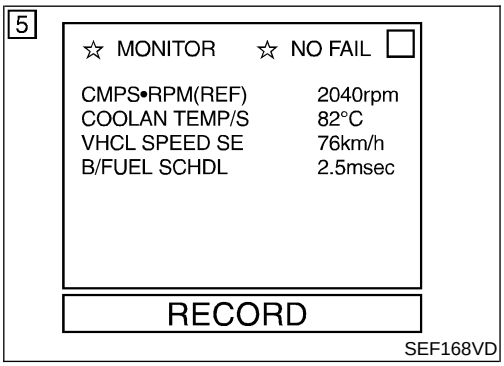


On Board Diagnosis Logic

NAEC0458

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140 0512 (Right bank)	• An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor
P0160 0315 (Left bank)		



DTC Confirmation Procedure

NAEC0459

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

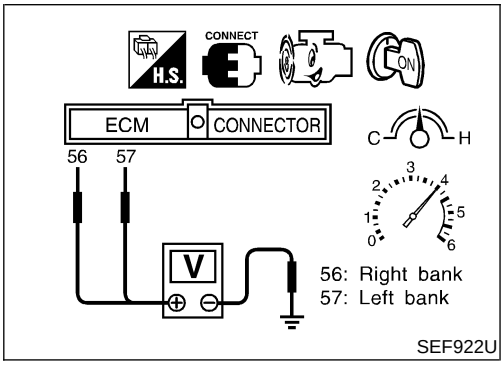
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle with engine running.
4) Let engine idle for 1 minute.
5) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	1,300 - 3,100 rpm (A/T) 1,500 - 3,600 rpm (M/T)
VHCL SPEED SE	64 - 130 km/h (40 - 80 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec (A/T) 0.5 - 5.9 msec (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure".



Overall Function Check

NAEC0460

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

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.

4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure".

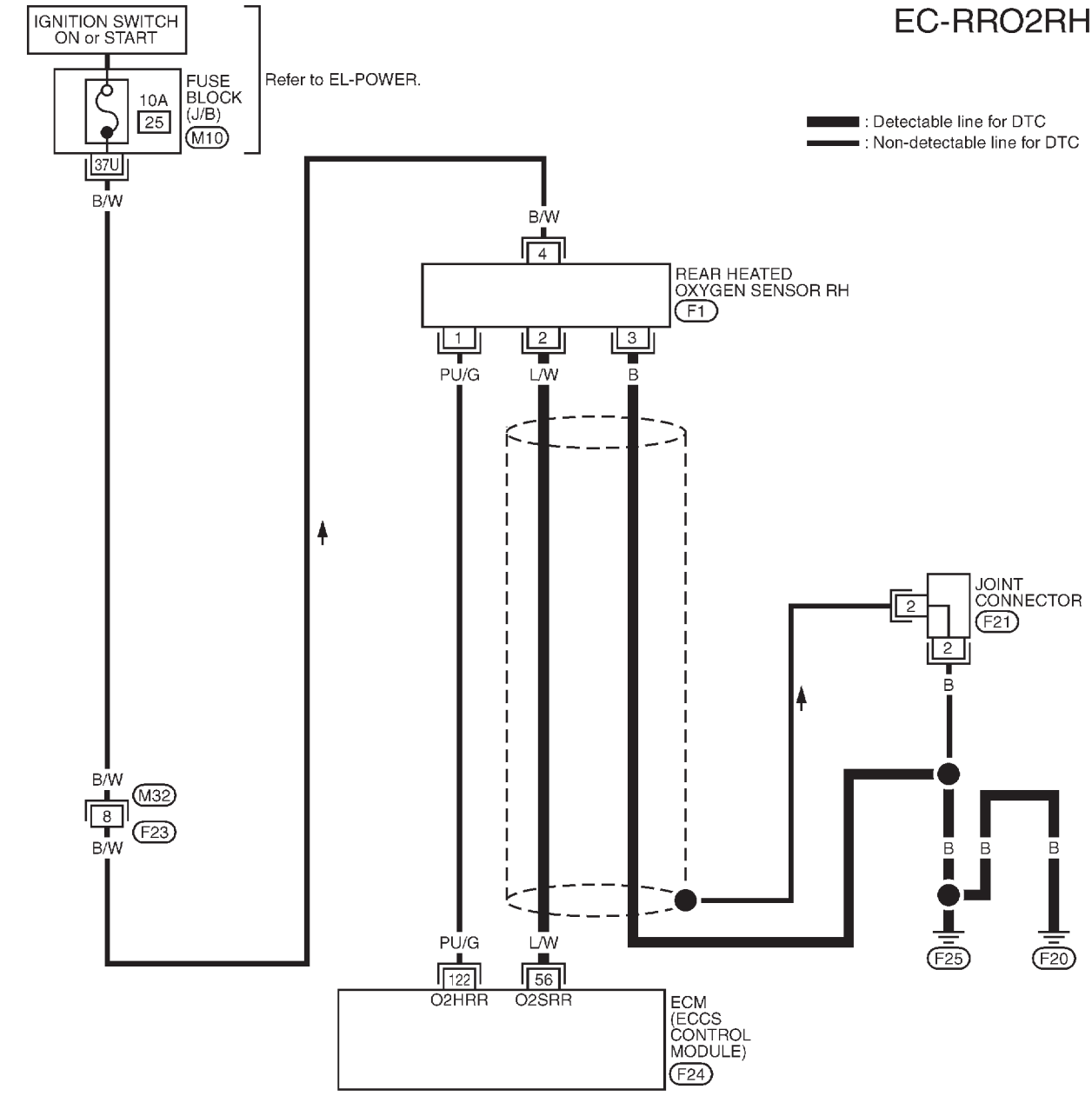
Wiring Diagram

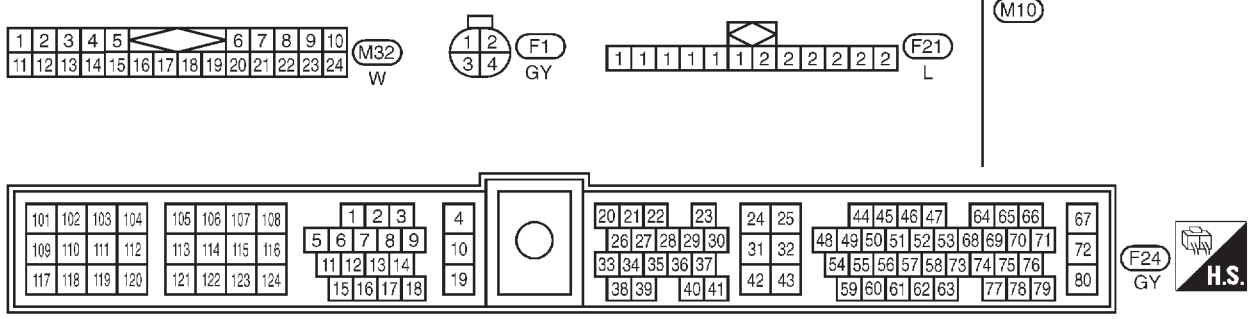
NAEC0461

RIGHT BANK

NAEC0461S01

EC-RRO2RH-01





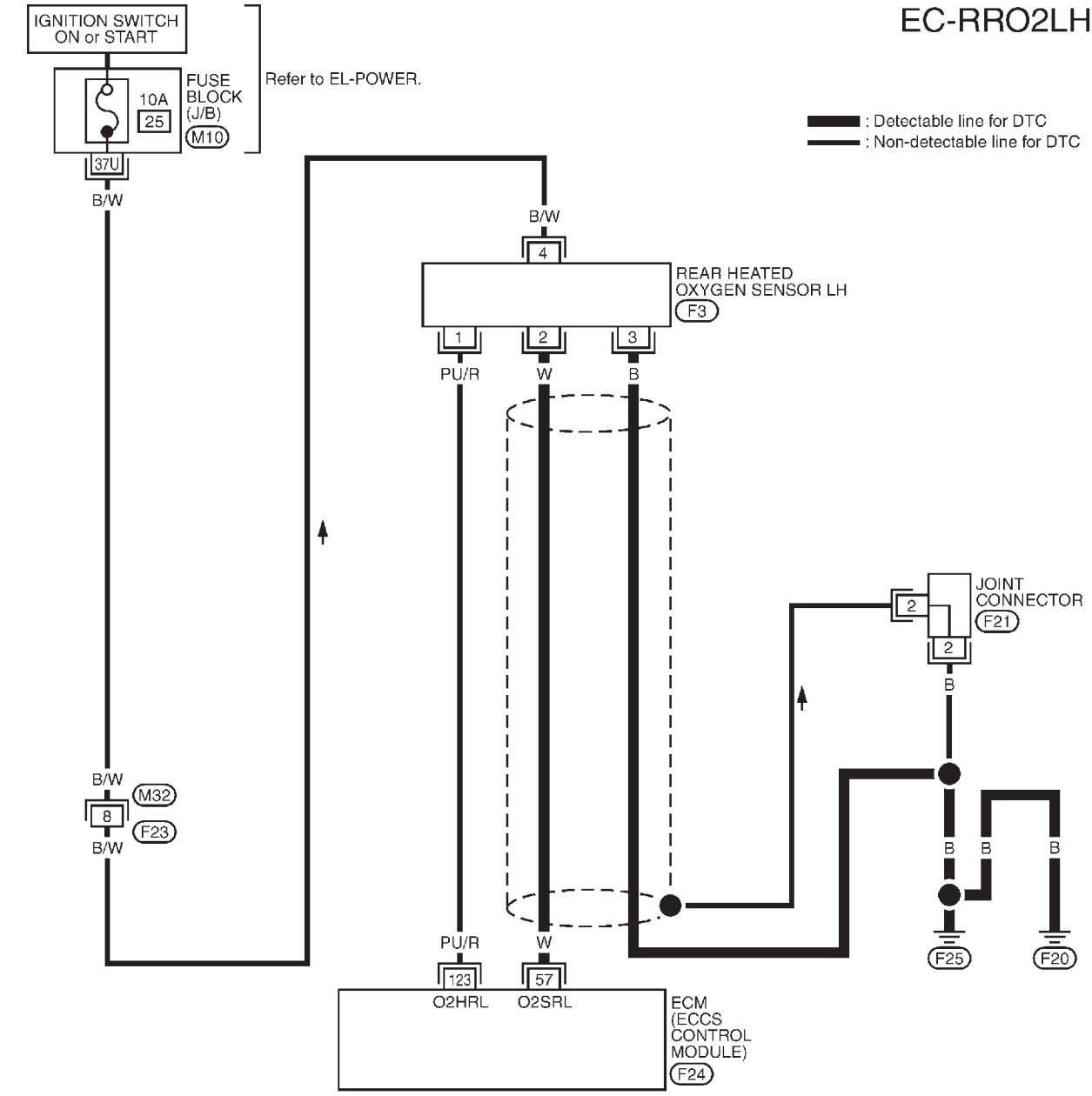
Refer to last page (Foldout page).
M10

MEC050C

LEFT BANK

NAEC0461S02

EC-RRO2LH-01



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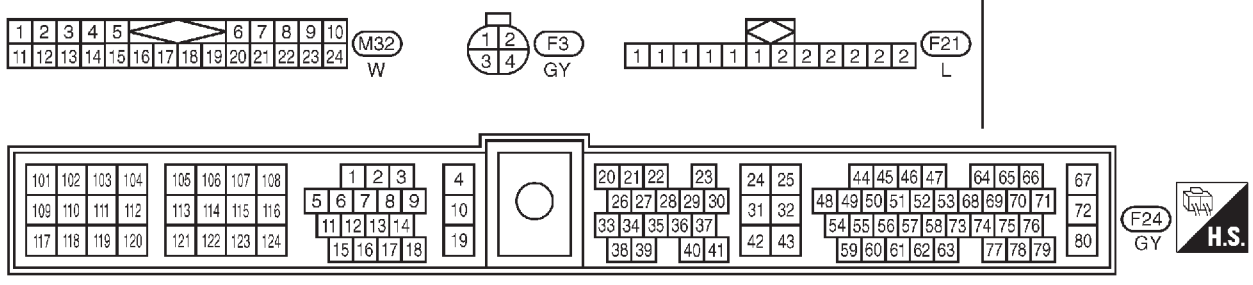
M10



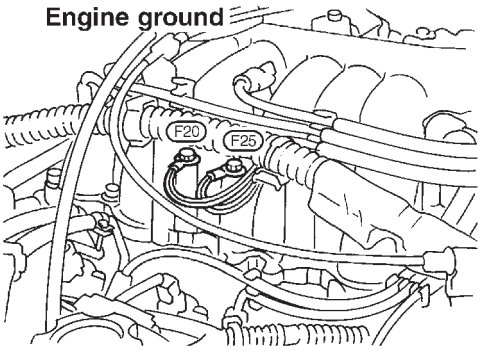
MEC054C

Diagnostic Procedure

NAEC0462

1	RETIGHTEN GROUND SCREWS

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

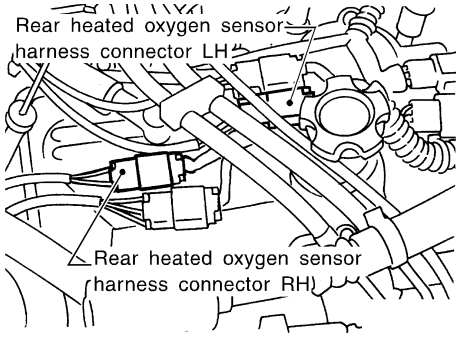


SEF031S

▶	GO TO 2.

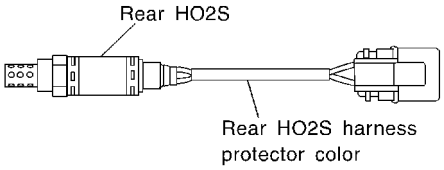
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect corresponding rear heated oxygen sensor harness connector and ECM harness connector.



SEF879W

2. Check harness continuity between ECM terminal and sensor terminal as follows.

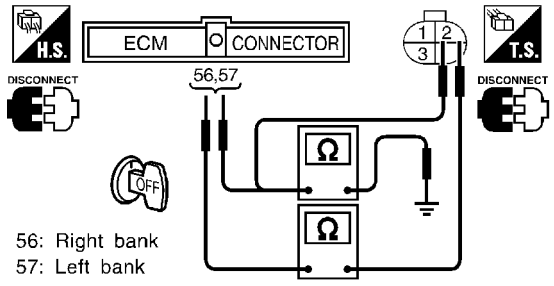


P0140 (-B1) Right bank: White
P0160 (-B2) Left bank: Red

SEF194WL

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0140	56	2	Right (White)
P0160	57	2	Left (Red)

SEF886W



SEF698U

Continuity should exist.

3. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0140	56 or 2	Ground	Right (White)
P0160	57 or 2	Ground	Left (Red)

SEF887W

Continuity should not exist.

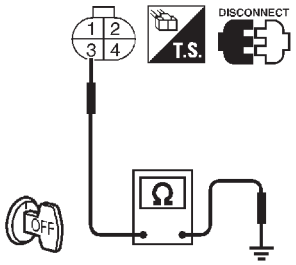
4. Also check harness for short to power.

OK or NG

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

3	CHECK GROUND CIRCUIT

1. Check harness continuity between terminal 3 and engine ground.



SEF699U

Continuity should exist.

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

OK or NG

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

4	CHECK CONNECTORS FOR WATER

Check rear heated oxygen sensor connector and harness connector for water.
Water should not exist.

OK or NG

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

5	CHECK REAR HEATED OXYGEN SENSOR

Refer to "Component Inspection", EC-289.

OK or NG

OK	▶	GO TO 6.
NG	▶	Check harness protector color. White; Right bank (-B1) Red; Left bank (-B2) Replace corresponding rear heated oxygen sensor.

6	CHECK SHIELD CIRCUIT

1. Remove joint connector.
2. Check the following.

- Continuity between joint connector terminal and ground
- Joint connector
  (Refer to EL-312, "HARNESS LAYOUT".)
  Continuity should exist.
  If OK, check harness for short to ground and short to power. Then reconnect joint connector.

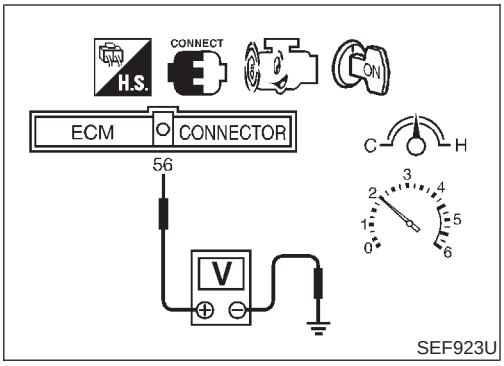
OK or NG

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

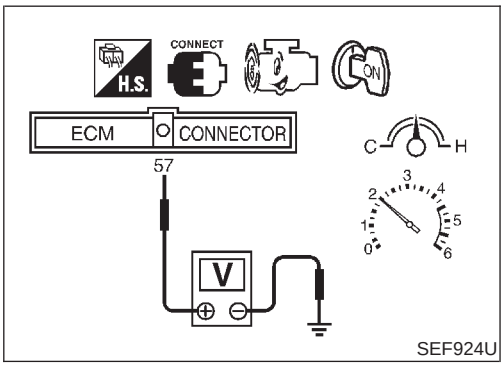
7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

▶ **INSPECTION END**



SEF923U



SEF924U

Component Inspection

NAEC0463

REAR HEATED OXYGEN SENSOR

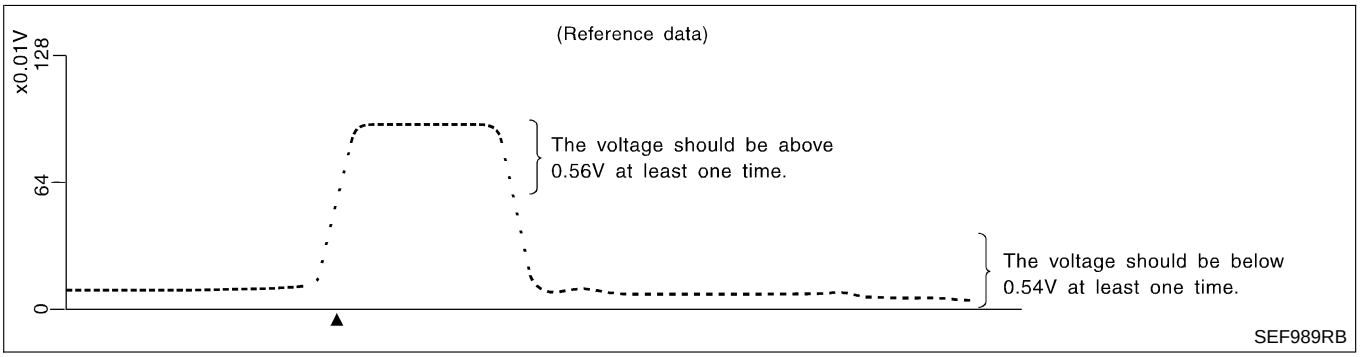
NAEC0463S01

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SEN-B1 (-B2)” as the monitor item with CONSULT.
4) Check “RR O2 SEN-B1 (-B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
   “RR O2 SEN-B1 (-B2)” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.
   “RR O2 SEN-B1 (-B2)” should be below 0.54V at least once when the “FUEL INJECTION” is −25%.

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “OD” OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.



SEF989RB

CAUTION:

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

Description

NAEC0112

SYSTEM DESCRIPTION

NAEC0112S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heaters

The ECM performs ON/OFF control of the rear heated oxygen sensor heaters corresponding to the engine speed.

OPERATION

NAEC0112S02

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT Reference Value in Data Monitor Mode

NAEC0113

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 HTR-B1 RR O2 HTR-B2	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,200 rpm.	OFF
	● Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	ON

ECM Terminals and Reference Value

NAEC0114

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

CAUTION:

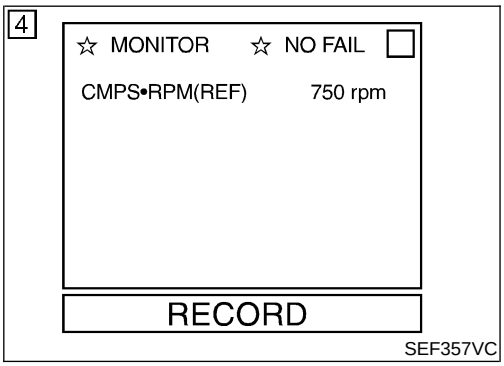
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122 (Right bank)	PU/G	Rear heated oxygen sensor heater	**[Ignition switch "ON"]** ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
123 (Left bank)	PU/R		**[Engine is running]** ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V

On Board Diagnosis Logic

NAEC0115

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141 0902 (Right bank) P0161 1002 (Left bank)	• The current amperage in the rear heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) • Rear heated oxygen sensor heater



DTC Confirmation Procedure

NAEC0116

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine.
3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Stop vehicle and let engine idle for at least 6 seconds.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure".

With GST

1) Start engine.
2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle and let engine idle for at least 6 seconds.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Start engine.
6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
7) Stop vehicle and let engine idle for at least 6 seconds.
8) Select "MODE 3" with GST.
9) If DTC is detected, go to "Diagnostic Procedure".

No Tools

1) Start engine.
2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle and let engine idle for at least 6 seconds.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure".

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

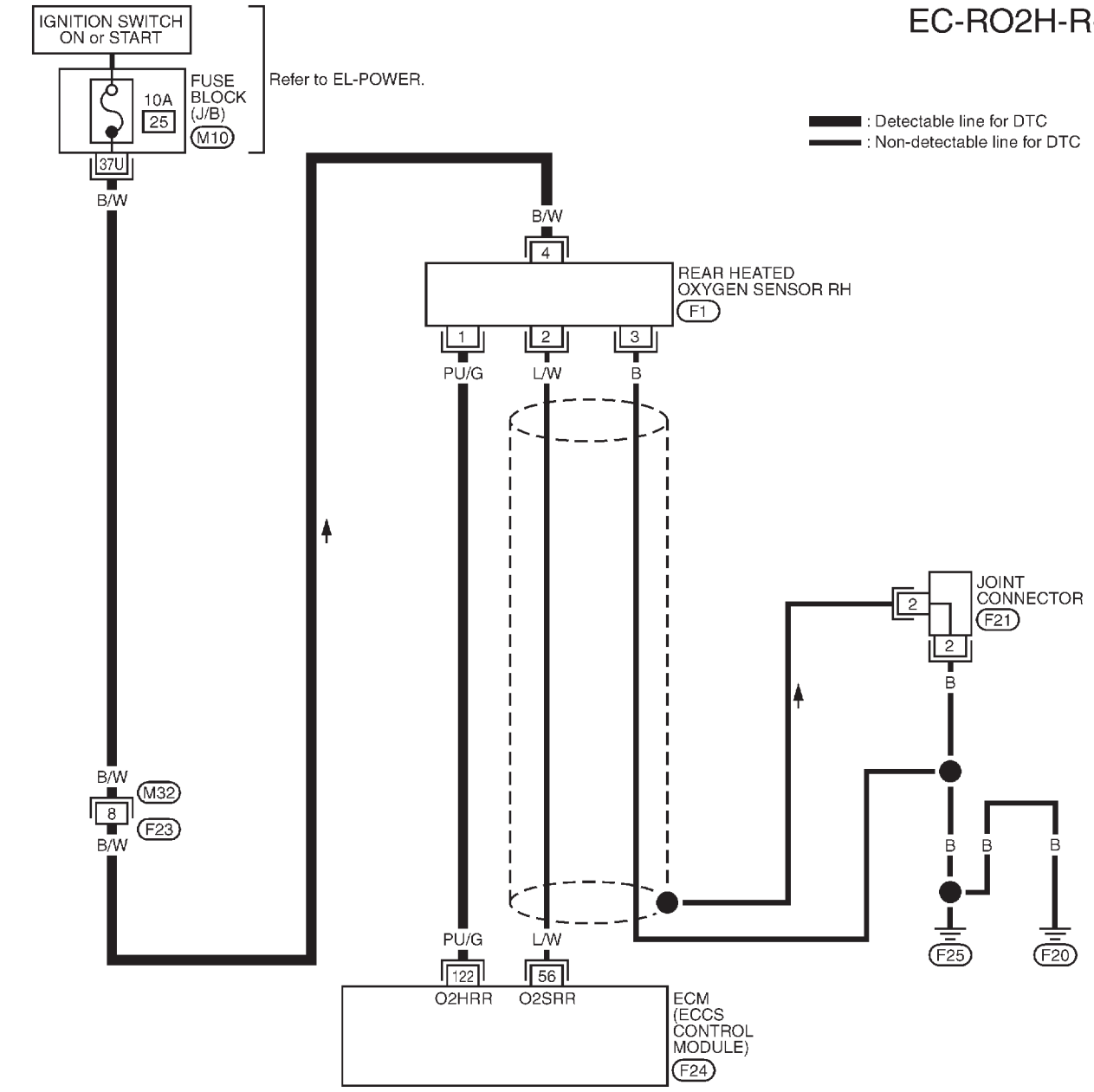
Wiring Diagram

NAEC0117

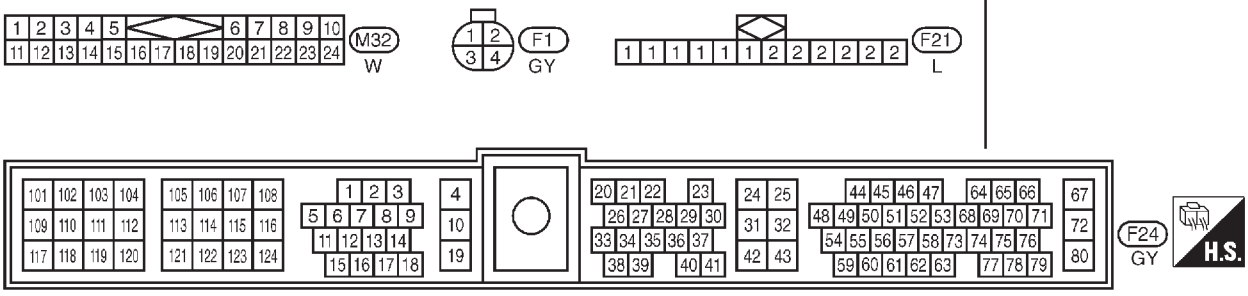
RIGHT BANK

NAEC0117S01

EC-RO2H-R-01



Refer to last page (Foldout page).
M10

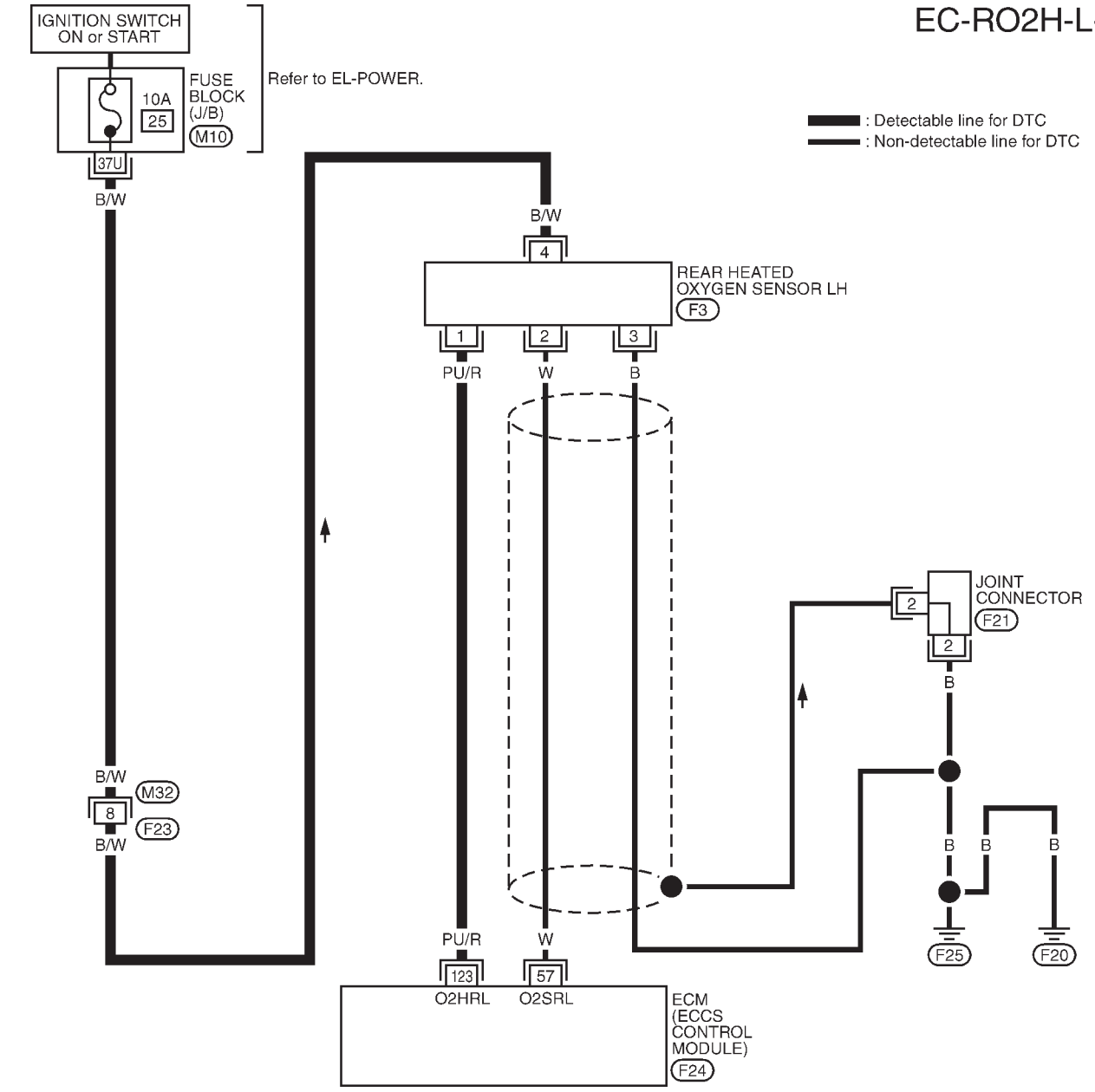


MEC051C

LEFT BANK

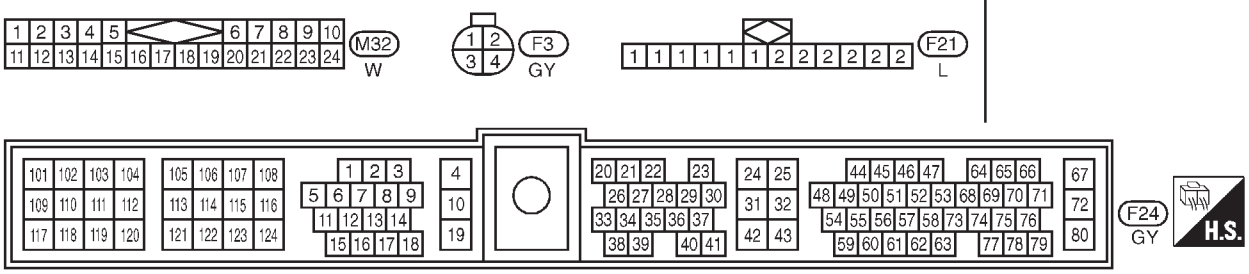
NAEC0117S02

EC-RO2H-L-01



Refer to last page (Foldout page).

M10



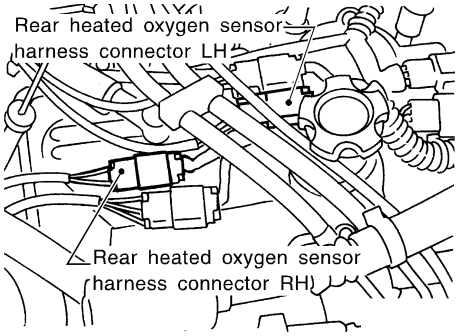
MEC055C

Diagnostic Procedure

NAEC0118

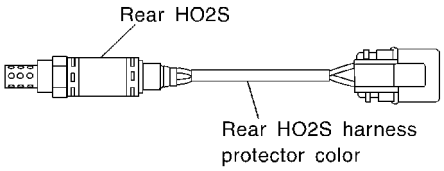
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect corresponding rear heated oxygen sensor harness connector.



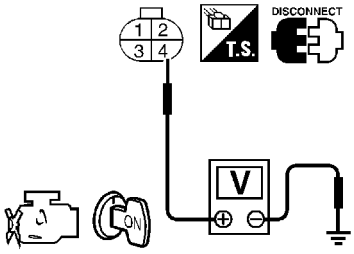
SEF879W

3. Turn ignition switch “ON”.
4. Check voltage between terminal 4 and ground.



P0141 (-B1) Right bank: White
P0161 (-B2) Left bank: Red

SEF194WJ



SEF700U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M32
- Harness connector M10
- 10A fuse
- Harness for open or short between rear heated oxygen sensor and fuse

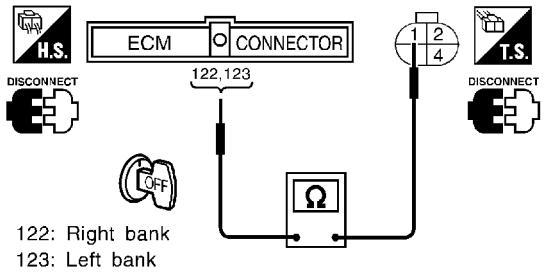
	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and sensor terminal as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0141	122	1	Right (White)
P0161	123	1	Left (Red)

SEF888W



SEF701U

Continuity should exist.

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

OK or NG

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

4	CHECK REAR HEATED OXYGEN SENSOR HEATER

Refer to "Component Inspection", EC-296.

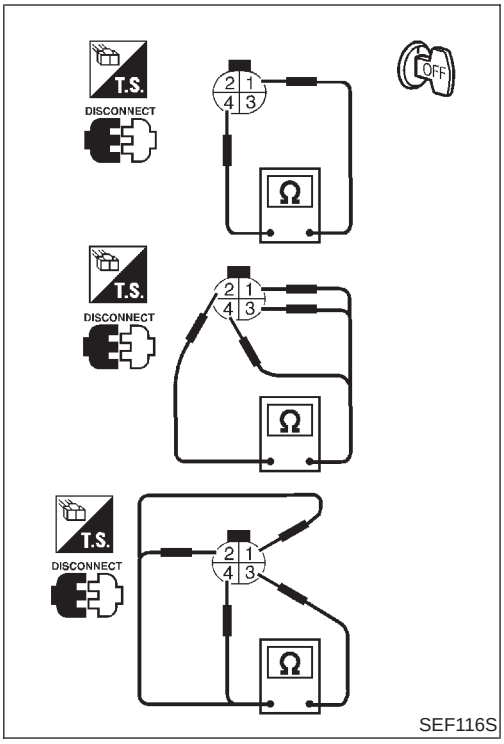
OK or NG

OK	▶	GO TO 5.
NG	▶	Check harness protector color. White; Right bank (-B1) Red; Left bank (-B2) Replace rear heated oxygen sensor

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

▶ **INSPECTION END**



Component Inspection

NAEC0119

REAR HEATED OXYGEN SENSOR HEATER

NAEC0119S01

Check the following.

1. Check resistance between terminals 4 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

2. Check continuity.

Terminal No.	Continuity
2 and 1, 3, 4	No
3 and 1, 2, 4	

If NG, replace the rear heated oxygen sensor.

CAUTION:

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

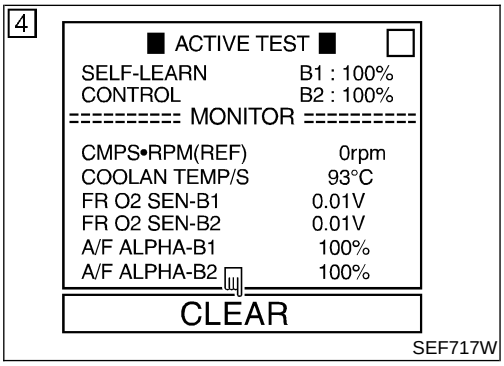
On Board Diagnosis Logic

NAEC0150

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115 (Right bank) P0174 0210 (Left bank)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Front heated oxygen sensor • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor



SEF717W

DTC Confirmation Procedure

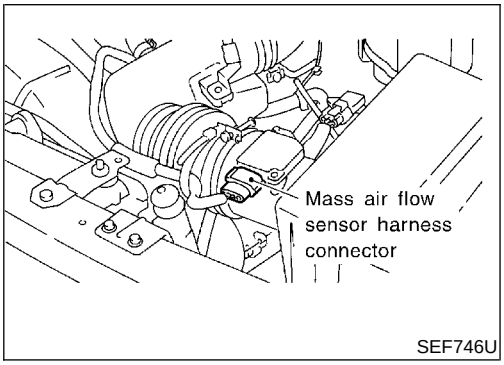
NAEC0151

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-301.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, check exhaust and intake air leak visually.



SEF746U

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.

8) Select "MODE 7" with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-301.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, check exhaust and intake air leak visually..

Without CONSULT

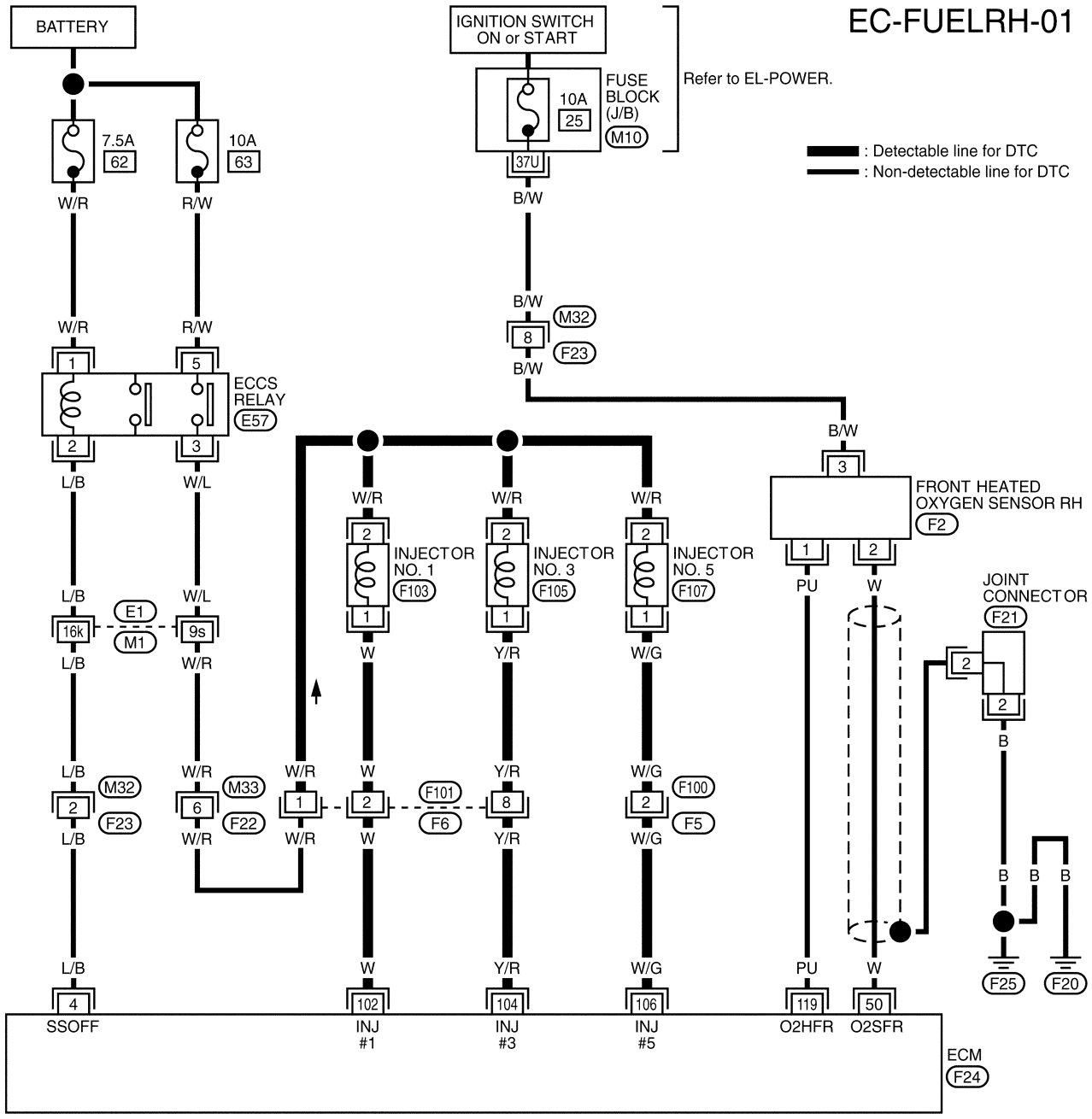
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Turn ignition switch "ON".
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68.
8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
9) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC 0115 should be detected at this stage, if a malfunction exists.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction. If so, go to "Diagnostic Procedure", EC-301.
11) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, check exhaust and intake air leak visually.

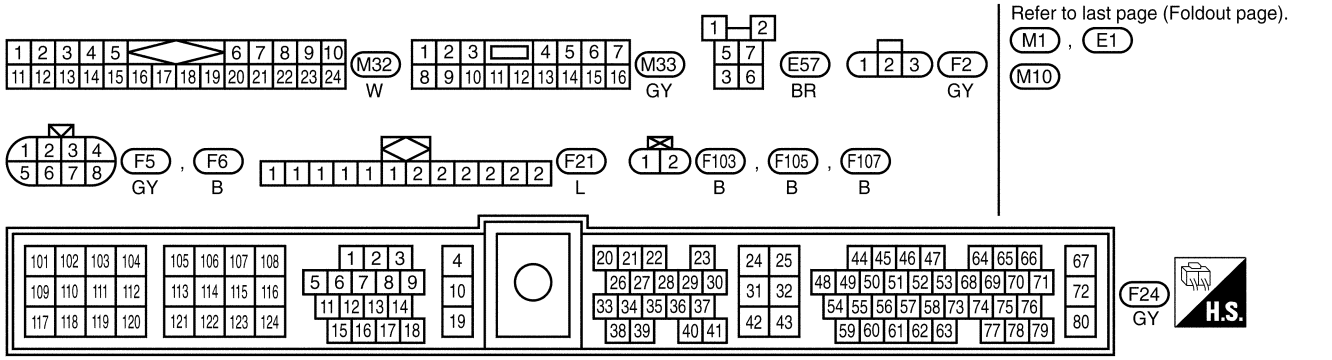
Wiring Diagram

NAEC0152

RIGHT BANK

NAEC0152S01



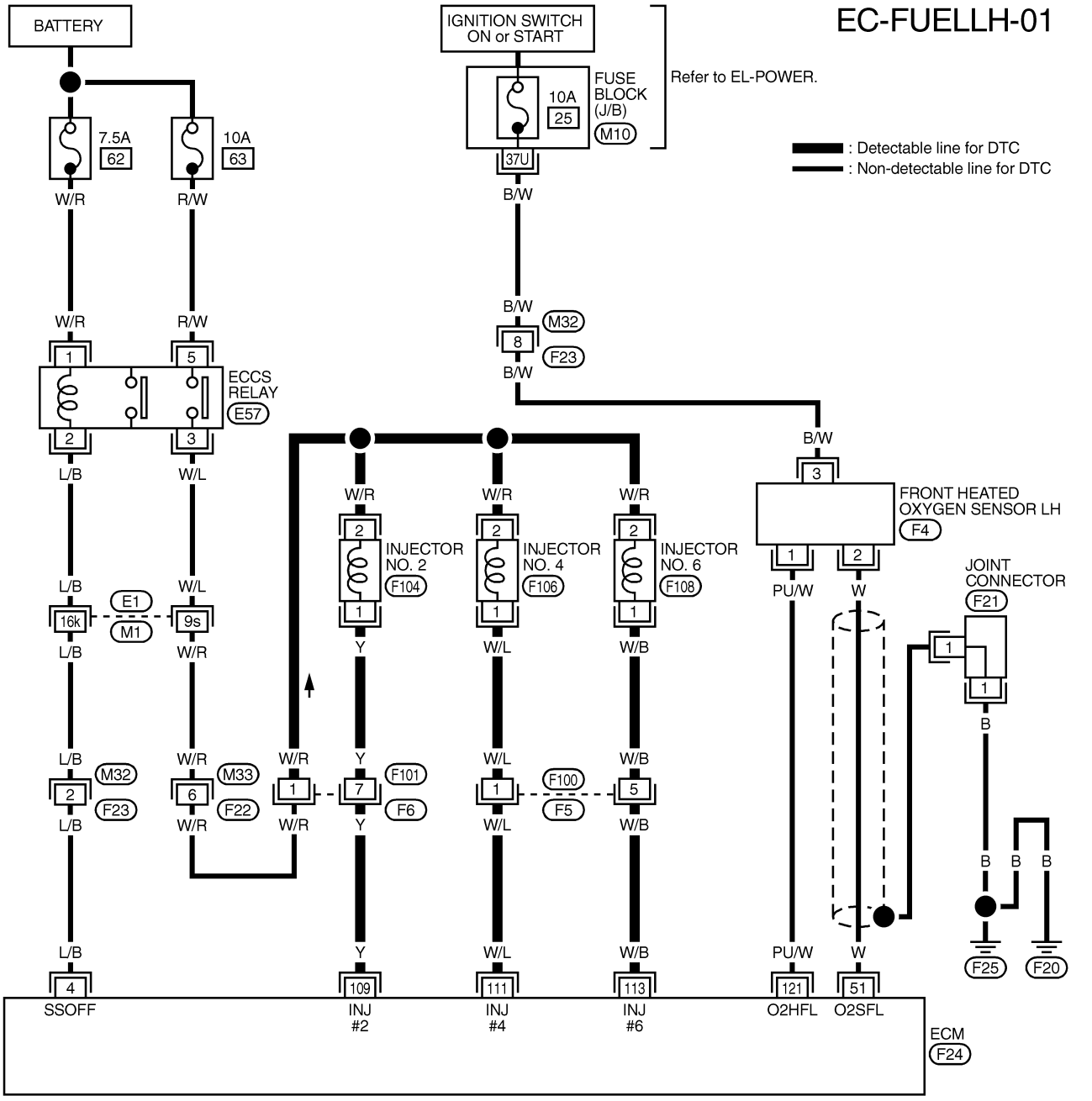


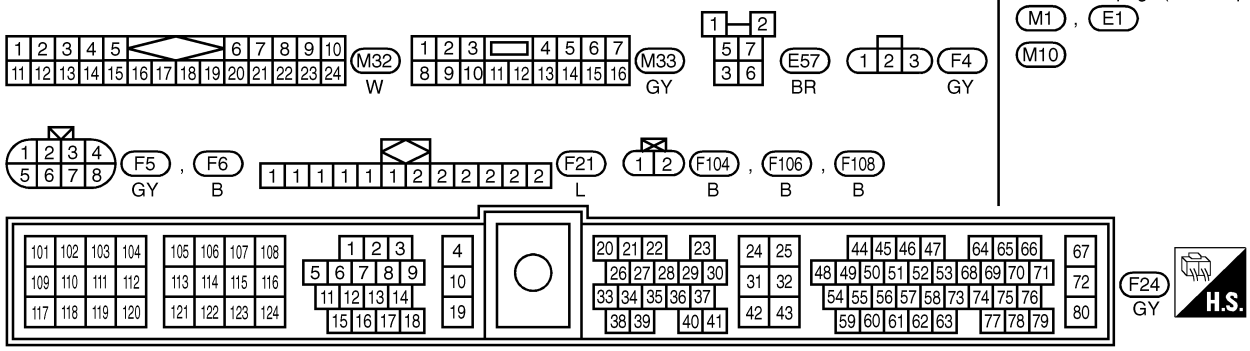
MEC683C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0152S02





Refer to last page (Foldout page).
M1 , E1
M10

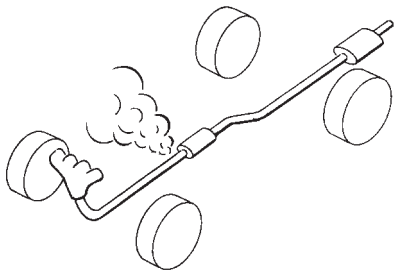
MEC705C

Diagnostic Procedure

NAEC0153

1	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

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

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT-I

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.

	▶	GO TO 4.

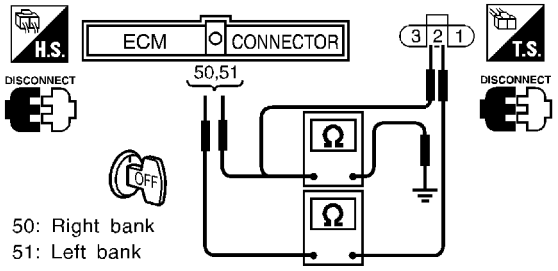
Diagnostic Procedure (Cont'd)

4	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT-II

1. Check harness continuity between ECM terminal and sensor terminal as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0171	50	2	Right (Black)
P0174	51	2	Left (Blue)

SEF889W



SEF632W

Continuity should exist.

2. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0171	50 or 2	Ground	Right (Black)
P0174	51 or 2	Ground	Left (Blue)

SEF890W

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-37.
2. Install fuel pressure gauge and check fuel pressure.

At idling:

When fuel pressure regulator valve vacuum hose is connected.

235 kPa (2.4 kg/cm^2, 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.

294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-568.)
- Fuel pressure regulator (Refer to EC-38.)
- Fuel lines (Refer to MA-18, "ENGINE MAINTENANCE".)
- Fuel filter for clogging

	▶	Repair or replace.

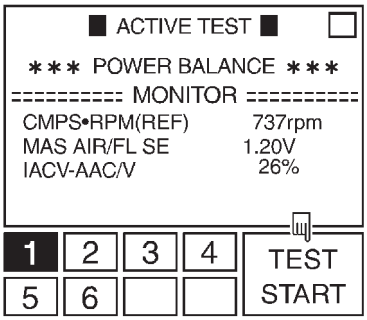
7	CHECK MASS AIR FLOW SENSOR	
With CONSULT 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
With GST 1. Install all parts removed. 2. Check "MASS AIR FLOW" in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
No Tools 1. Install all parts removed. 2. Check voltage between ECM terminal 54 and ground. **1.0 - 1.7V: at idling** **1.7 - 2.3V: at 2,500 rpm**		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-146.

Diagnostic Procedure (Cont'd)

8	CHECK FUNCTION OF INJECTORS

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

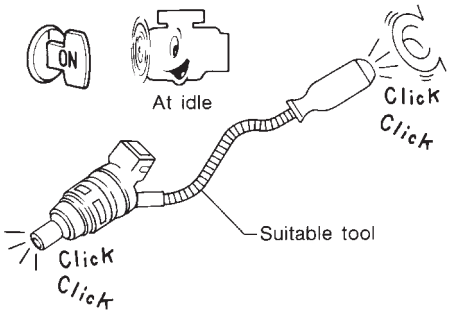


SEF389V

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

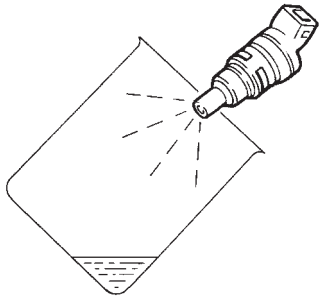
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-555.

9	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to EC-38.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**

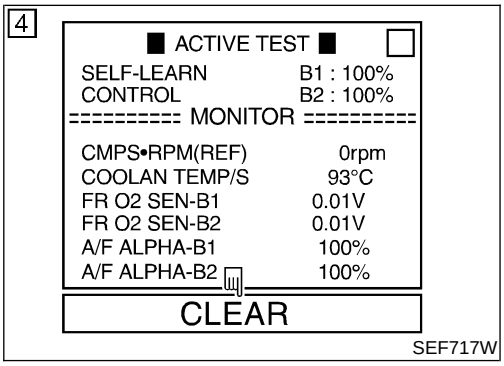
On Board Diagnosis Logic

NAEC0154

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114 (Right bank)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor
P0175 0209 (Left bank)		



SEF717W

DTC Confirmation Procedure

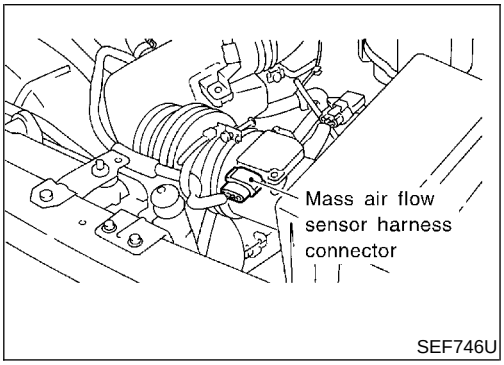
NAEC0155

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT.
4) Clear the self-learning control coefficient by touching “CLEAR”.
5) Select “DATA MONITOR” mode with CONSULT.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-310.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to “Diagnostic Procedure”, EC-310. If engine does not start, remove ignition plugs and check for fouling, etc.



SEF746U

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6) Select “MODE 4” with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.

8) Select "MODE 7" with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-310.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-310. If engine does not start, check exhaust and intake air leak visually.

Without CONSULT

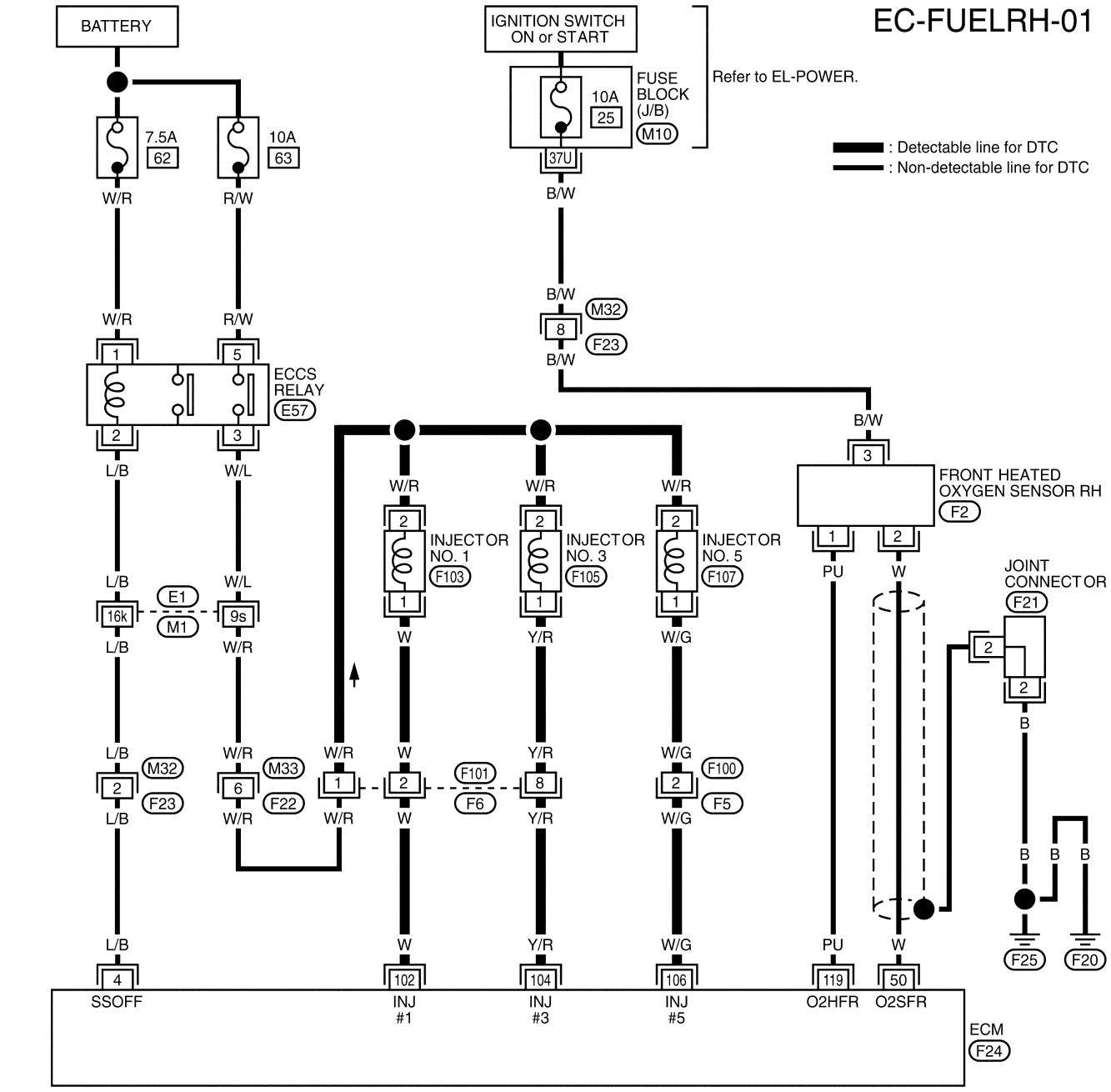
1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 5 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
6) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-68.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC 0114 or 0209 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-310.
9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-310. If engine does not start, remove ignition plugs and check for fouling, etc.

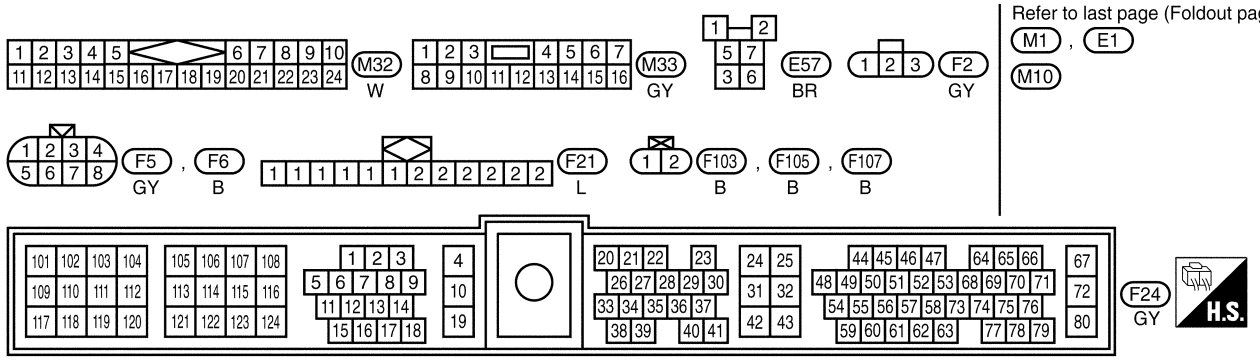
Wiring Diagram

NAEC0156

RIGHT BANK

NAEC0156S01

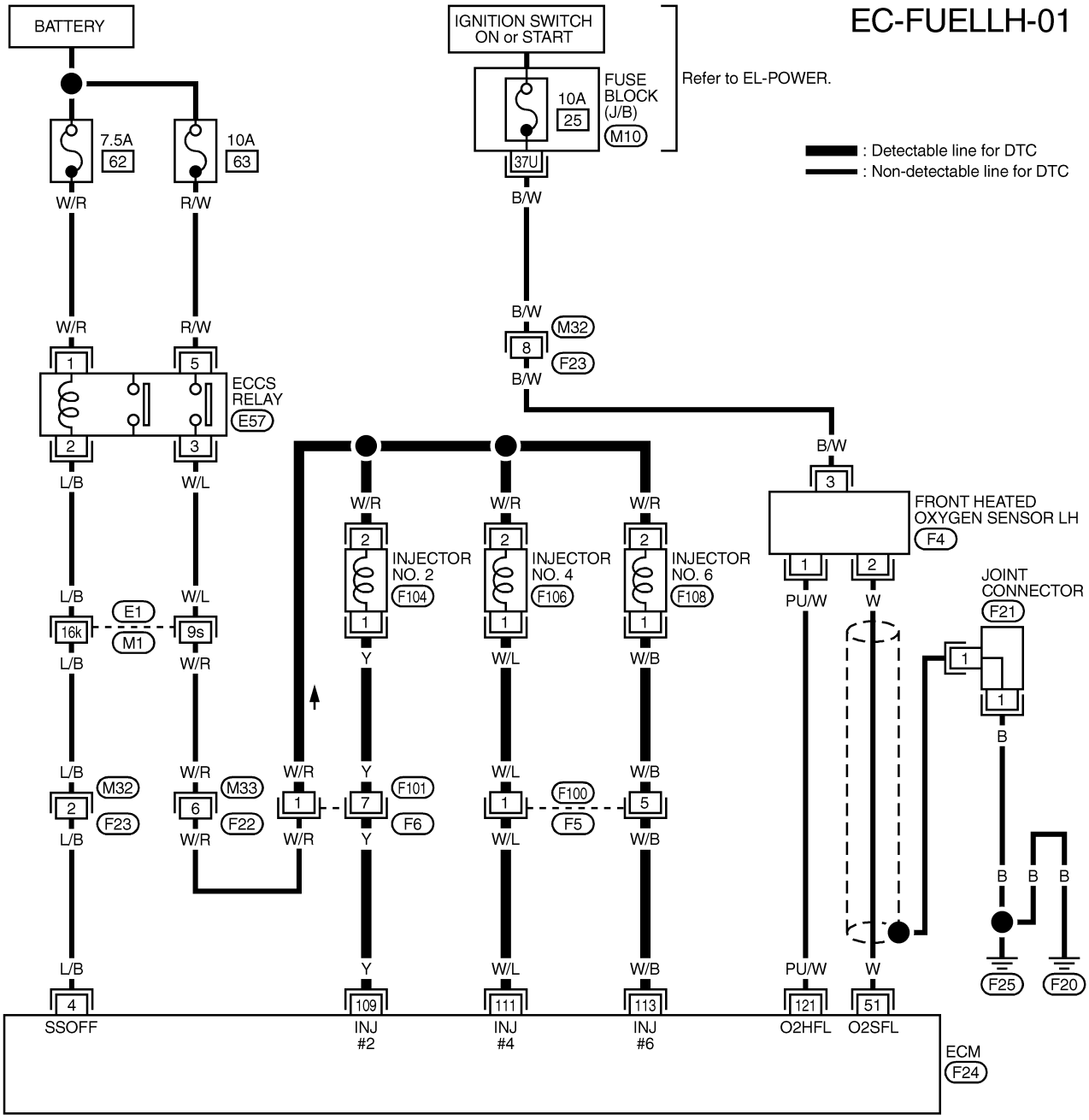


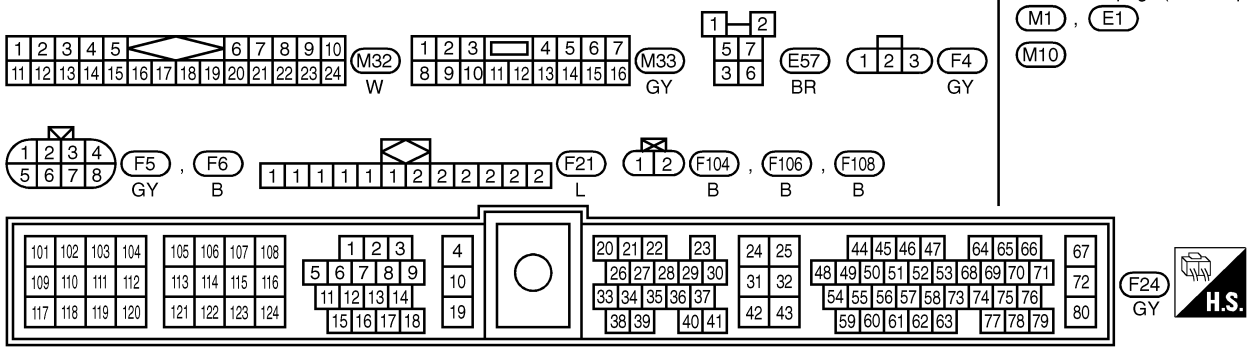


MEC683C

LEFT BANK

NAEC0156S02





Refer to last page (Foldout page).
M1, E1
M10

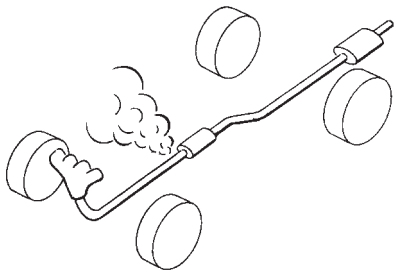
MEC705C

Diagnostic Procedure

NAEC0157

1	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

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

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT-I

1. Turn ignition switch “OFF”.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.

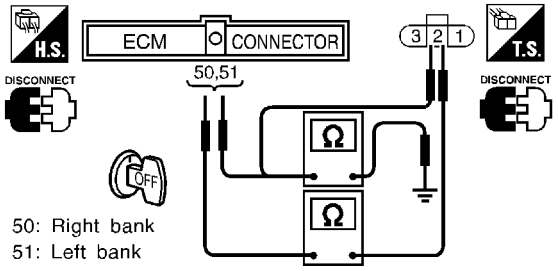
	▶	GO TO 4.

4	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT-II

1. Check harness continuity between ECM terminal and sensor terminal as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0172	50	2	Right (Black)
P0175	51	2	Left (Blue)

SEF891W



SEF632W

Continuity should exist.

2. Check harness continuity between ECM terminal or sensor terminal and ground as follows.

DTC	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0172	50 or 2	Ground	Right (Black)
P0175	51 or 2	Ground	Left (Blue)

SEF892W

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-37.
2. Install fuel pressure gauge and check fuel pressure.

At idling:

When fuel pressure regulator valve vacuum hose is connected.

235 kPa (2.4 kg/cm^2, 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.

294 kPa (3.0 kg/cm^2, 43 psi)

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-568.)
- Fuel pressure regulator (Refer to EC-38.)

	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

7	CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Install all parts removed.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

With GST

1. Install all parts removed.
2. Check "MASS AIR FLOW" in MODE 1 with GST.

3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

No Tools

1. Install all parts removed.
2. Check voltage between ECM terminal 54 and ground.

1.0 - 1.7V: at idling
1.7 - 2.3V: at 2,500 rpm

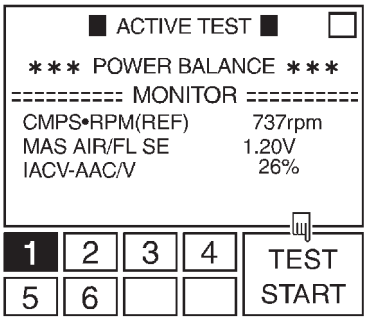
OK or NG

OK	▶	GO TO 8.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-146.

8	CHECK FUNCTION OF INJECTORS

With CONSULT

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

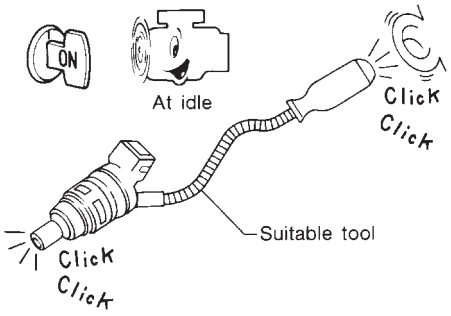


SEF389V

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-555.

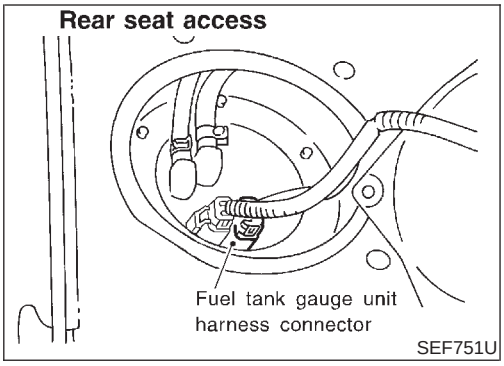
9	CHECK INJECTOR

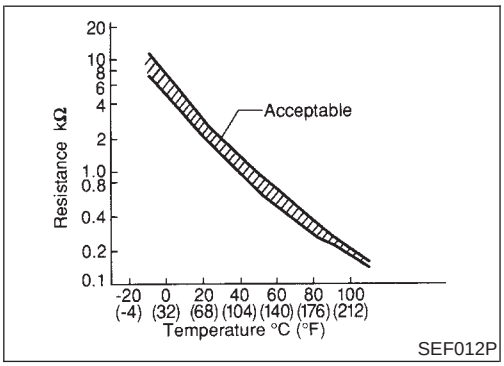
1. Remove injector assembly. Refer to EC-38.
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175).
   The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**





Component Description

NAEC0166

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NAEC0167

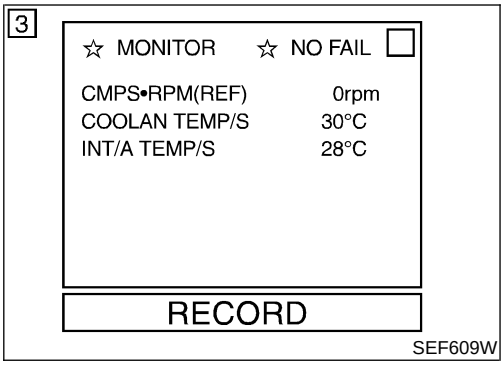
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180 0402	• An excessively high or low voltage is sent to ECM. • Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor

DTC Confirmation Procedure

NAEC0168

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

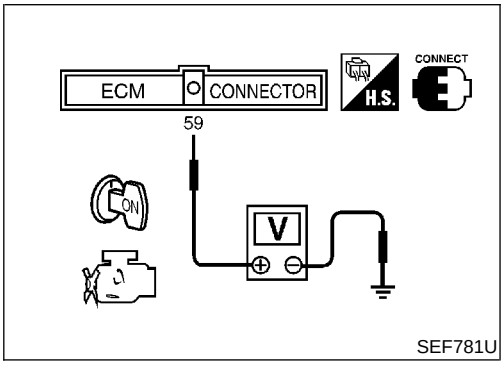


With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 10 seconds.
   If the result is NG, go to "Diagnostic Procedure", EC-318.
   If the result is OK, go to following step.
4) Check "COOLAN TEMP/S" value.
   If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
   If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-318.

With GST

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Select "MODE 7" with GST.
   If the result is NG, go to "Diagnostic Procedure", EC-318.
   If the result is OK, go to following step.
3) Select "MODE 1" with GST and check for the engine coolant temperature.
   If the temperature is less than 60°C (140°F), the result will be OK.
   If the temperature is above 60°C (140°F), go to the following step.
4) Cool engine down until the engine coolant temperature is less than 60°C (140°F).
5) Wait at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-318.



No Tools

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
   If the result is NG, go to "Diagnostic Procedure", EC-318.
   If the result is OK, go to following step.
4) Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
   If the voltage is more than 1.0V, the result will be OK.

DTC Confirmation Procedure (Cont'd)

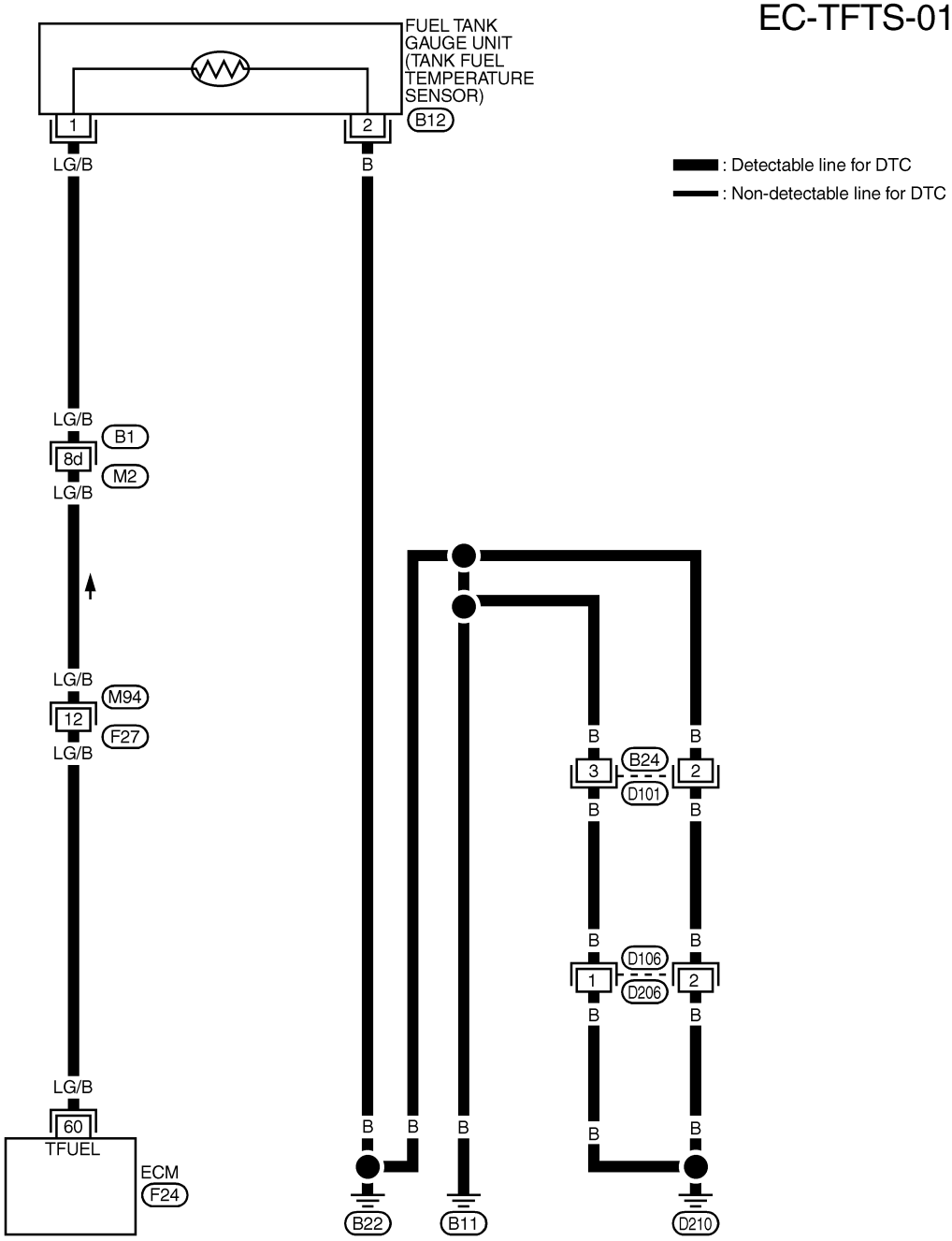
If the voltage is less than 1.9V, go to the following step.

5) Cool engine down until the voltage becomes more than 1.9V.
6) Wait at least 10 seconds.
7) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
8) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
9) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-318.

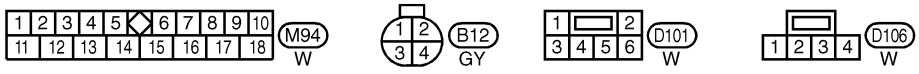
Wiring Diagram

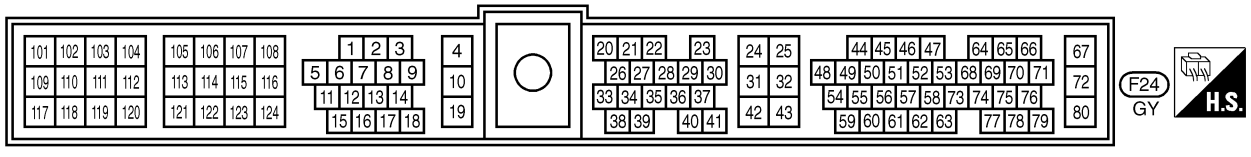
NAEC0169

EC-TFTS-01



Refer to last page (Foldout page).
M2 , B1





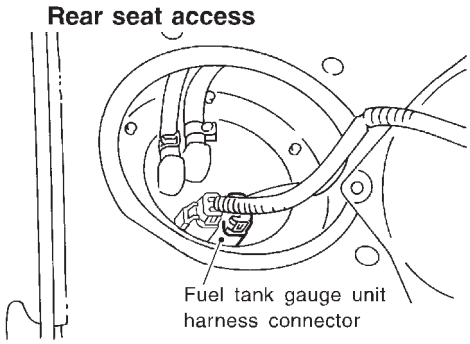
MEC666C

Diagnostic Procedure

NAEC0170

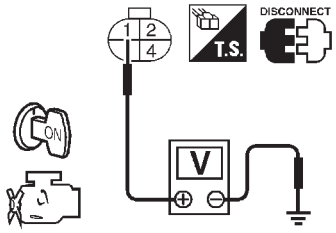
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit harness connector.



SEF751U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF702U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

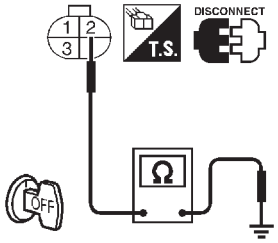
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between ECM and fuel tank temperature sensor

	▶	Repair harness or connector.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 2 and body ground.



SEF703U

Continuity should exist.

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

OK or NG

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

4	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-319.

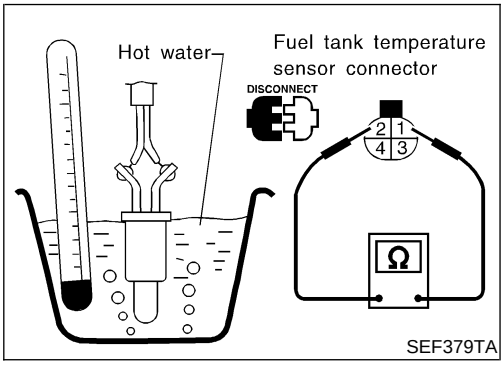
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel tank temperature sensor.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF379TA

Component Inspection

FUEL TANK TEMPERATURE SENSOR

NAEC0171

NAEC0171S01

Check resistance by heating with hot water or heat gun as shown in the figure.

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

If NG, replace fuel tank temperature sensor.

On Board Diagnosis Logic

NAEC0172

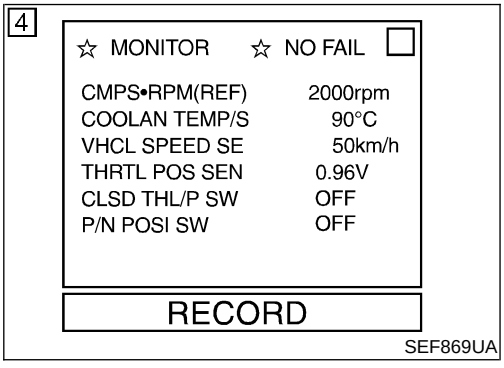
When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted • Injectors • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Drive plate/Flywheel • Front heated oxygen sensor • Incorrect distributor rotor
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	
P0305 (0604)	• No. 5 cylinder misfires.	
P0306 (0603)	• No. 6 cylinder misfires.	



SEF869UA

DTC Confirmation Procedure

NAEC0173

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321.

With GST

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

2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible.

NOTE:
Refer to the freeze frame data for the test driving conditions.

4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible.
4) Turn ignition switch "OFF", wait at least 5 seconds, and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321.

Diagnostic Procedure

NAEC0174

1	CHECK FOR INTAKE AIR LEAK	
Start engine and run it at idle speed. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

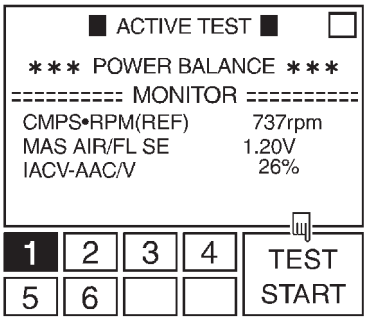
3	CHECK EGR FUNCTION	
Perform "DTC Confirmation Procedure" of "DTC P1402 EGR FUNCTION (OPEN)". Refer to EC-479.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

Diagnostic Procedure (Cont'd)

4	PERFORM POWER BALANCE TEST

With CONSULT

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

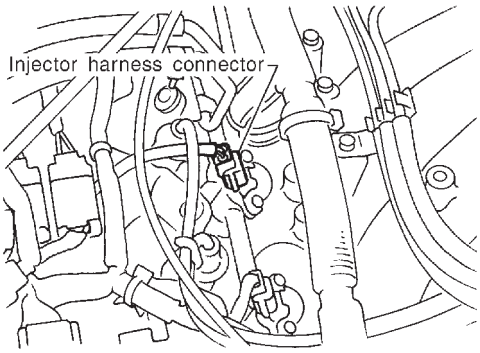


SEF389V

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



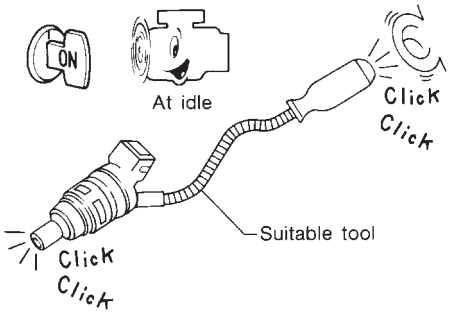
SEF995R

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



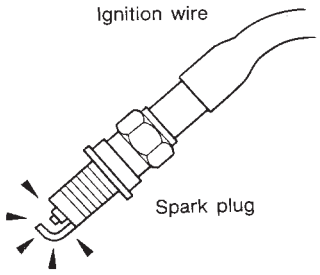
MEC703B

Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-555.

6	CHECK IGNITION SPARK

1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

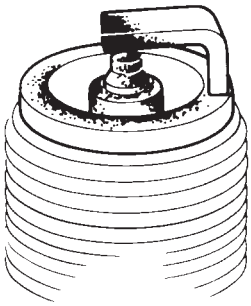
Refer to "Component Inspection", EC-326.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-454.
NG	▶	Replace.

8	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-21, "ENGINE MAINTENANCE".

Diagnostic Procedure (Cont'd)

9	CHECK COMPRESSION PRESSURE

Refer to EM section.

- Check compression pressure.

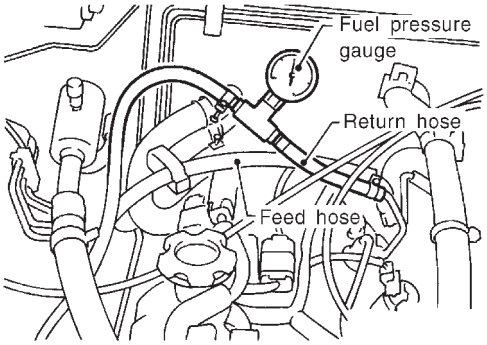
Standard:
1,196 kPa (12.2 kg/cm^2, 173 psi)/300 rpm
Minimum:
883 kPa (9.0 kg/cm^2, 128 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 10.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10	CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero.
   Refer to EC-37.
3. Install fuel pressure gauge and check fuel pressure.



SEF964R

At idle:
Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-568.)
- Fuel pressure regulator (Refer to EC-38.)
- Fuel lines (Refer to MA-18, "ENGINE MAINTENANCE".)
- Fuel filter for clogging

	▶	Repair or replace.

12	CHECK IGNITION TIMING

Perform "Basic Inspection", EC-99.

OK or NG

OK	▶	GO TO 13.
NG	▶	Adjust ignition timing.

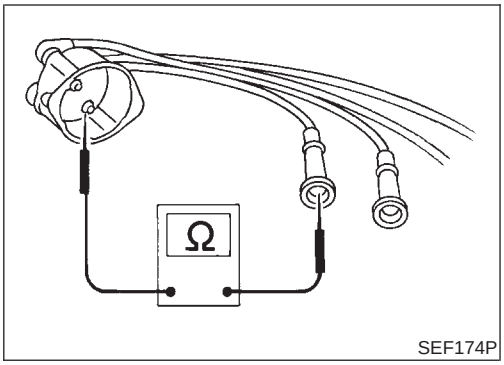
13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH	
Refer to "Component Inspection", EC-207.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace front heated oxygen sensor.

14	CHECK MASS AIR FLOW SENSOR	
With CONSULT Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
With GST Check "MASS AIR FLOW" in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
No Tools Check voltage between ECM terminal 54 and ground. **1.0 - 1.7V: at idling** **1.7 - 2.3V: at 2,500 rpm**		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-146.

15	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-118.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or replace.

16	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip Diagnostic Trouble Code to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-68.		
	▶	GO TO 17.

17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**



SEF174P

Component Inspection

NAEC0175

IGNITION WIRES

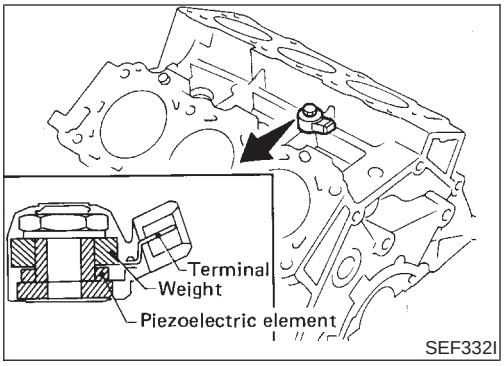
NAEC0175S01

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

Resistance:

Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 8.5
6	Approximately 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



Component Description

NAEC0176

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.
Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.

ECM Terminals and Reference Value

NAEC0177

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

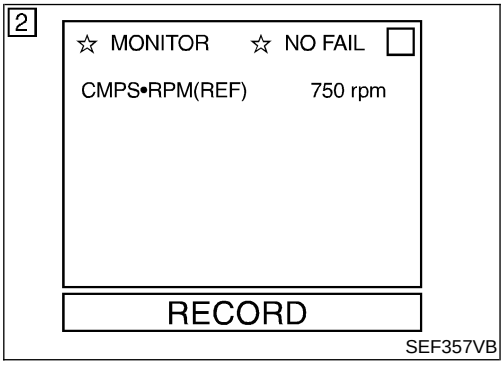
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

NAEC0178

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0325 0304	● An excessively low or high voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



DTC Confirmation Procedure

NAEC0179

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.
3) If DTC is detected, go to "Diagnostic Procedure", EC-330.

With GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.
3) If DTC is detected, go to "Diagnostic Procedure", EC-330.

No Tools

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

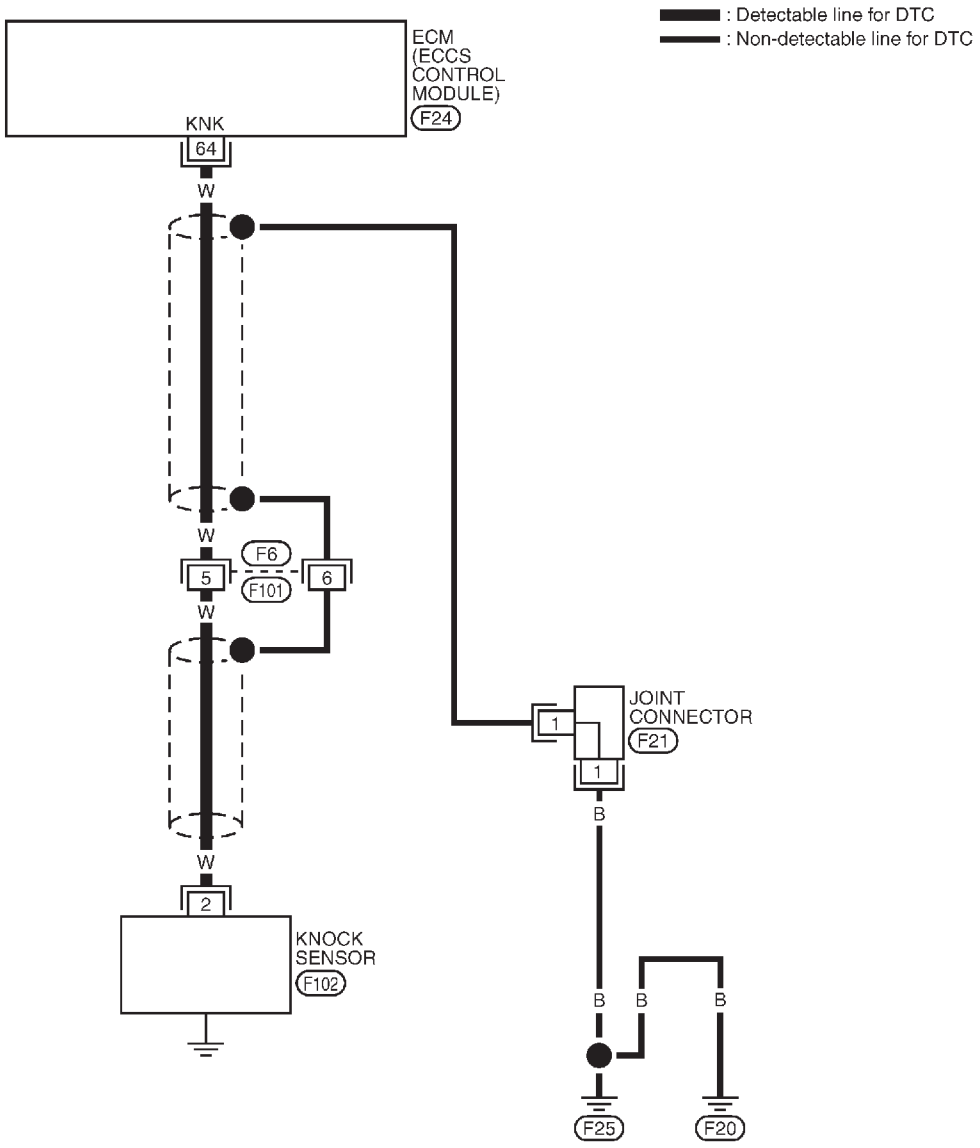
DTC Confirmation Procedure (Cont'd)

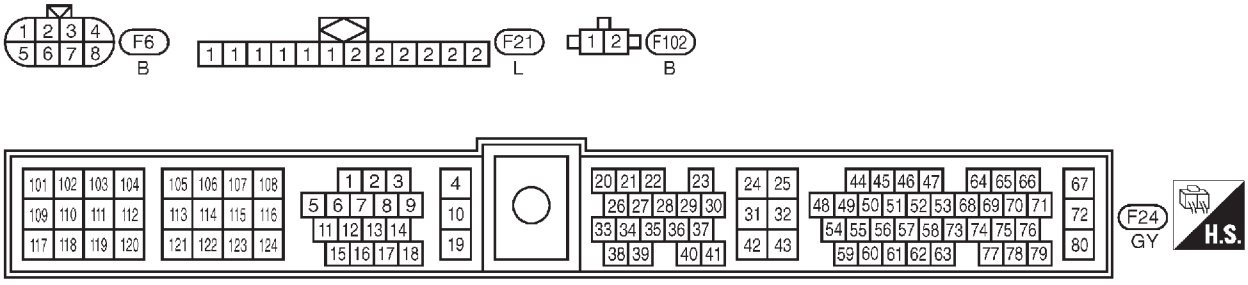
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If DTC is detected, go to "Diagnostic Procedure", EC-330.

Wiring Diagram

NAEC0180

EC-KS-01





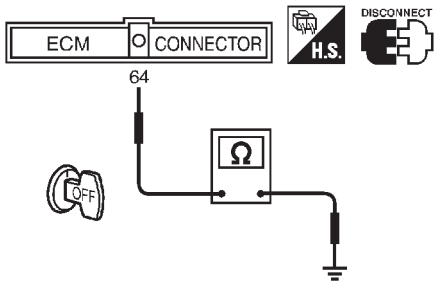
MEC061C

Diagnostic Procedure

NAEC0181

1	CHECK INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 64 and engine ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.



SEF704U

Resistance:
Approximately 500 - 620 kΩ [at 25°C (77°F)]

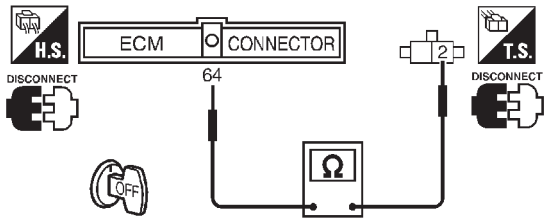
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 64 and terminal 2.



SEF705U

Continuity should exist.

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

OK or NG

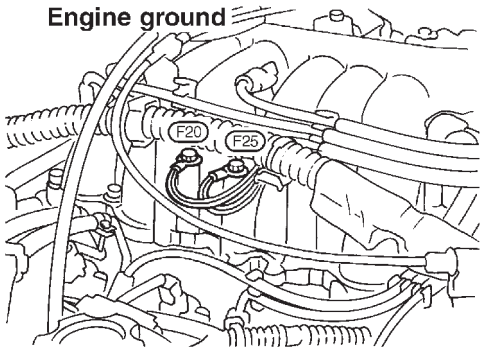
OK	▶	GO TO 4.
NG	▶	GO TO 3.

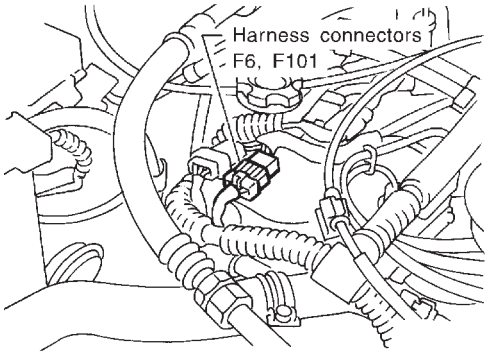
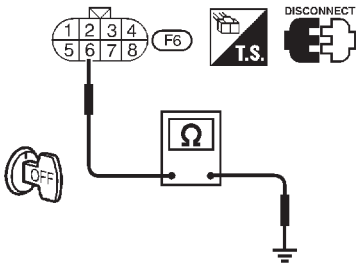
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector F6, F101
- Harness for open or short between ECM and knock sensor

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

4	CHECK KNOCK SENSOR	
Refer to "Component Inspection", EC-332.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

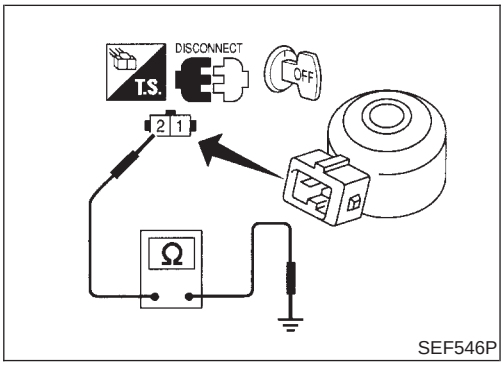
5	RETIGHTEN GROUND SCREWS	
Loose and retighten engine ground screws.		
 SEF031S		
	▶	GO TO 6.

6	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F6 and F101.		
 SEF996RA		
2. Check harness continuity between terminal 6 and ground.		
 SEF782U		
Continuity should exist.		
3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F6 and F101 ● Joint connector F21 (Refer to EL-312, "HARNESS LAYOUT".) ● Harness for open or short between harness connector F6 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF546P

Component Inspection

NAEC0182

KNOCK SENSOR

NAEC0182S01

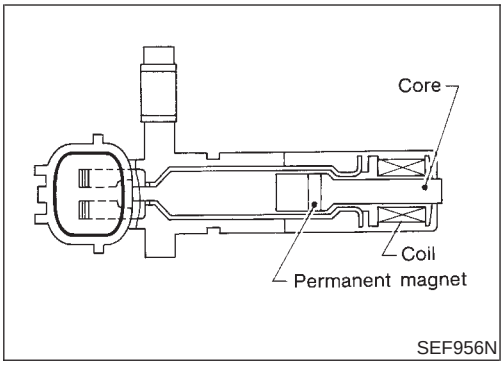
- Use an ohmmeter which can measure more than 10 MΩ.

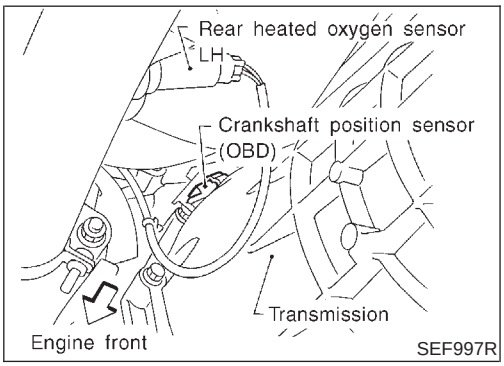
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 2 and ground.

Resistance: 500 - 620 kΩ [at 25°C (77°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.





Component Description

NAEC0183

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.

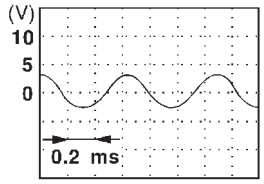
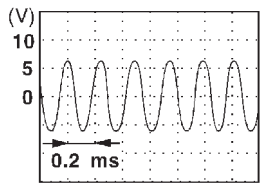
ECM Terminals and Reference Value

NAEC0184

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

CAUTION:

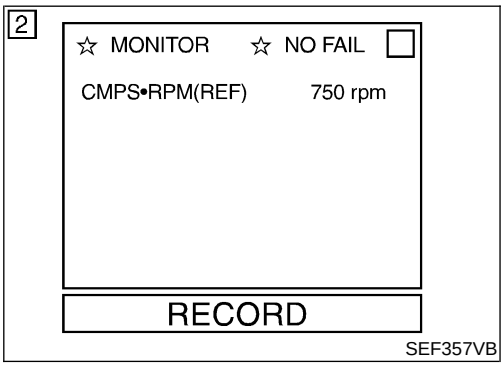
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	2 - 4V (AC range)  SEF691W

On Board Diagnosis Logic

NAEC0185

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335 0802	• The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) • Crankshaft position sensor (OBD)



DTC Confirmation Procedure

NAEC0186

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-336.

With GST

1) Start engine and run it for at least 15 seconds at idle speed.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-336.

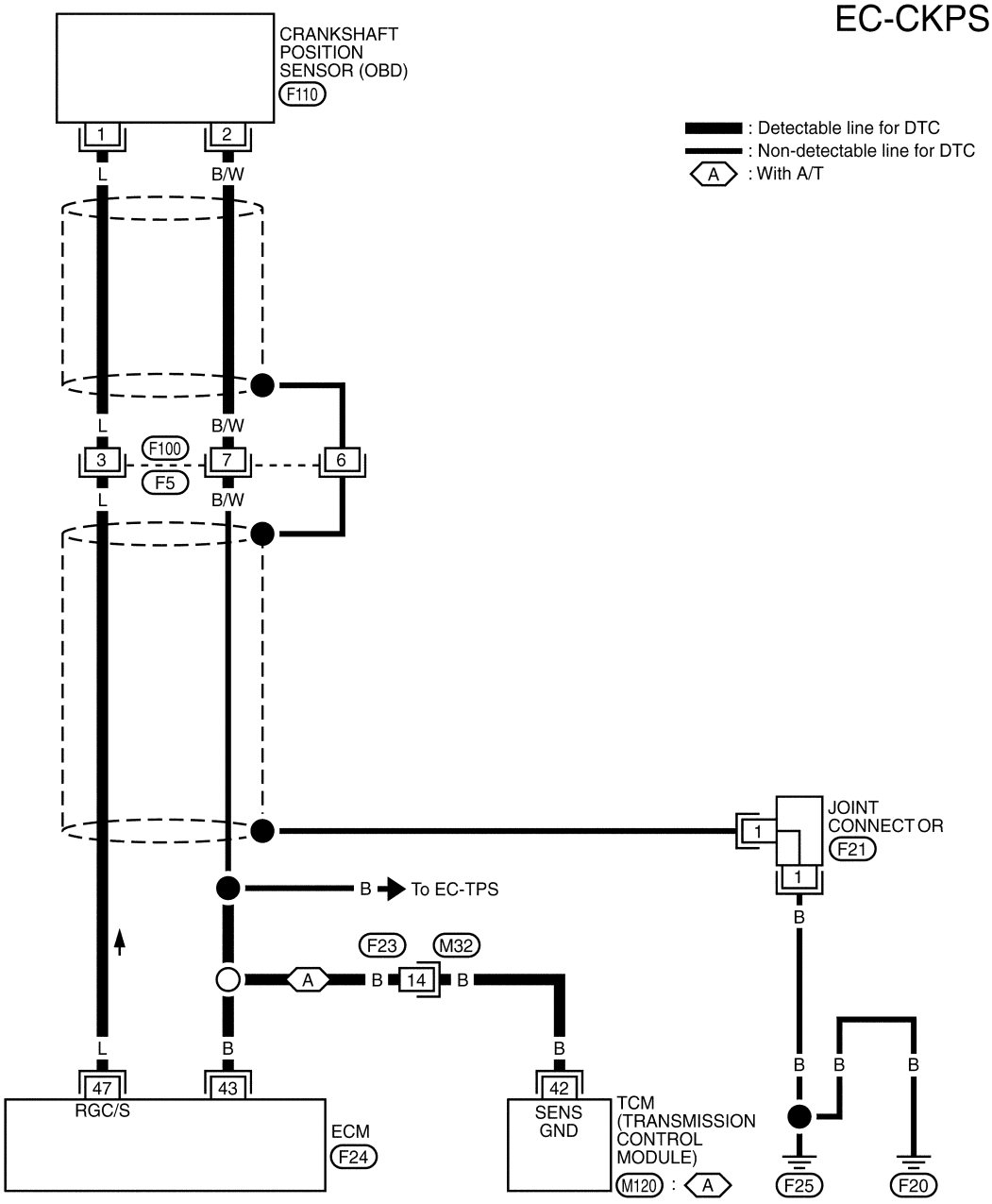
No Tools

1) Start engine and run it for at least 15 seconds at idle speed.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II” (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-336.

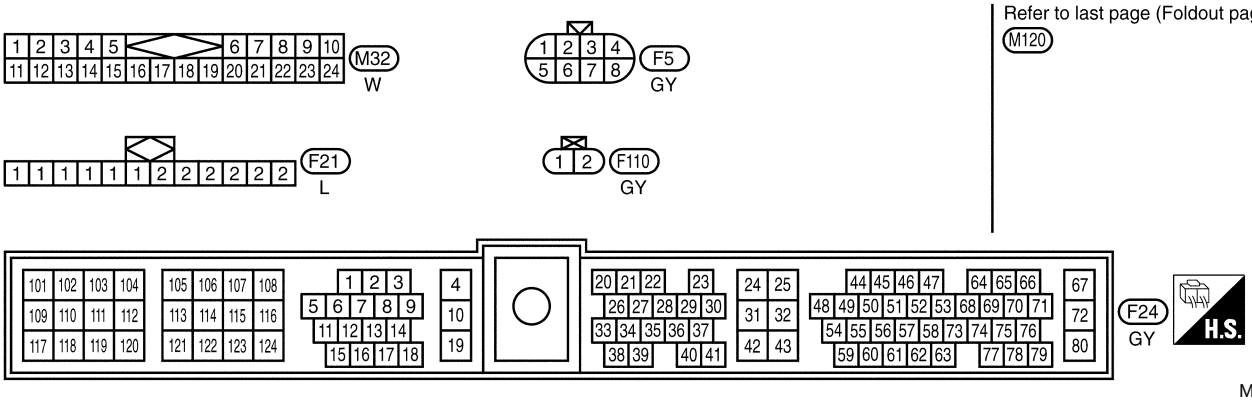
Wiring Diagram

NAEC0187

EC-CKPS-01



Refer to last page (Foldout page).
M120



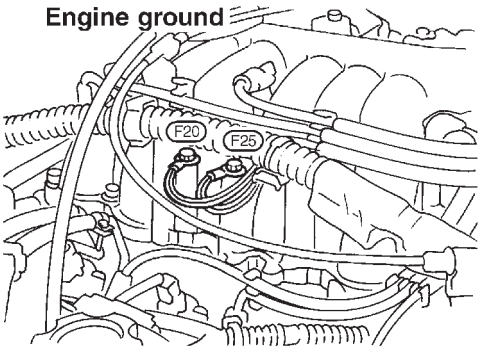
MEC667C

Diagnostic Procedure

NAEC0188

1	RETIGHTEN GROUND SCREWS

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

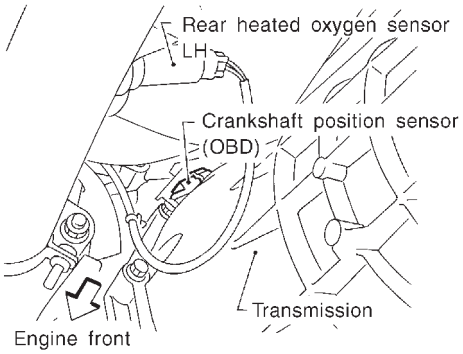


SEF031S

▶	GO TO 2.

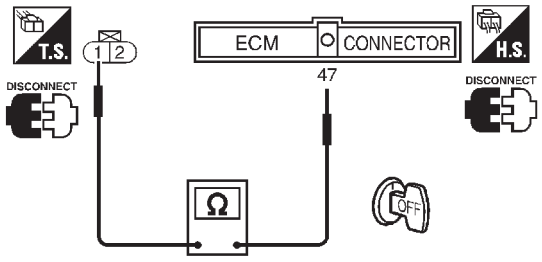
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF997R

2. Check continuity between ECM terminal 47 and terminal 1.



SEF706U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

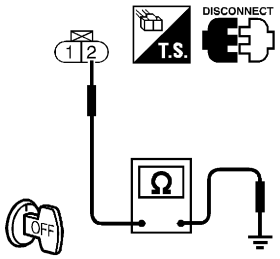
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, F100
- Harness for open or short between ECM and crankshaft position sensor (OBD)

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

4	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between terminal 2 and engine ground.



SEF707U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, F100
- Harness connectors F23, M32
- Harness for open or short between crankshaft position sensor (OBD) and ECM
- Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission control module)

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

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)

Refer to "Component Inspection", EC-338.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

7	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors F5, F100.
2. Check harness continuity between harness connector F5 and engine ground.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

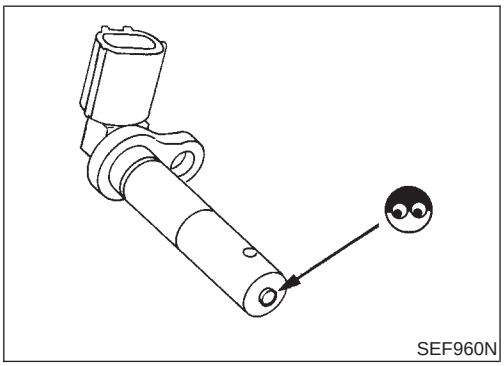
OK	▶	GO TO 9.
NG	▶	GO TO 8.

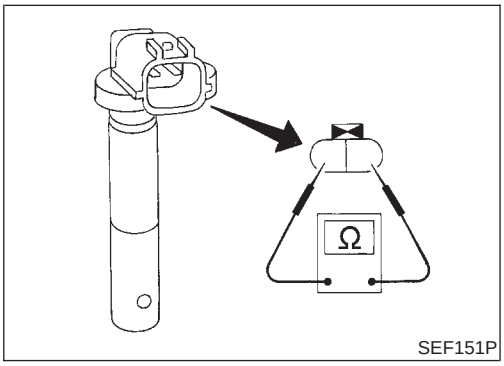
8	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, F102
- Joint connector
- Harness for open or short between harness connector F5 and engine ground

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

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**


SEF960N



SEF151P

Component Inspection

NAEC0189

CRANKSHAFT POSITION SENSOR (OBD)

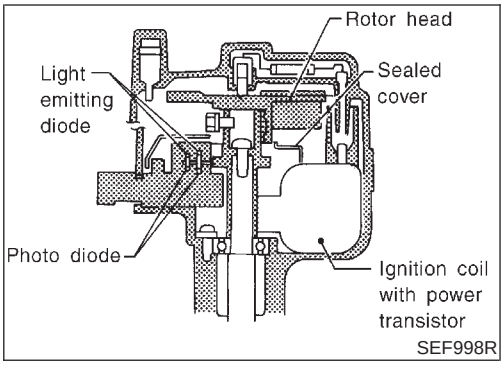
NAEC0189S01

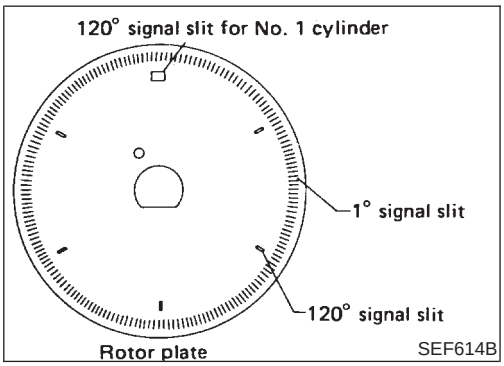
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.

5. Check resistance as shown in the figure.

   Resistance: Approximately 166.5 - 203.5Ω [at 20°C (68°F)]

   If NG, replace crankshaft position sensor (OBD).





Component Description

NAEC0190

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

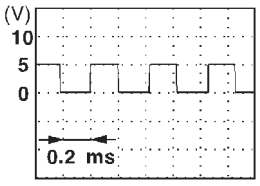
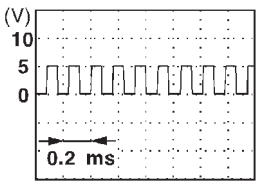
ECM Terminals and Reference Value

NAEC0191

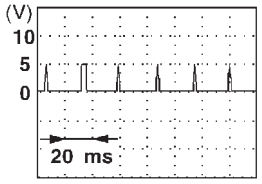
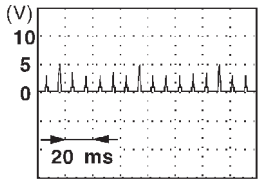
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
44	B/W	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.5V  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V  SEF001V

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	L	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed	0.3 - 0.5V  SEF997U
53	L		**[Engine is running]** ● Engine speed is 2,000 rpm	0.3 - 0.5V  SEF998U
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0192

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0340 0101	A)	Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.) ● Dead (Weak) battery
	B)	Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 120° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

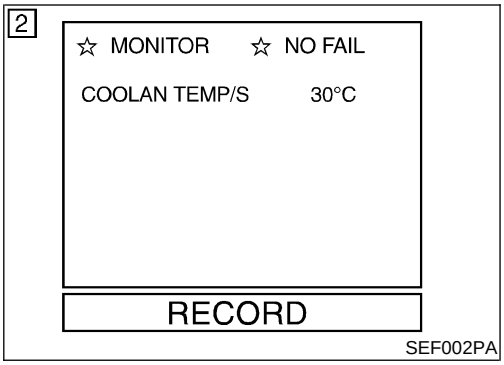
NAEC0193

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.



PROCEDURE FOR MALFUNCTION A

NAEC0193S01

With CONSULT

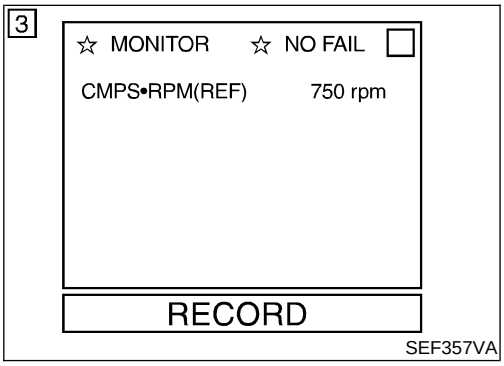
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

With GST

1) Crank engine for at least 2 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

No Tools

1) Crank engine for at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.



PROCEDURE FOR MALFUNCTION B AND C

NAEC0193S02

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

With GST

1) Start engine and run it for at least 2 seconds at idle speed.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

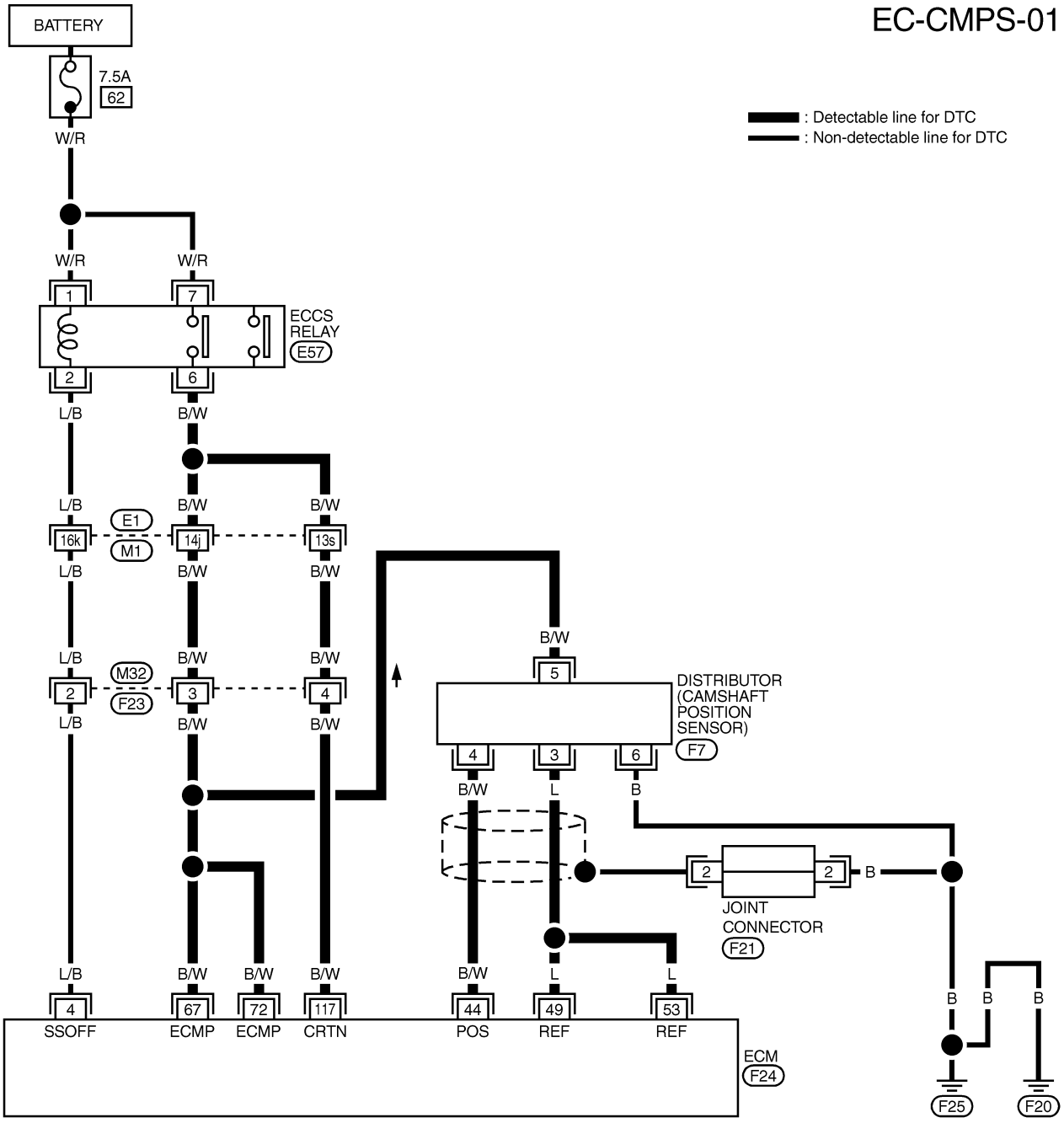
No Tools

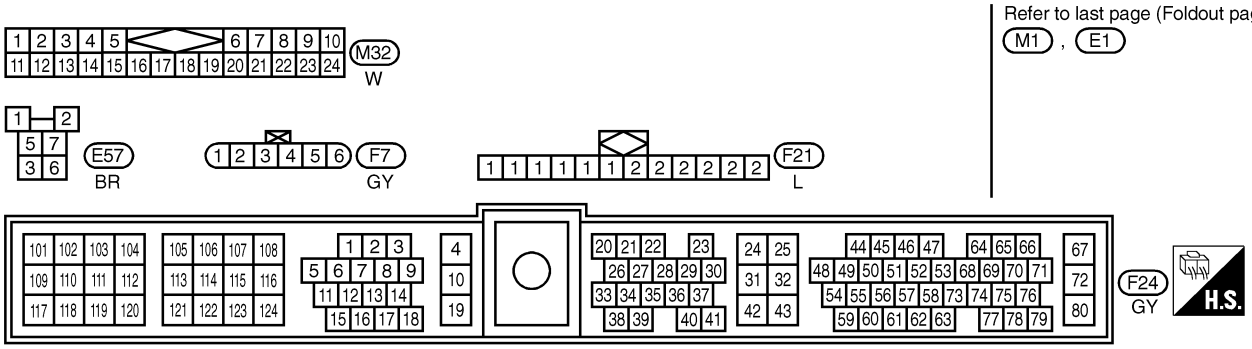
1) Start engine and run it for at least 2 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-343.

Wiring Diagram

NAEC0194

EC-CMPS-01





Refer to last page (Foldout page).
M1 , E1

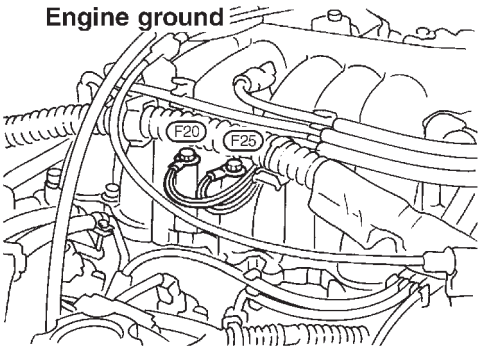
MEC668C

Diagnostic Procedure

NAEC0195

1	RETIGHTEN GROUND SCREWS

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

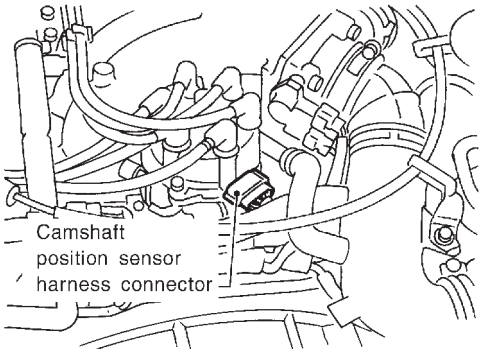


SEF031S

▶	GO TO 2.

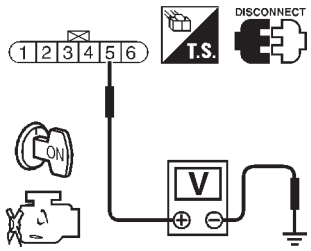
2	CHECK POWER SUPPLY

1. Disconnect camshaft position sensor harness connector.



SEF999R

2. Turn ignition switch “ON”.
3. Check voltage between terminal 5 and ground with CONSULT or tester.



SEF708U

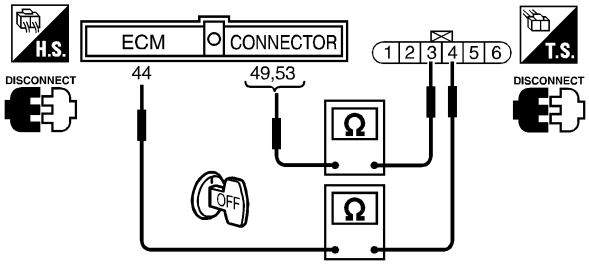
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F23, M32 ● Harness connectors M1, E1 ● Harness for open or short between camshaft position sensor and ECCS relay ● Harness for open or short between camshaft position sensor and ECM	
▶	Repair harness or connectors.

4	CHECK INPUT SIGNAL CIRCUIT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between sensor terminal 4 and ECM terminal 44, sensor terminal 3 and ECM terminals 49, 53. **Continuity should exist.**	



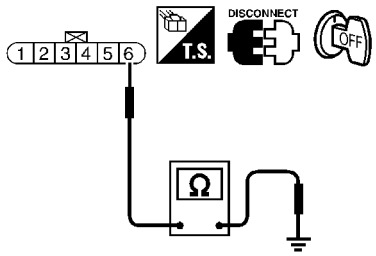
SEF851W

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

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK GROUND CIRCUIT
1. Turn ignition switch "OFF". 2. Check harness continuity between sensor terminal 6 and engine ground.	



SEF710U

Continuity should exist.

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

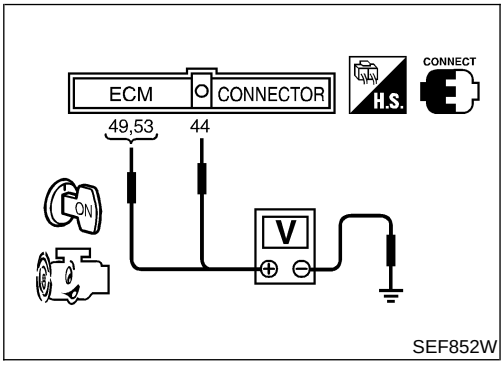
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK CAMSHAFT POSITION SENSOR	
Refer to "Component Inspection", EC-345.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace camshaft position sensor.

7	CHECK SHIELD CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal and ground ● Joint connector (Refer to EL-312, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**



Component Inspection

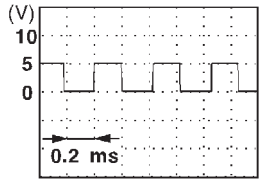
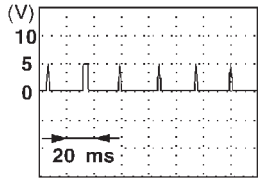
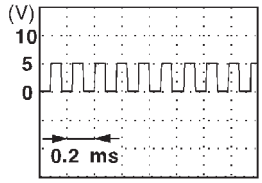
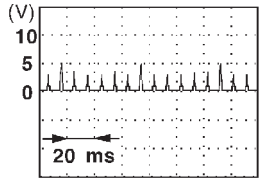
CAMSHAFT POSITION SENSOR

NAEC0196

NAEC0196S01

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 49, 53 and ground, ECM terminal 44 and ground with DC range.

Component Inspection (Cont'd)

Condition	ECM terminal	Voltage
Engine running at idle	44 and ground	Approximately 2.5V  SEF999U
	49, 53 and ground	0.3 - 0.5V  SEF997U
Engine speed is 2,000 rpm	44 and ground	Approximately 2.5V  SEF001V
	49, 53 and ground	0.3 - 0.5V  SEF998U

If NG, replace distributor assembly with camshaft position sensor.

Description

NAEC0197

SYSTEM DESCRIPTION

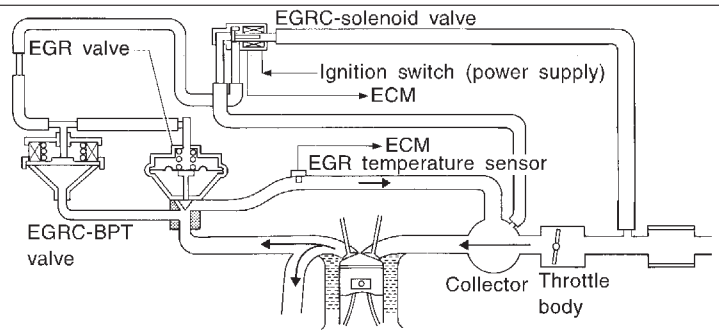
NAEC0197S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

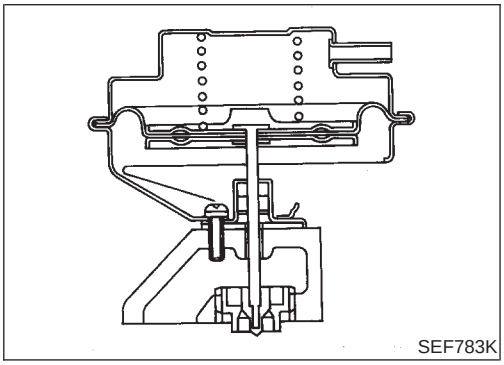
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current does not flow through the solenoid valve. This causes the intake manifold vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum



SEF317U



SEF783K

COMPONENT DESCRIPTION

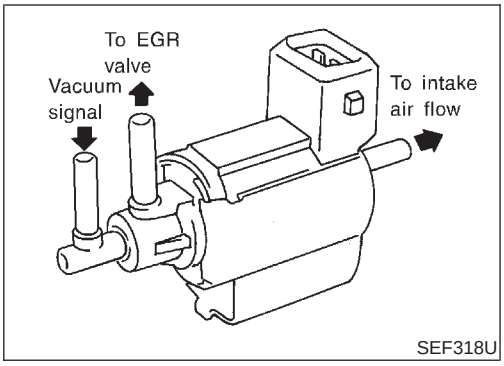
NAEC0197S02

Exhaust Gas Recirculation (EGR) Valve

NAEC0197S0201

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

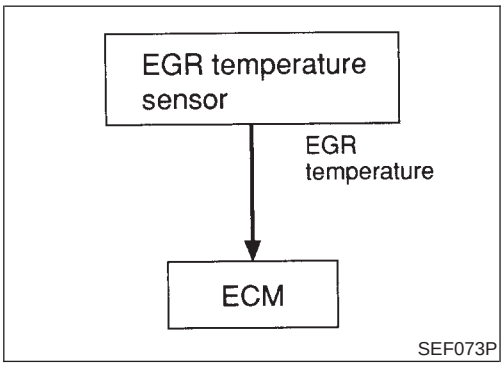
Description (Cont'd)



EGRC-solenoid Valve

NAEC0197S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold collector to the EGR valve) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal.



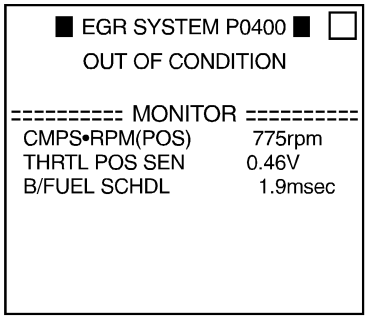
On Board Diagnosis Logic

NAEC0198

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

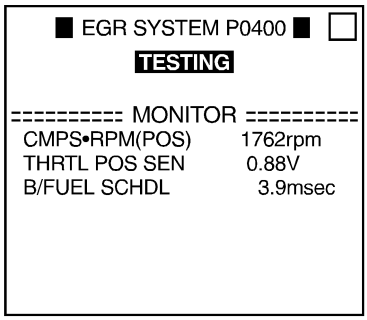
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	No EGR flow is detected under condition that calls for EGR.	• EGR valve stuck closed • EGRC-BPT valve • Vacuum hoses • EGRC-solenoid valve • EGR passage • EGR temperature sensor • Exhaust gas leaks

5



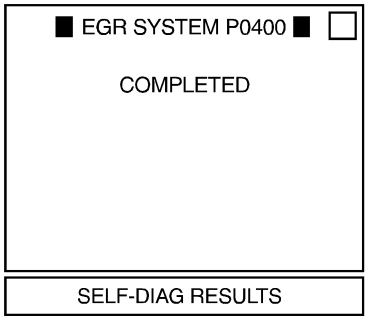
SEF603W

8



SEF604W

8



SEF785UA

DTC Confirmation Procedure

NAEC0464

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at "SELF-DIAG RESULTS" mode with CONSULT even though DTC work support test result is NG.

TESTING CONDITION:

For best results, perform the test at a temperature of 5°C (41°F) or higher.

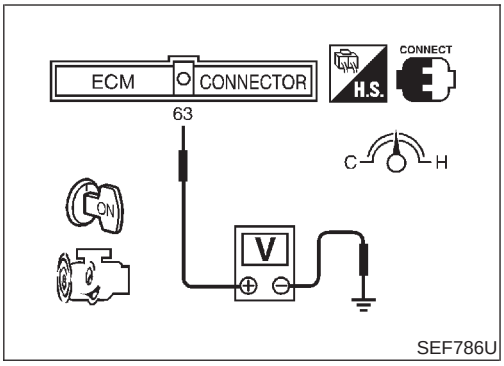
With CONSULT

1) Turn ignition switch "ON".
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
   Confirm COOLAN TEMP/S value is within the range listed below.
   COOLAN TEMP/S: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
3) Start engine and let it idle monitoring "COOLAN TEMP/S" value. When the "COOLAN TEMP/S" value reaches 70°C (158°F), immediately go to the next step.
4) Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If "COMPLETED" appears on CONSULT screen, go to step 9.
   If "COMPLETED" does not appear on CONSULT screen, go to the following step.
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds or more.)

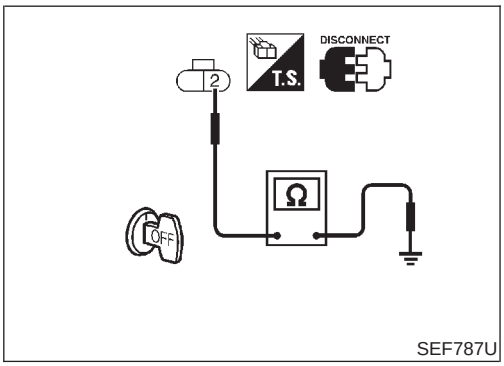
CMPS·RPM (POS)	1,600 - 2,400 rpm (A/T) 1,800 - 2,600 rpm (M/T)
B/FUEL SCHDL	3.0 - 4.5 msec
THRTL POS SEN	X − (X + 0.7) V (A/T) X − (X + 0.66) V (M/T) X = Voltage value measured at step 7
Selector lever	Suitable position

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

9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-352.



SEF786U



SEF787U

Overall Function Check

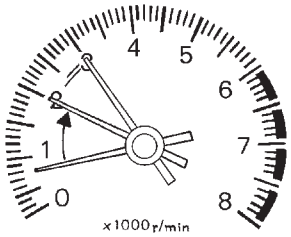
NAEC0199

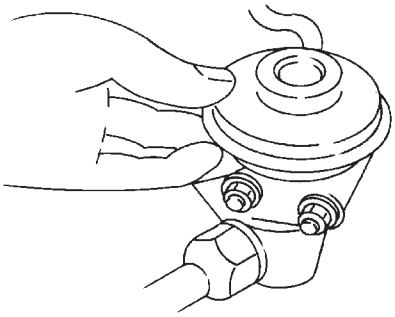
Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Check the EGR valve lifting when revving engine from idle up to 3,000 rpm quickly under no load.
   EGR valve should lift up and down without sticking.
   If NG, go to “Diagnostic Procedure”, EC-352.
3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.
   Less than 4.5V should exist.
   If NG, go to the next step.
4) Turn ignition switch “OFF”.
5) Disconnect EGR temperature sensor harness connector.
6) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ground.
   Continuity should exist.
7) Perform “EGR TEMPERATURE SENSOR”, “Component Inspection”, EC-477.

Overall function check





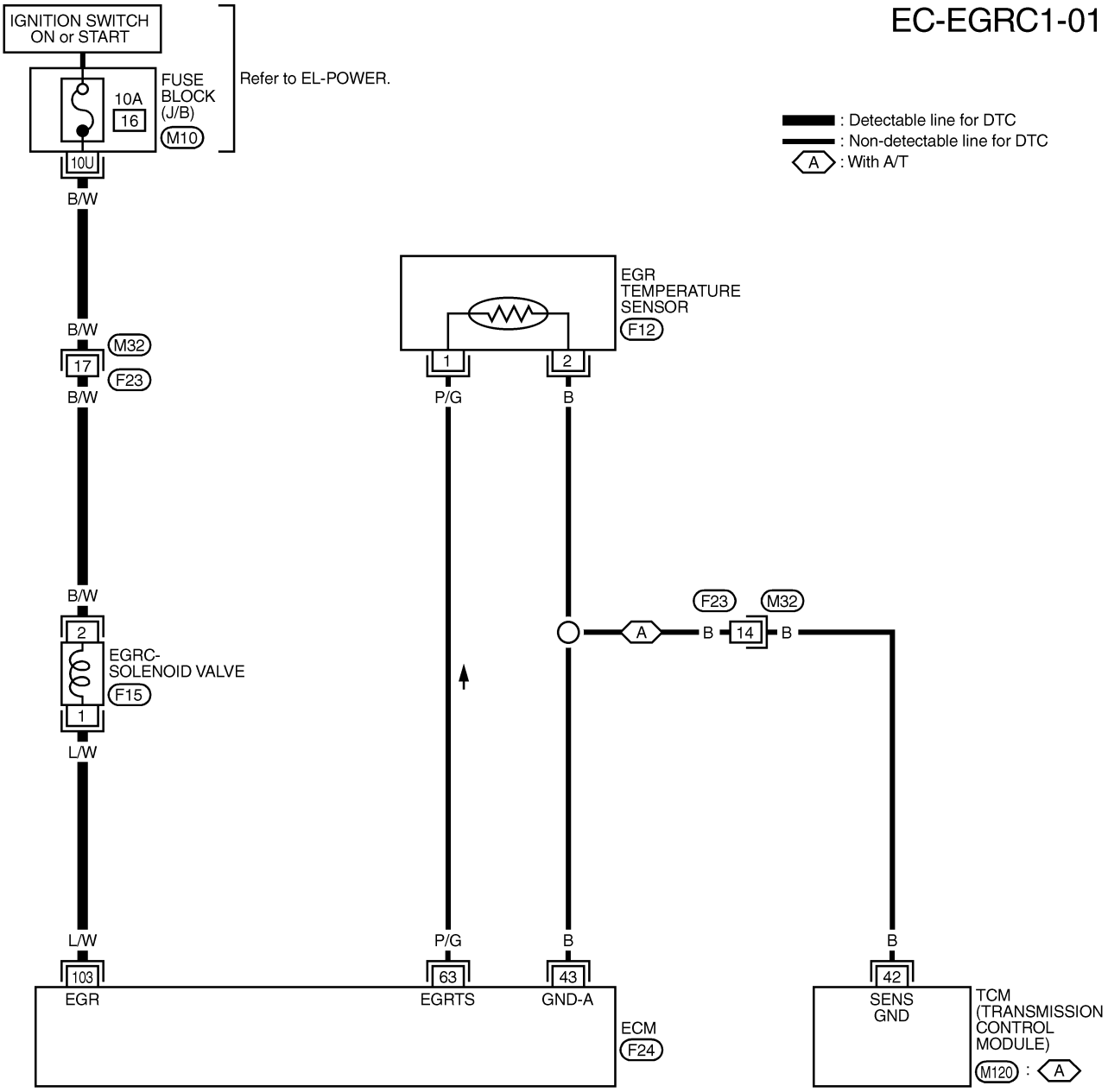
Check the EGR valve lifting when revving engine from idle up to 3,000 rpm quickly.

SEF863U

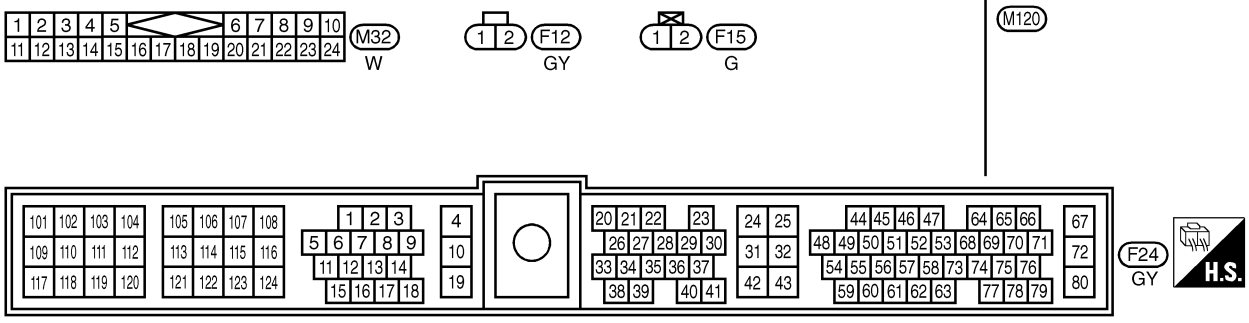
Wiring Diagram

NAEC0200

EC-EGRC1-01



Refer to last page (Foldout page).
M10
M120



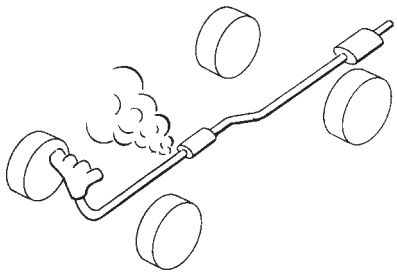
MEC669C

Diagnostic Procedure

NAEC0201

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

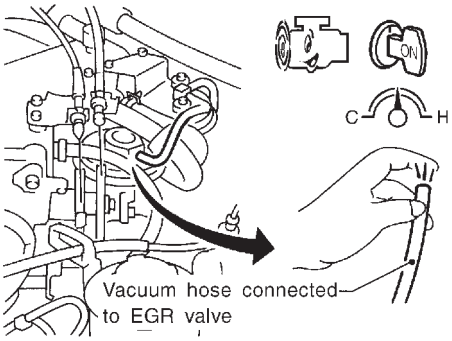
OK or NG

OK (With CONSULT)	▶	GO TO 2.
OK (Without CONSULT)	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

2	CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT

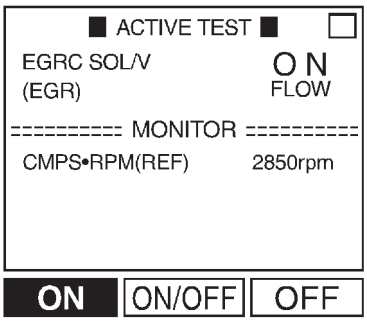
1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF049S

Vacuum should not exist at idle.

4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
5. Check for vacuum existence when revving engine from idle up to 3,000 rpm.



SEF788U

Vacuum should exist when revving engine.

OK or NG

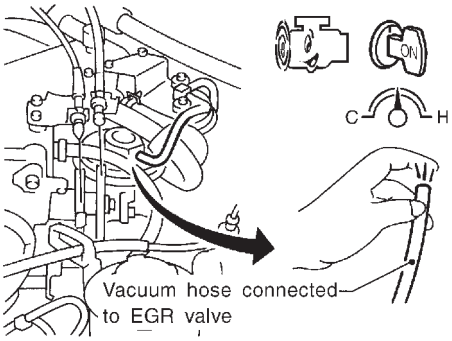
OK	▶	GO TO 4.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM SOURCE TO EGR VALVE

Without CONSULT

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF049S

Vacuum should not exist at idle.

4. Check for vacuum existence when revving engine from idle up to 3,000 rpm quickly.
   Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EGR VALVE

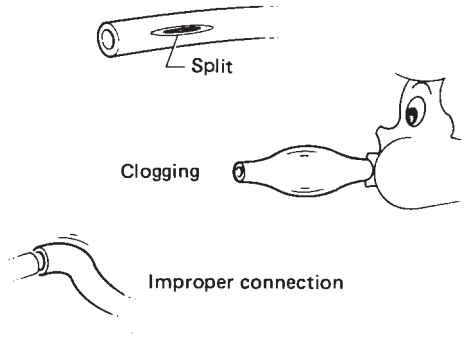
Refer to "Component Inspection", EC-357.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR valve.

5	CHECK VACUUM HOSE

1. Turn ignition switch "OFF".
2. Check vacuum hose for clogging, cracks or improper connection.



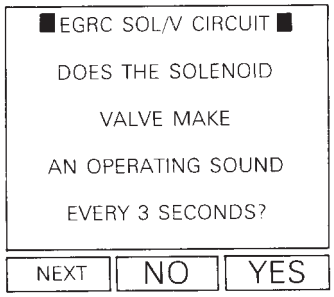
SEF109L

OK or NG

OK (With CONSULT)	▶	GO TO 6.
OK (Without CONSULT)	▶	GO TO 7.
NG	▶	Repair or replace vacuum hose.

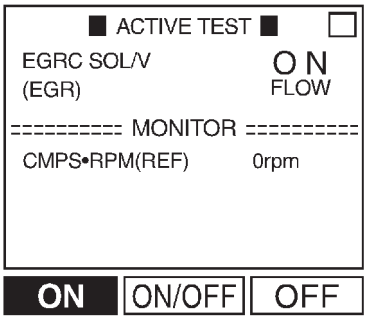
6	CHECK EGRC-SOLENOID VALVE

With CONSULT
1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF957D

With CONSULT
1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.



SEF789U

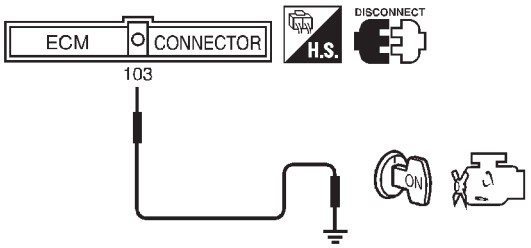
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

Diagnostic Procedure (Cont'd)

7	CHECK COMPONENT

Without CONSULT
(EGRC-solenoid valve)
1. Disconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Connect a suitable jumper wire between ECM terminal 103 and engine ground.



SEF354V

4. Check operating sound of EGRC-solenoid valve when disconnecting and connecting the jumper wire.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

8	CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-471.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGRC-solenoid valve.

9	CHECK EGRC-BPT VALVE

Refer to "Component Inspection", EC-357.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGRC-BPT valve.

10	CHECK EGR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-477.

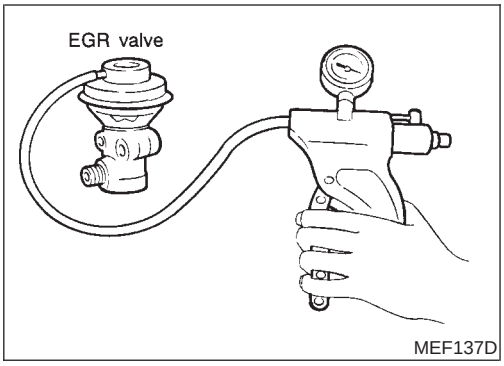
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR temperature sensor.

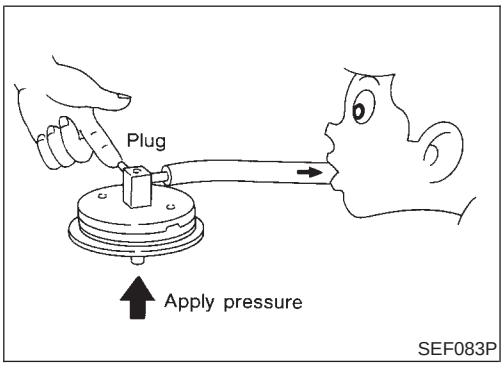
11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



MEF137D



SEF083P

Component Inspection

NAEC0202

EGR VALVE

NAEC0202S01

Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.

- Check for sticking.

If NG, repair or replace EGR valve.

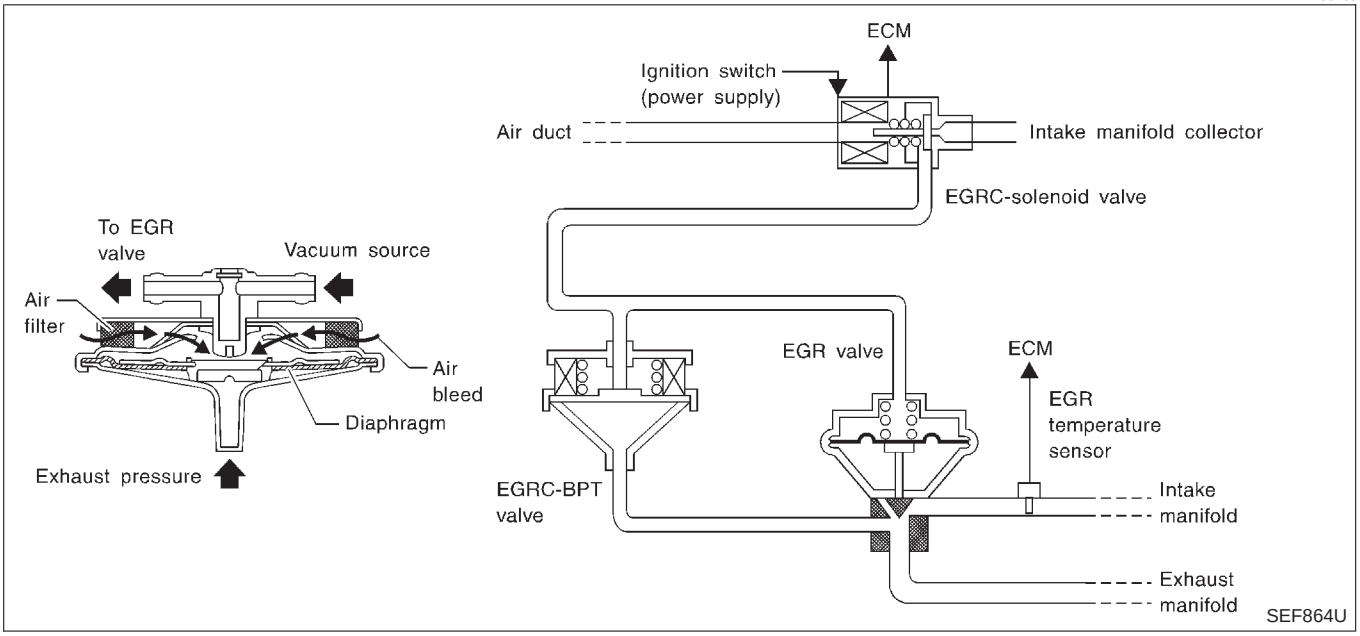
EGRC-BPT VALVE

NAEC0202S04

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

Description

NAEC0203



SYSTEM DESCRIPTION

NAEC0203S01

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling intake manifold vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

On Board Diagnosis Logic

NAEC0204

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	• The EGRC-BPT valve does not operate properly.	• EGRC-BPT valve • EGR valve • Loose or disconnected rubber tube • Blocked rubber tube • Camshaft position sensor • Blocked exhaust system • Orifice • Mass air flow sensor • EGRC-solenoid valve

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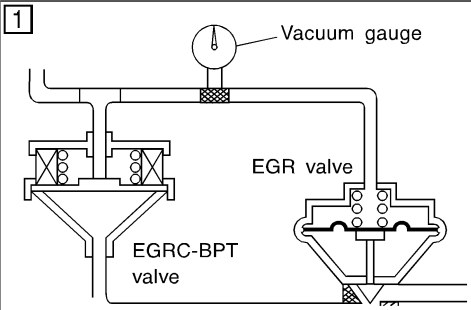

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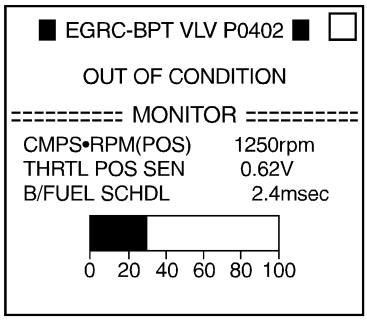

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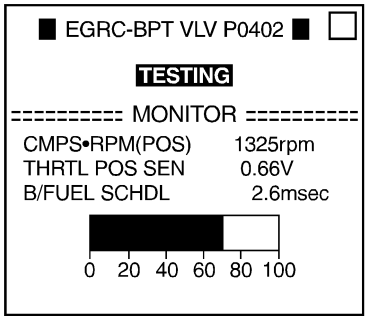

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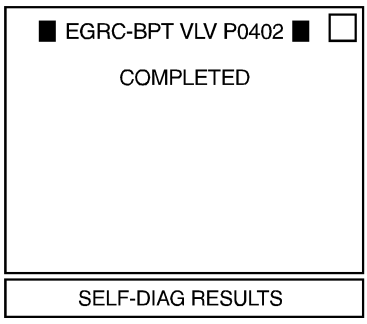

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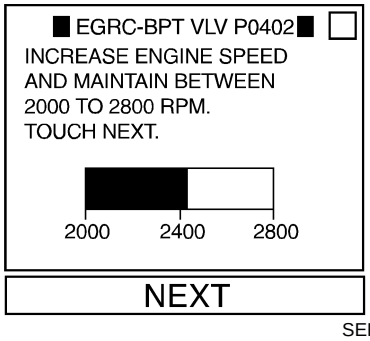


SEF034WA

DTC Confirmation Procedure

NAEC0465

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION

For best results, perform the test at a temperature of 5°C (41°F) or higher.

With CONSULT

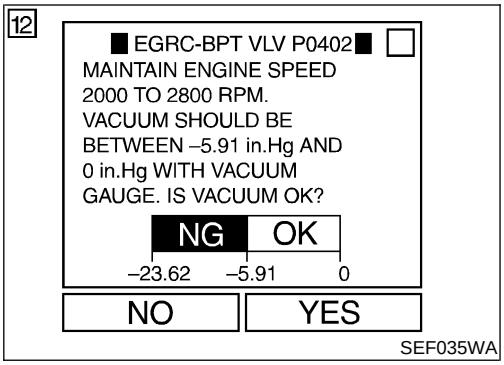
1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Start engine and warm it up to normal operating temperature.
3) Stop engine and wait at least 5 seconds.
4) Turn ignition switch "ON" and select "EGRC-BPT/V P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Start engine and let it idle.
6) Touch "START".
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

CMPS·RPM (POS)	1,200 - 1,800 rpm (A/T) 1,400 - 2,200 rpm (M/T)
Vehicle speed	30 - 60 km/h (19 - 37 MPH) (A/T) 30 - 100 km/h (19 - 62 MPH) (M/T)
B/FUEL SCHDL	2.3 - 2.8 msec (A/T) 2.3 - 2.7 msec (M/T)
THRTL POS SEN	X − (X + 0.88) V X = Voltage value measured at step 7
Selector lever	Suitable position

- **The bar chart on CONSULT screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
- **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
- **If "TESTING" does not appear on CONSULT screen, retry from step 3.**

9) If CONSULT instructs to carry out "OVERALL FUNCTION CHECK", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-360.
10) Open engine hood.
11) Raise engine speed to 2,000 to 2,800 rpm under no-load and hold it. Then touch "NEXT" on CONSULT screen.

DTC Confirmation Procedure (Cont'd)



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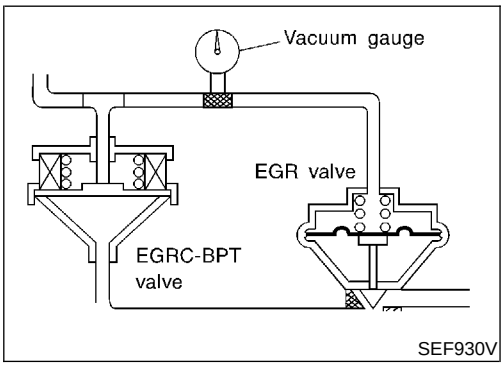


SEF930V

12) Check vacuum gauge while keeping engine speed 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-360.
If OK, touch "YES" on the CONSULT screen.

13) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twist.
If NG, repair or replace.
If OK, touch "YES" on the CONSULT screen.

Overall Function Check

NAEC0205

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Lift up vehicle.
3) Start engine and shift to "1st" gear or "1" position.
4) Check vacuum gauge while keeping engine speed 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-360.
If OK, go to next step.
5) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnections, cracks or blockages.
If NG, repair or replace.

Diagnostic Procedure

NAEC0466

1	CHECK HOSE	
1. Turn ignition switch "OFF". 2. Check vacuum hose for clogging and improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace vacuum hose.

2	CHECK EXHAUST SYSTEM	
Check exhaust system for collapse.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

3	CHECK ORIFICE
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Replace vacuum hose.

4	CHECK EGRC-BPT VALVE
Refer to "Component Inspection", EC-362.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace EGRC-BPT valve.

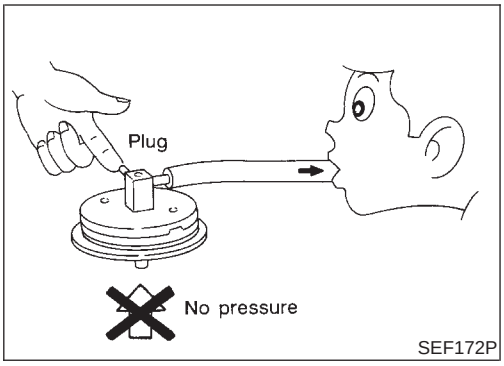
5	CHECK CAMSHAFT POSITION SENSOR
Refer to "Component inspection", EC-345.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace camshaft position sensor.

6	CHECK MASS AIR FLOW SENSOR
Refer to "Component Inspection", EC-155.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace mass air flow sensor.

7	CHECK EGRC-SOLENOID VALVE
Refer to "Component Inspection", EC-471.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace EGRC-solenoid valve.

8	CHECK EGR VALVE
Refer to "Component Inspection", EC-357.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



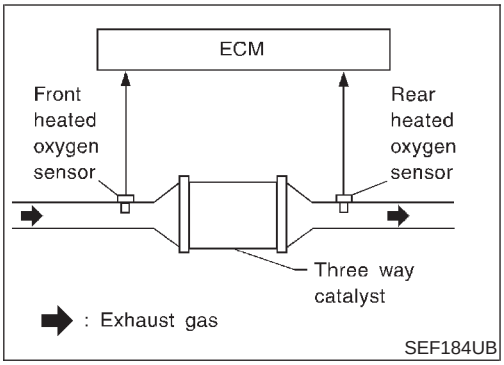
Component Inspection

NAEC0206

EGRC-BPT VALVE

NAEC0206S01

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.
   Leakage should exist.



On Board Diagnosis Logic

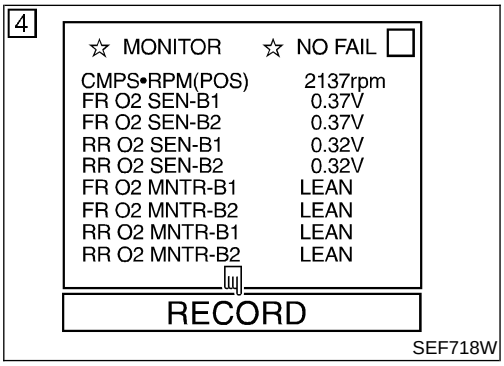
NAEC0207

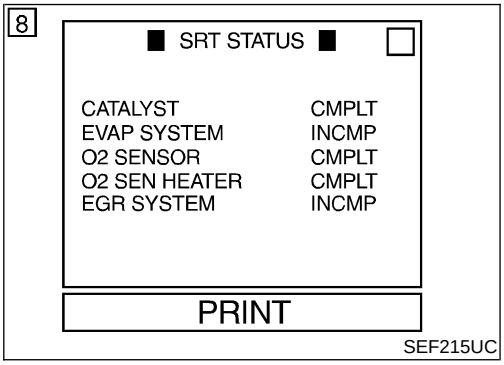
The ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702 (right bank)	• Warm-up three way catalyst does not operate properly. • Warm-up three way catalyst does not have enough oxygen storage capacity.	• Warm-up three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing
P0430 0703 (left bank)		





DTC Confirmation Procedure

NAEC0467

CAUTION:

Always drive vehicle at a safe speed.

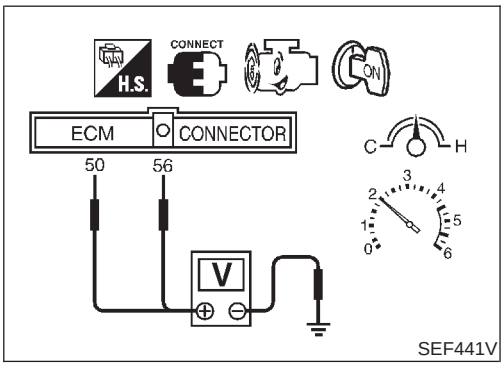
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SEN-B1 (-B2)", "RR O2 SEN-B1 (-B2)", "FR O2 MNTR-B1 (-B2)", "RR O2 MNTR-B1 (-B2)" in "DATA MONITOR" mode with CONSULT.
4) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constantly under no load.
5) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 MNTR-B1 (-B2)" is much less than that of "FR O2 MNTR-B1 (-B2)" as shown below.
   Switching frequency ratio = A/B
   A: Rear heated oxygen sensor switching frequency
   B: Front heated oxygen sensor switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, the warm-up three way catalyst is not operating properly.
   If the "FR O2 MNTR-B1 (-B2)" does not indicate "RICH" and "LEAN" periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-224.)
   If the result is NG, go to "Diagnostic Procedure", EC-364.
   If the result is OK, go to following step.
6) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT.

7) Drive vehicle at a speed of approximately 86 to 96 km/h (53 to 60 MPH) with "D" position ("OD" ON) (A/T), 5th gear position (M/T) for at least 10 consecutive minutes.
(Drive the vehicle in an area where vehicle speed and accelerator pressure can be held steady and constant.)
If the result is NG, go to "Diagnostic Procedure".
8) Select "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT.
9) Verify that "CATALYST" is "CMPLT".
If not "CMPLT", repeat the test from step 6.



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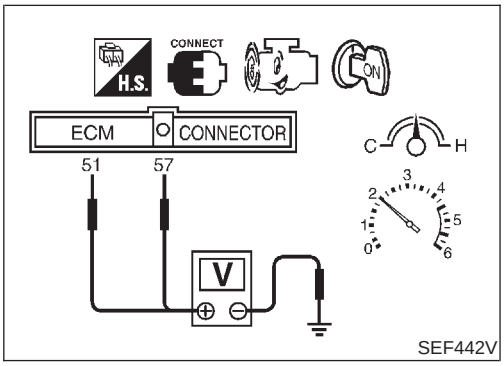


SEF442V

Overall Function Check

NAEC0208

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeters probes between ECM terminals 50 (front heated oxygen sensor right bank signal), 51 (front heated oxygen sensor left bank signal) and engine ground, and ECM terminals 56 (rear heated oxygen sensor right bank signal), 57 (rear heated oxygen sensor left bank signal) and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.
Switching frequency ratio = A/B
A: Rear heated oxygen sensor voltage switching frequency
B: Front heated oxygen sensor voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-364.

NOTE:
If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-224.)

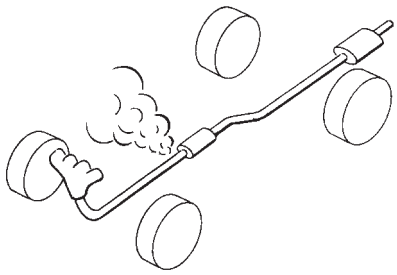
Diagnostic Procedure

NAEC0209

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

2	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before the warm-up three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING

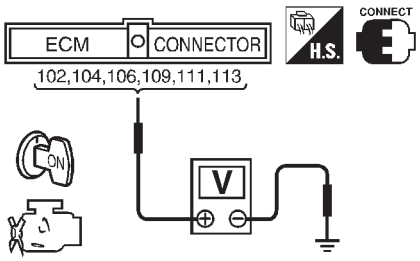
Check ignition timing.
Refer to "TROUBLE DIAGNOSIS — BASIC INSPECTION", EC-99.

OK or NG

OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-555.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT or tester.



SEF711U

Battery voltage should exist.

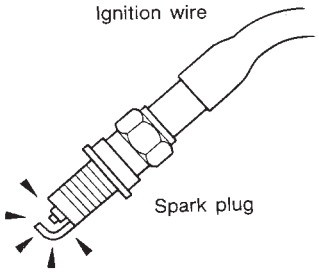
OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-556.

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

Refer to "Component Inspection", EC-326.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-454.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-38.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

Does not drip	▶	GO TO 9.
Drips	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

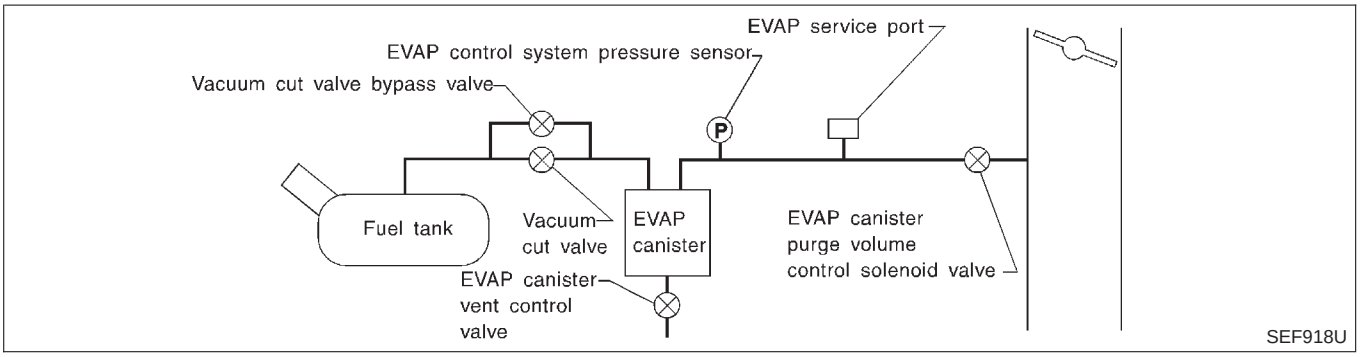
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NAEC0210

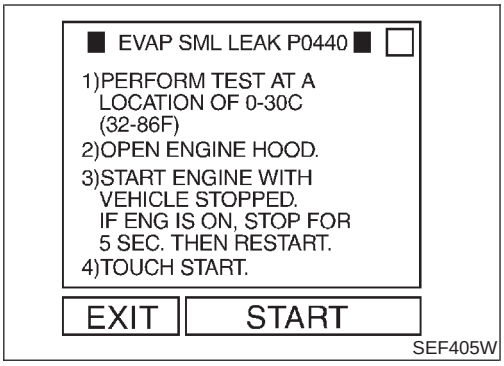
NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for "DTC P1448" first. (See EC-518.)

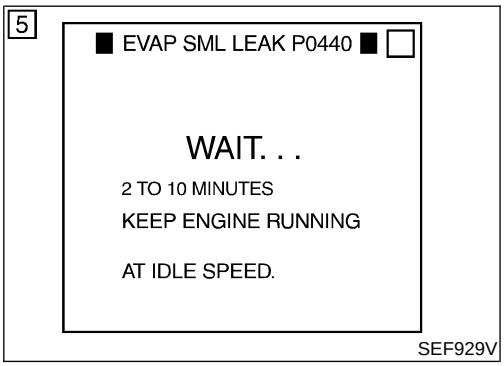
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.

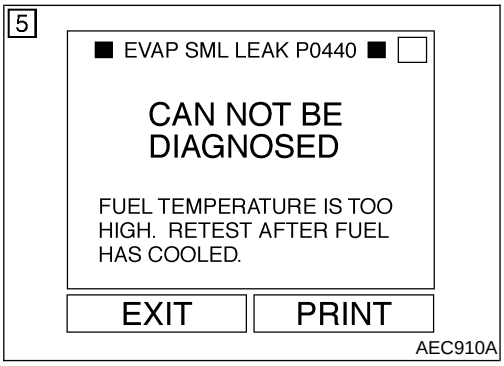


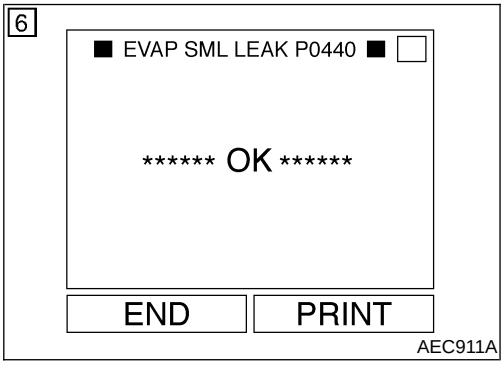
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440 0705	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Absolute pressure sensor • Fuel tank temperature sensor • MAP/BARO switch solenoid valve and the circuit • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**









DTC Confirmation Procedure

NAEC0211

NOTE:

- **If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-518.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

With CONSULT

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.

NOTE:

- If the CONSULT screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest.
  (Use a fan to reduce the stabilization time.)
- If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to "Basic Inspection", EC-99.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-369.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

With GST

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that the fuel level is low.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-62.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-369.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1440", EC-488.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-512.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

No Tools

NOTE:
- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that the fuel level is low.

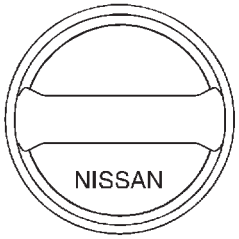
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-369.

Diagnostic Procedure

NAEC0212

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

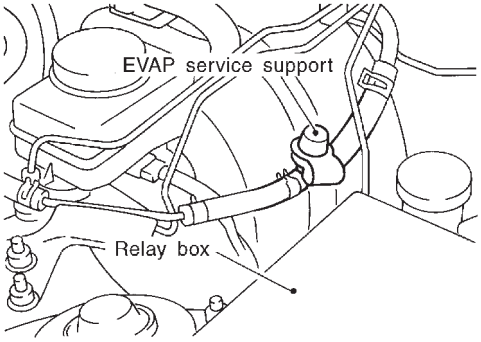
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly by rotating the cap clockwise. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

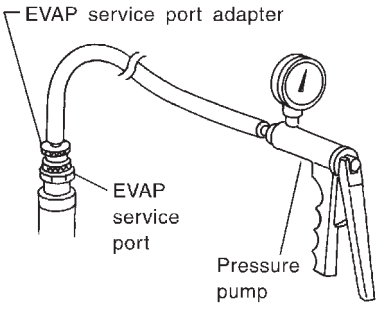
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap. **OK or NG**	
OK ▶	GO TO 6.
NG ▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)
Refer to "Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)", EC-31. **OK or NG**	
OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.	



SEF907U



SEF916U

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT ▶	GO TO 6.
Models without CONSULT ▶	GO TO 7.

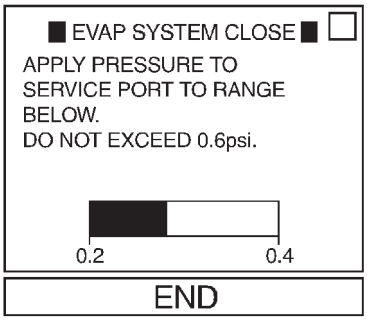
6	CHECK FOR EVAP LEAK

With CONSULT

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

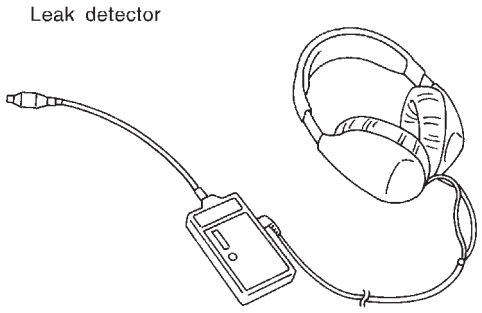
NOTE:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



SEF917U

4. Using EVAP leak detector, locate the EVAP leak. Refer to the instruction manual for more details about the leak detector.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.



SEF200U

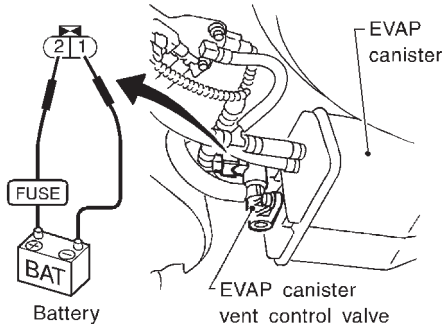
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

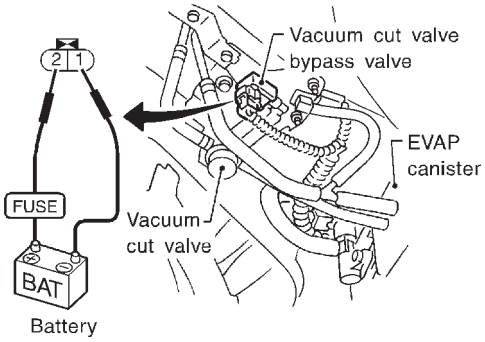
Without CONSULT

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



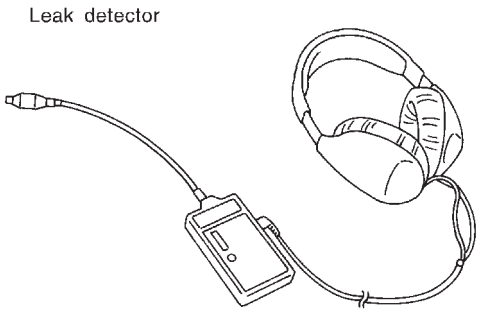
SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details about the leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.

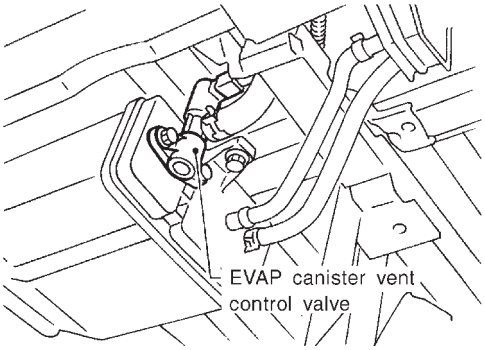


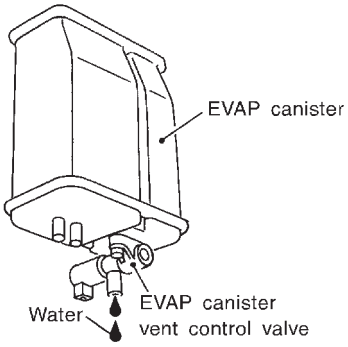
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR	
Refer to "Component Inspection", EC-509.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-385.		
 SEF143S		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

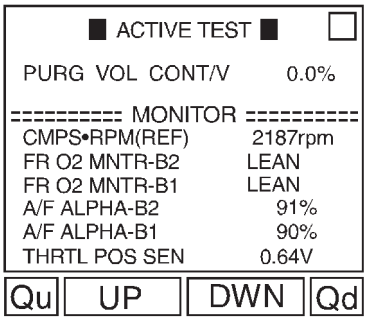
10	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
 SEF596U		
Yes or No		
Yes	▶	GO TO 11.
No (With CONSULT)	▶	GO TO 13.
No (Without CONSULT)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT) ▶	GO TO 13.
OK (Without CONSULT) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



SEF908U

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

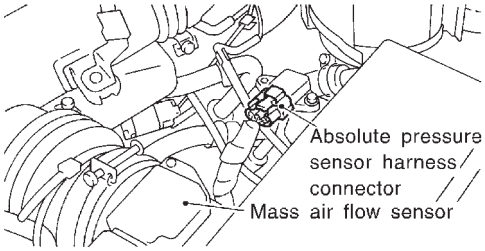
Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

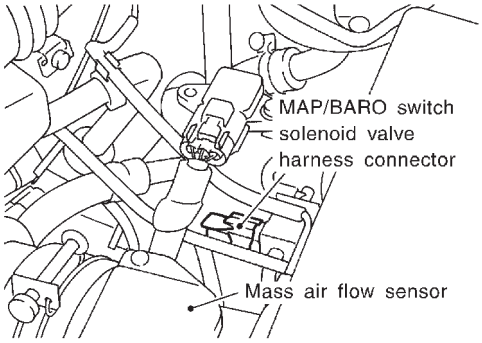
OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-24.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Repair or reconnect the hose.

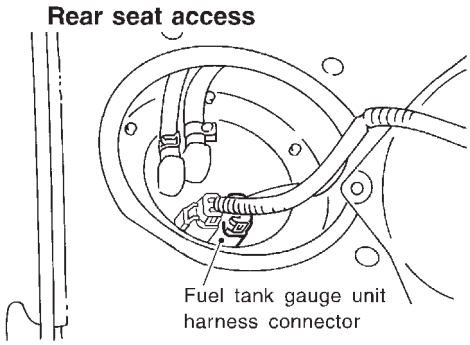
16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-383.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

17	CHECK ABSOLUTE PRESSURE SENSOR	
Refer to "Component Inspection", EC-166.		
 SEF748U		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Replace absolute pressure sensor.

18	CHECK MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT	
Refer to "Component Inspection", EC-450.		
 SEF756U		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace MAP/BARO switch solenoid valve.

19	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-319.



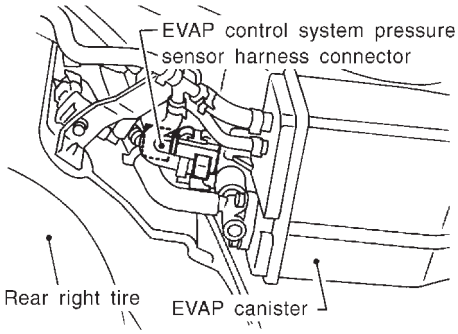
SEF751U

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel tank temperature sensor.

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-399.



SEF495R

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-30.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 23.

23	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**

Description

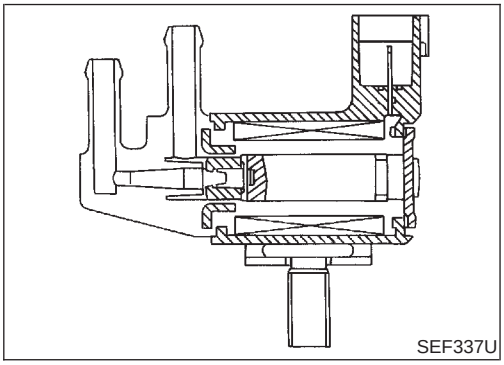
NAEC0214

SYSTEM DESCRIPTION

NAEC0214S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NAEC0214S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT Reference Value in Data Monitor Mode

NAEC0215

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

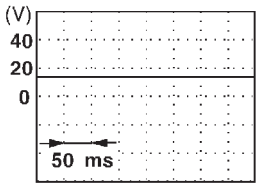
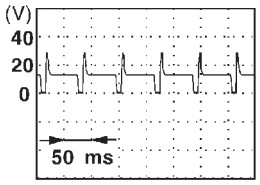
ECM Terminals and Reference Value

NAEC0216

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

CAUTION:

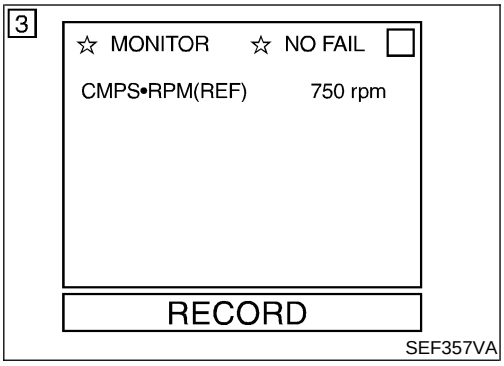
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	LG/B	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0217

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0443 1008	An improper voltage signal is sent to ECM through the valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NAEC0218

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 13 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-381.

With GST

1) Start engine and let it idle for at least 13 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-381.

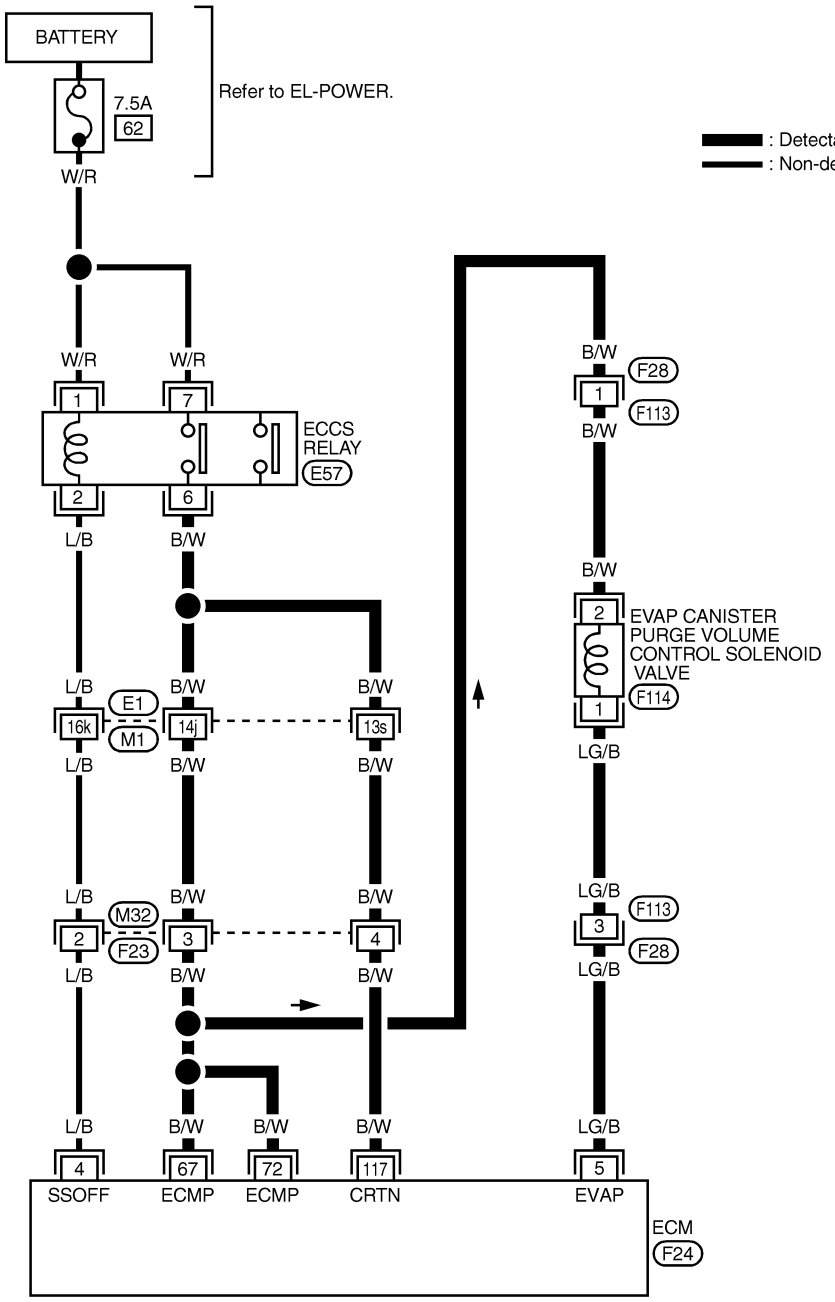
No Tools

1) Start engine and let it idle for at least 13 seconds.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-381.

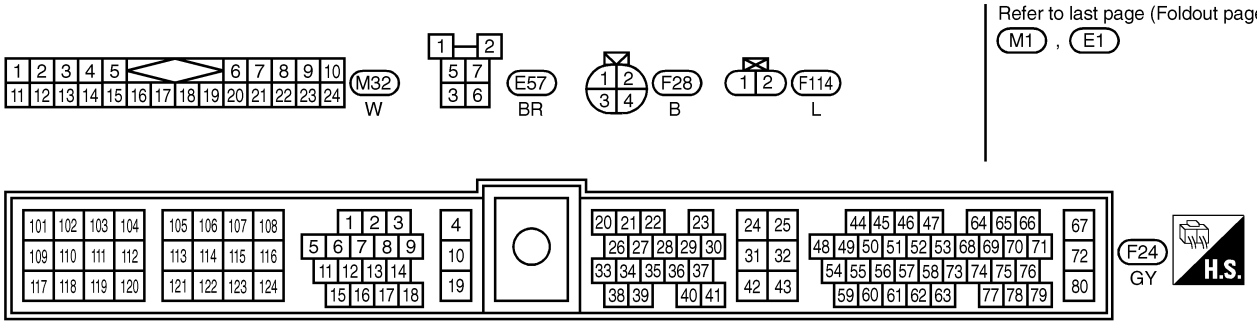
Wiring Diagram

NAEC0219

EC-PGC/V-01



Refer to last page (Foldout page).
M1 , E1



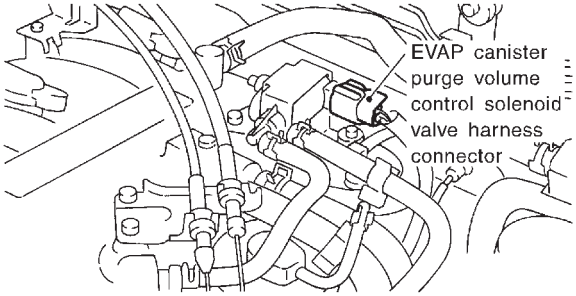
MEC670C

Diagnostic Procedure

NAEC0220

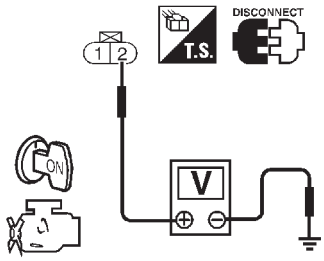
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF879U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF880U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

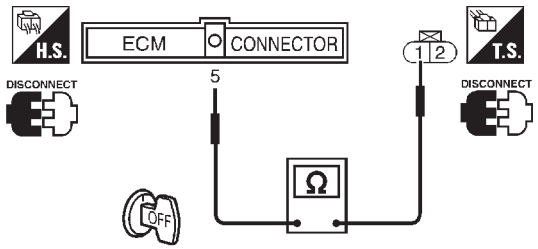
Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness connectors F28, F113
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECCS relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and terminal 1.



SEF881U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, F113
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-383.

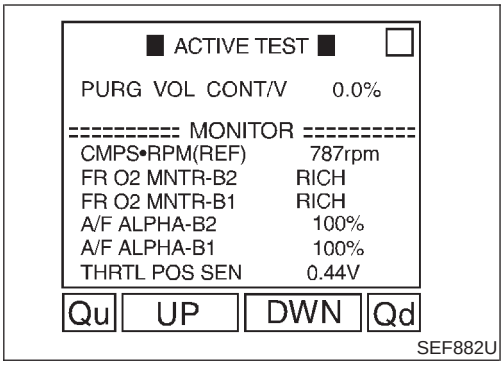
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

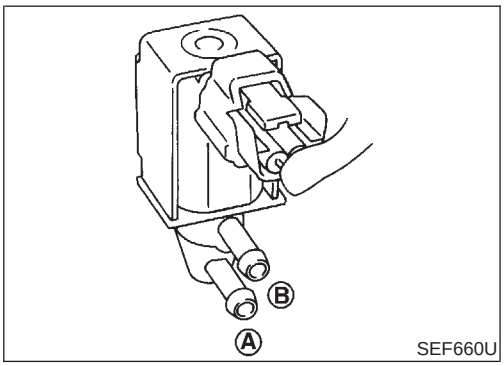
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

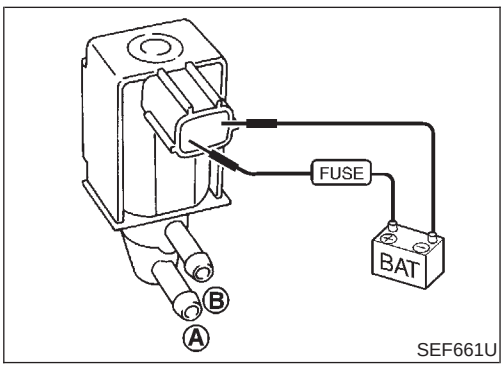
	▶	**INSPECTION END**



SEF882U



SEF660U



SEF661U

Component Inspection

NAEC0221

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

NAEC0221S01

With CONSULT

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

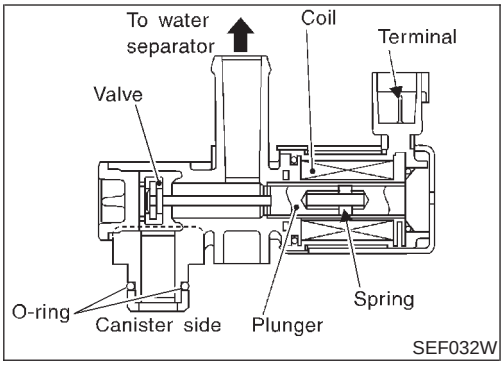
Without CONSULT

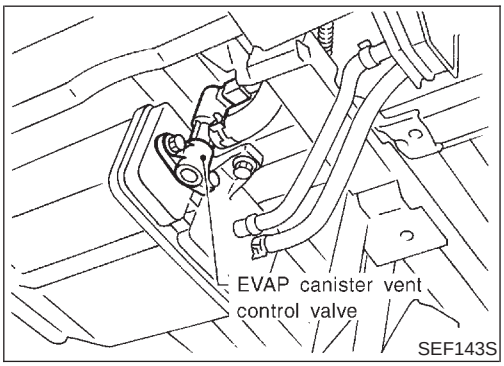
Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.

Component Description





Component Description

NAEC0222

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT Reference Value in Data Monitor Mode

NAEC0223

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0224

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	G/R	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0225

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446 0903	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC Confirmation Procedure

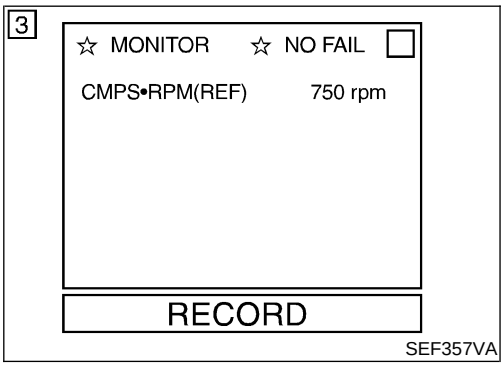
NAEC0226

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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



With CONSULT

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.

With GST

1) Start engine and wait at least 8 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.

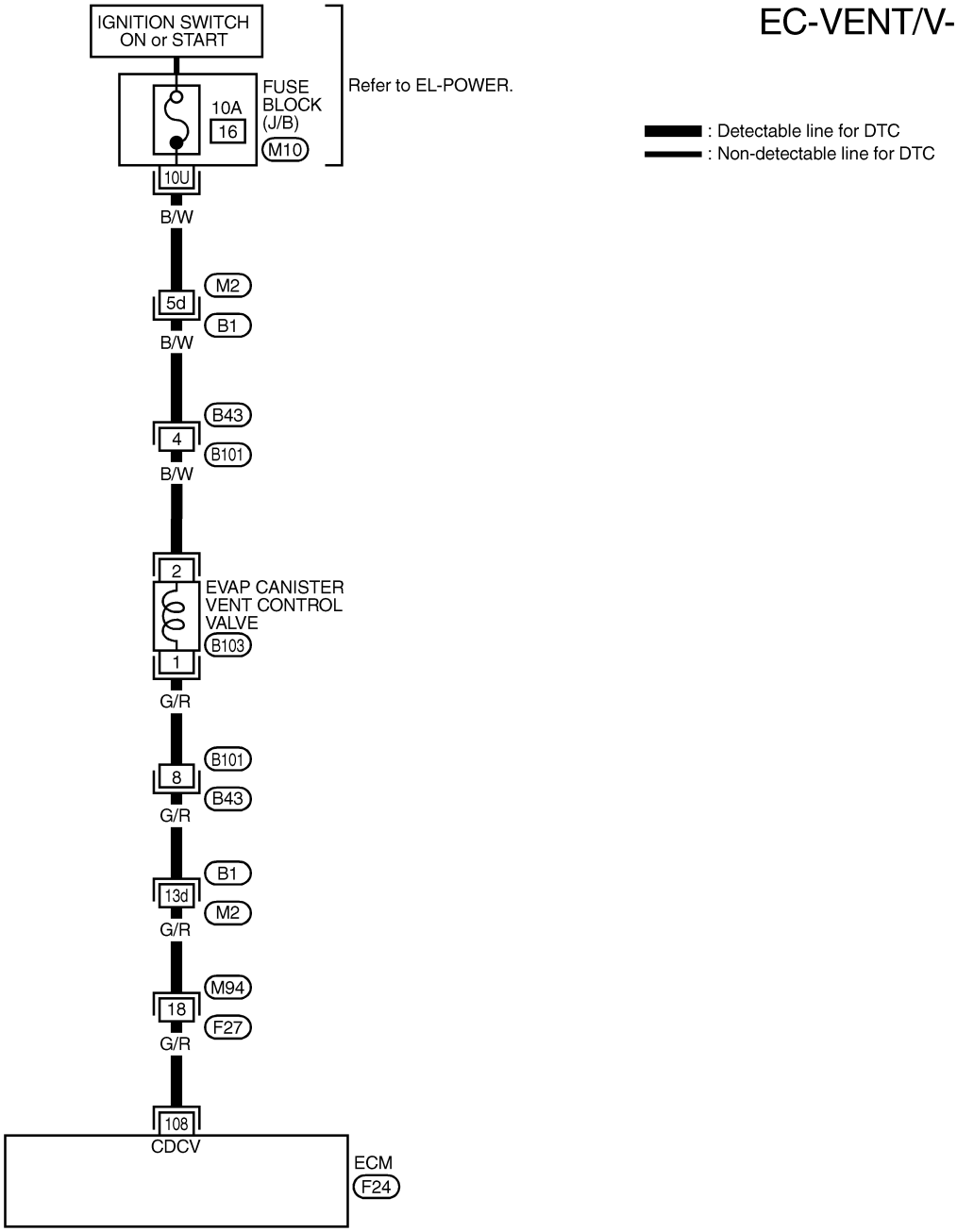
No Tools

1) Start engine and wait at least 8 seconds.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-387.

Wiring Diagram

NAEC0228

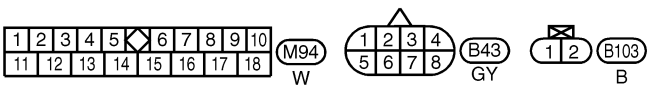
EC-VENT/V-01

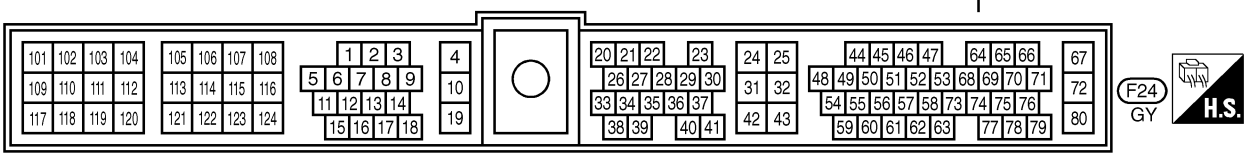


Refer to last page (Foldout page).

(M2) , (B1)

(M10)





MEC671C

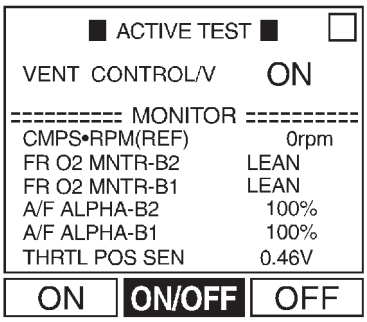
Diagnostic Procedure

NAEC0229

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

1. Turn ignition switch “OFF” and then turn “ON”.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT.
3. Touch “ON/OFF” on CONSULT screen.



SEF883U

4. Check for operating sound of the valve.
   Clicking noise should be heard.

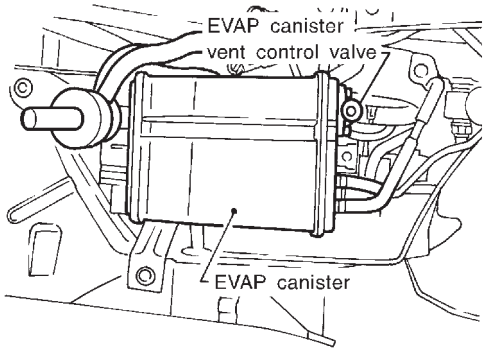
OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

Diagnostic Procedure (Cont'd)

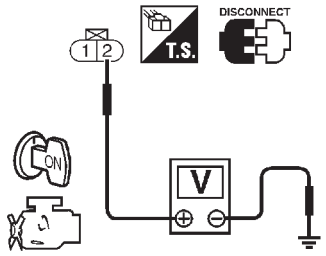
3	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF872T

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF884U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

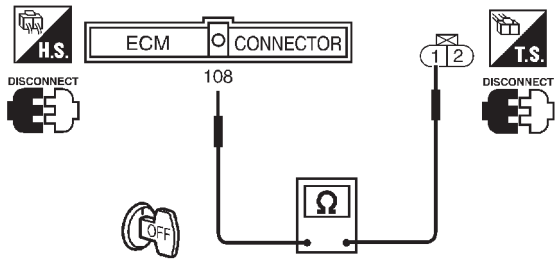
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M2, B1
- Harness connectors B43, B101
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

	▶	Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and terminal 1.



SEF885U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between EVAP canister vent control valve and ECM

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

7	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-389.

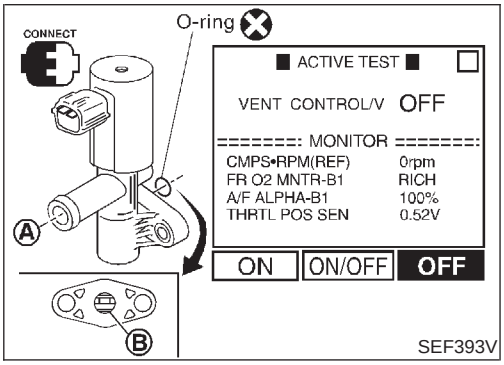
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister vent control valve.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF393V

Component Inspection

NAEC0230

EVAP CANISTER VENT CONTROL VALVE

NAEC0230S01

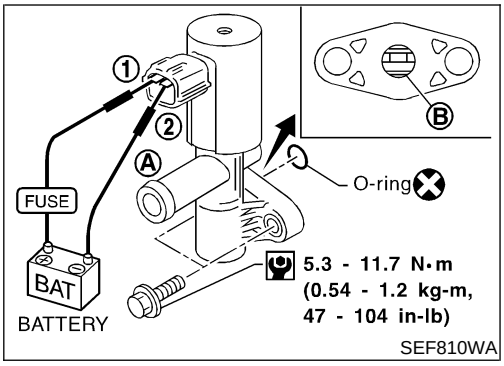
Check air passage continuity.

Ⓑ **With CONSULT**

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

Component Inspection (Cont'd)



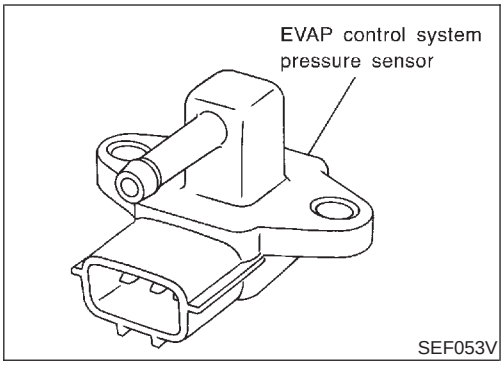
Without CONSULT

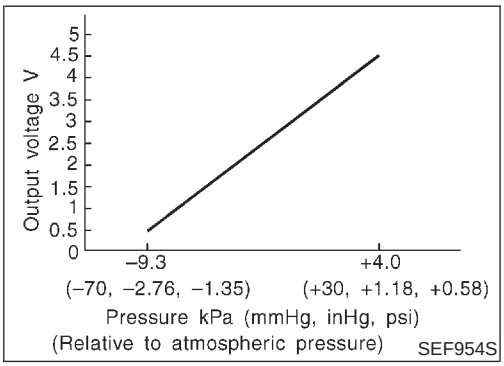
Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion B is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.





Component Description

NAEC0231

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

CONSULT Reference Value in Data Monitor Mode

NAEC0232

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NAEC0233

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
62	G/B	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V

On Board Diagnosis Logic

NAEC0234

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450 0704	• An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	• Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) • Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection. • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister purge volume control solenoid valve • EVAP canister • Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

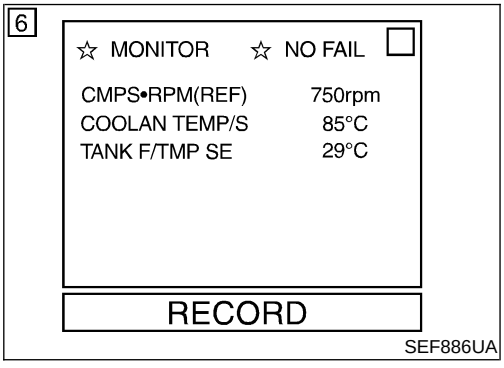
NAEC0235

NOTE:

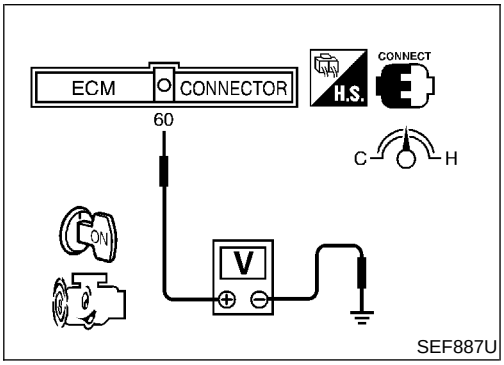
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.



SEF886UA



SEF887U

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT.
5) Make sure that “TANK F/TEMP SE” is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-395.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 60 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch “OFF” and wait at least 5 seconds.
4) Start engine and wait at least 20 seconds.
5) Select “MODE 7” with GST.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-395.

No Tools

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

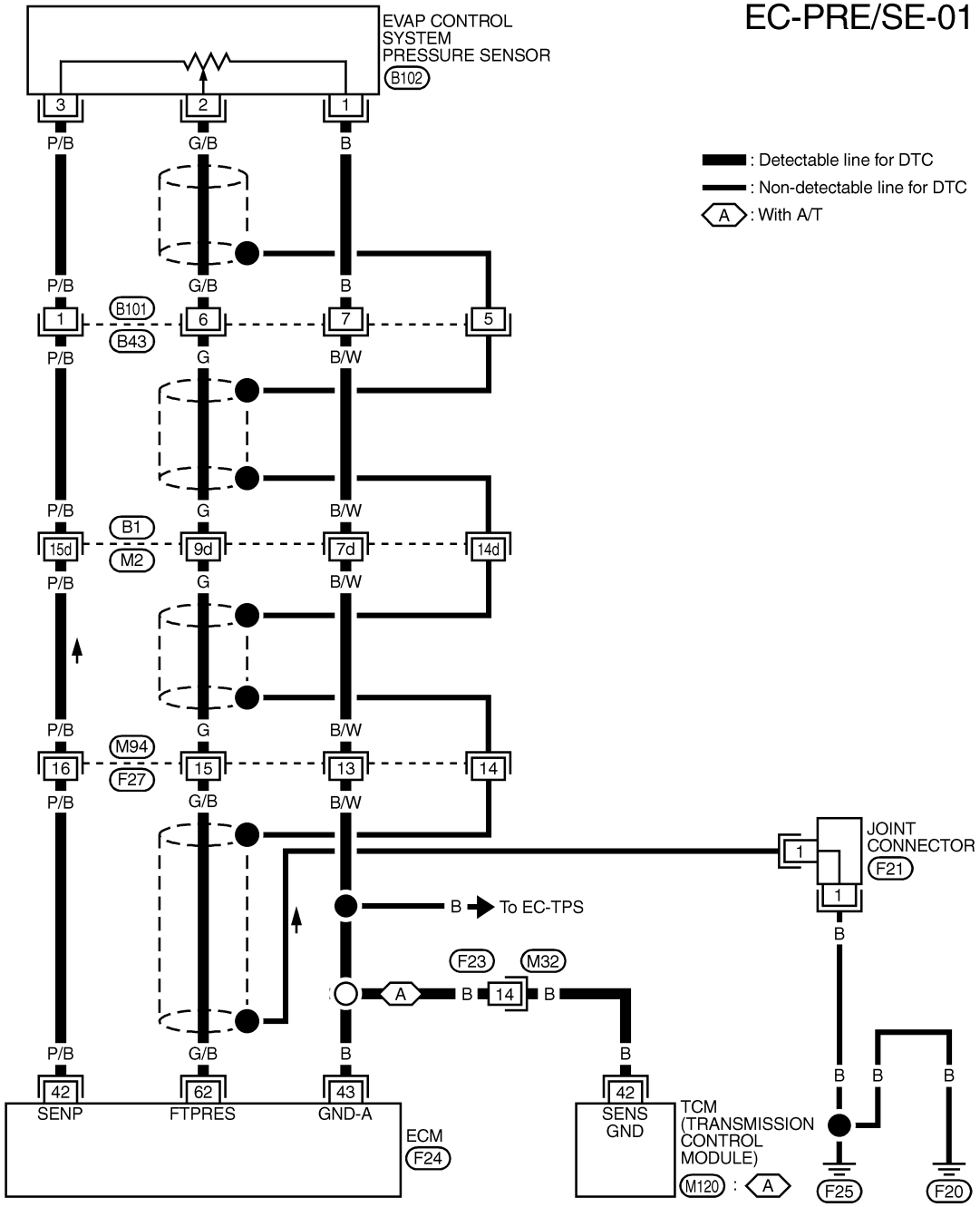
DTC Confirmation Procedure (Cont'd)

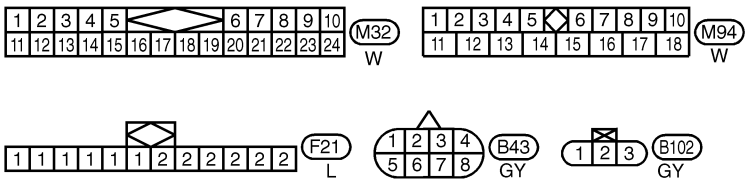
2) Check that voltage between ECM terminal 60 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine and wait at least 20 seconds.
5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-395.

Wiring Diagram

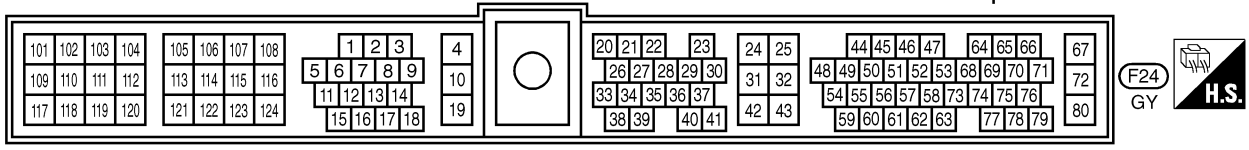
NAEC0236

EC-PRE/SE-01





Refer to last page (Foldout page).
M2 , B1
M120



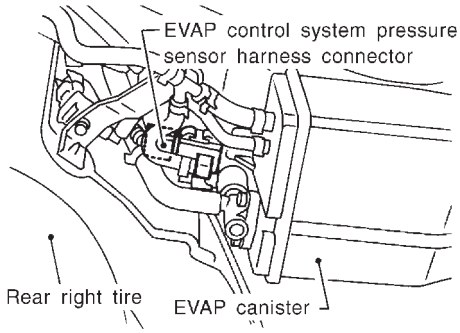
MEC672C

Diagnostic Procedure

NAEC0237

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.



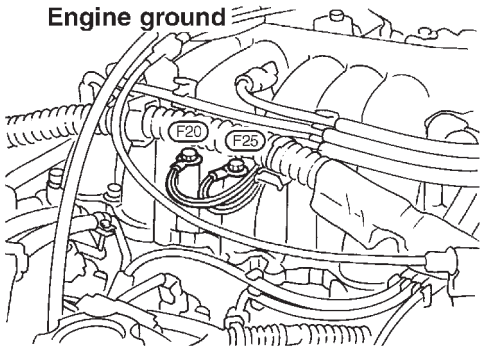
SEF495R

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.



SEF031S

	▶	GO TO 3.

3	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

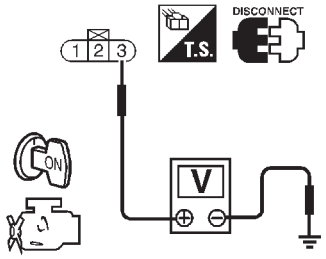
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

Diagnostic Procedure (Cont'd)

4	CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between terminal 3 and ground with CONSULT or tester.



SEF889U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

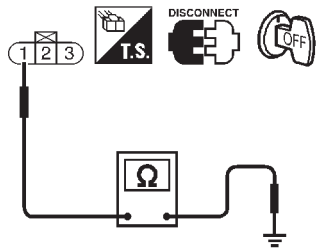
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal 1 and engine ground.



SEF890U

Continuity should exist.

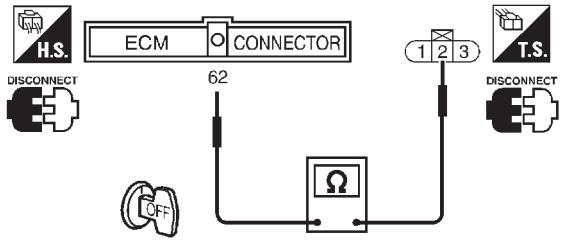
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness connectors F23, M32 ● Harness for open or short between EVAP control system pressure sensor and ECM ● Harness for open or short between EVAP control system pressure sensor and TCM (Transmission control module)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 62 and terminal 2.	



SEF891U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 ● Harness connectors M94, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Refer to "Component Inspection", EC-383.	

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE
Refer to "Component Inspection", EC-389.	

OK or NG

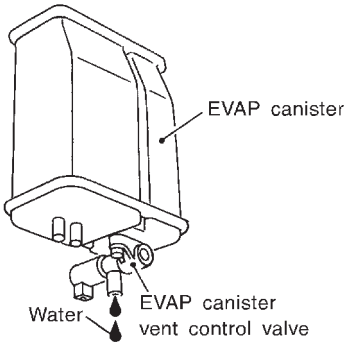
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to "Component Inspection", EC-399.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE	
1. Check obstructed water separator and rubber tube connected to EVAP canister vent control valve. For water separator, refer to EC-509. 2. Clean the rubber tube using air blower.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

14	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		



SEF596U

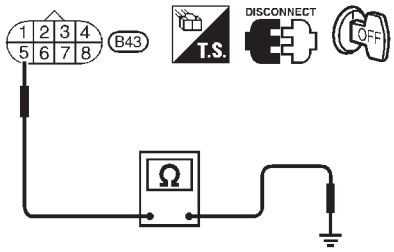
Yes or No		
Yes	▶	GO TO 15.
No	▶	GO TO 17.

15	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

17	CHECK SHIELD CIRCUIT

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors B43, B101.
3. Check harness continuity between terminal 5 and engine ground.



SEF892U

Continuity should exist.

4. Also check harness for short to ground and short to power. Then reconnect joint connector.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	DETECT MALFUNCTIONING PART

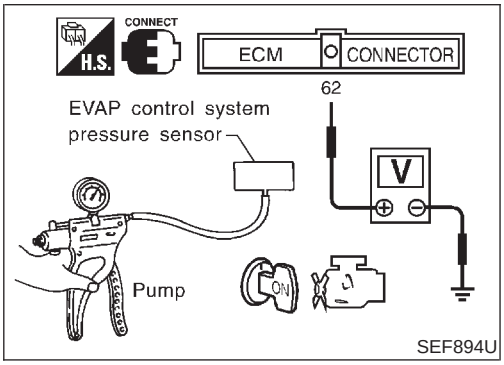
Check the following.
- Harness connectors F27, M94
- Harness connectors M2, B1
- Harness connectors B43, B101
- Joint connector F21 (Refer to EL-312, "HARNESS LAYOUT".)
- Harness for open or short between harness connector B43 and engine ground

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

19	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF894U

Component Inspection

EVAP CONTROL SYSTEM PRESSURE SENSOR

NAEC0238

NAEC0238S01

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.

Component Inspection (Cont'd)

Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

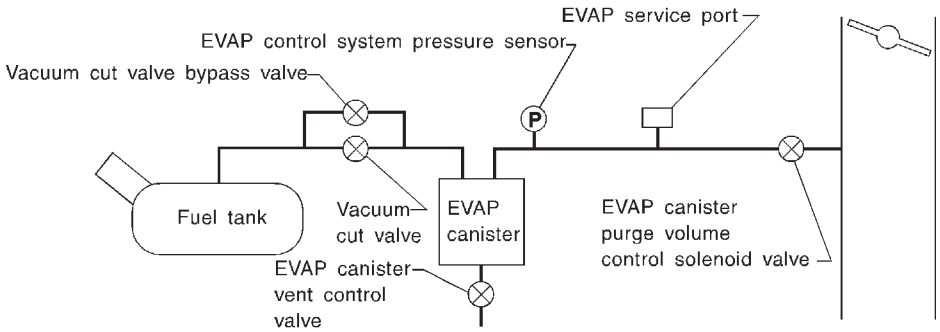
6. If NG, replace EVAP control system pressure sensor.

On Board Diagnosis Logic

NAEC0526

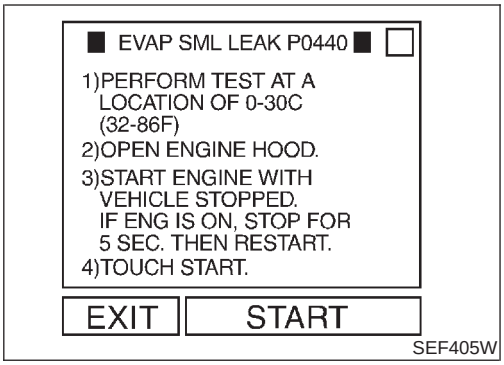
NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for "DTC P1448" first. (See EC-518.)

This diagnosis detects very large leaks (fuel filler cap fell off, etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.

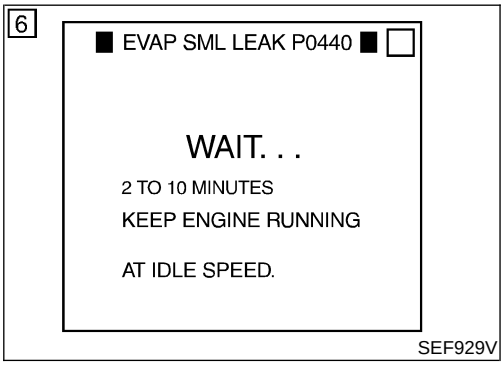


DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0455 0715	• EVAP system has a very large leak such as when fuel filler cap falls off. • EVAP system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Absolute pressure sensor • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • EVAP control system pressure sensor

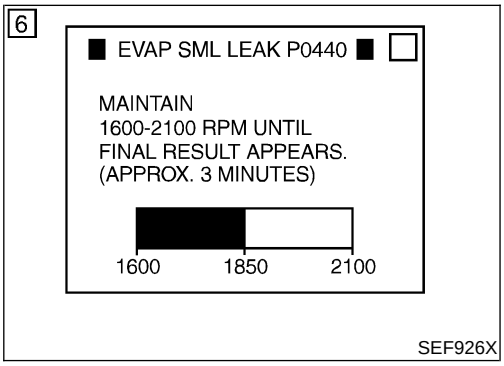
CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



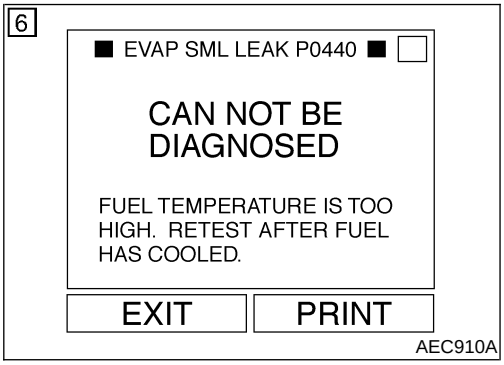
SEF405W



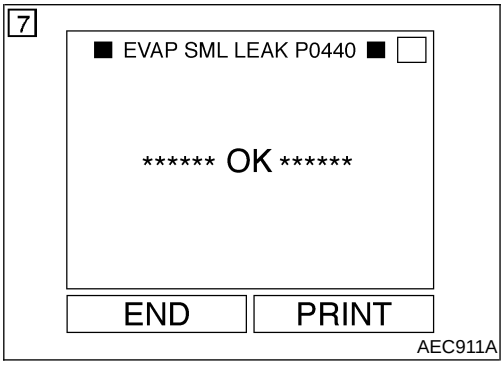
SEF929V



SEF926X



AEC910A



AEC911A

DTC Confirmation Procedure

NAEC0527

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-518.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

With CONSULT

1) Tighten fuel filler cap securely until ratcheting sound is heard.
2) Turn ignition switch "ON".
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
5) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.

NOTE:

- If the CONSULT screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest.
  (Use a fan to reduce the stabilization time.)
- If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to "Basic Inspection", EC-99.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT and make sure that "EVAP GROSS LEAK [P0455]." is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-404.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

With GST

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that the fuel level is low.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.

4) Select "MODE 1" with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-62.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-404.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0440, EC-369.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-512.
- If P0440, P0455, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

No Tools

NOTE:
- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that the fuel level is low.

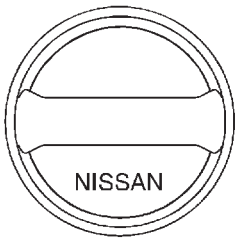
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-404.

Diagnostic Procedure

NAEC0528

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch “OFF”.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

Refer to “Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)”, EC-31.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to “Evaporative Emission System”, EC-30.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

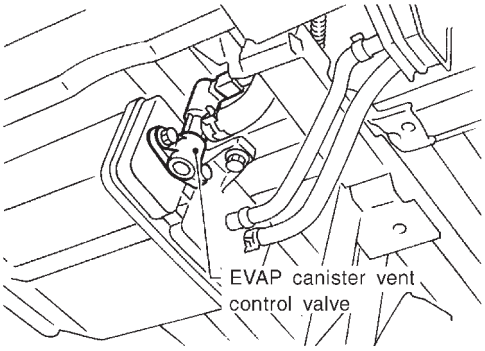
6	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 7.

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to "DTC Confirmation Procedure", EC-385.



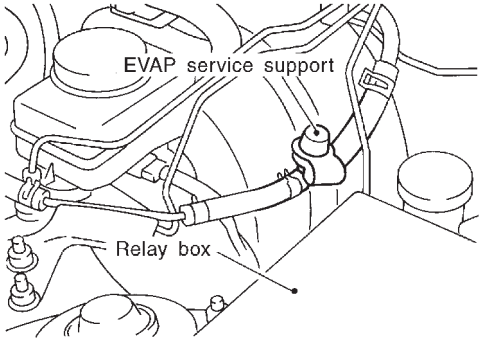
SEF143S

OK or NG

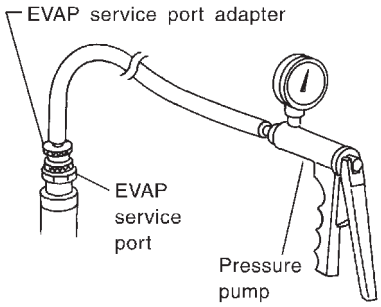
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.



SEF907U



SEF916U

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT	▶	GO TO 9.
Models without CONSULT	▶	GO TO 10.

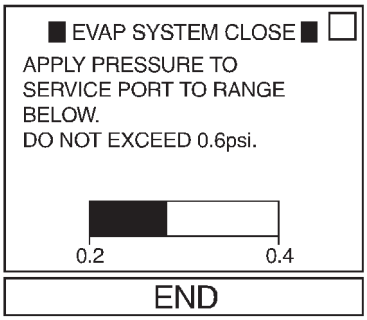
9	CHECK FOR EVAP LEAK

With CONSULT

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

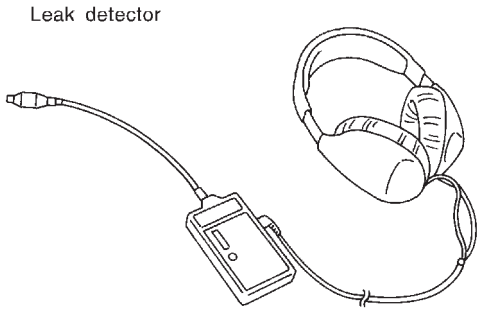
NOTE:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



SEF917U

4. Using EVAP leak detector, locate the EVAP leak. Refer to the instruction manual for more details about the leak detector.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.



SEF200U

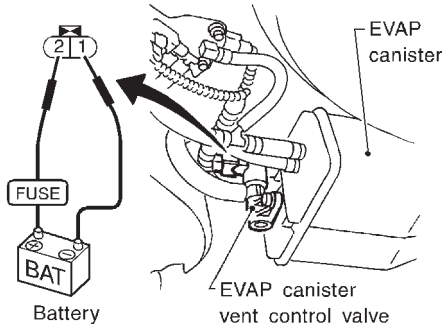
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

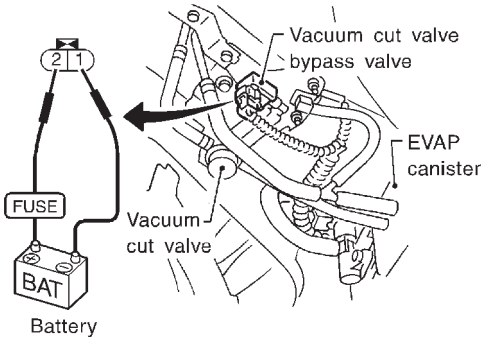
Without CONSULT

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



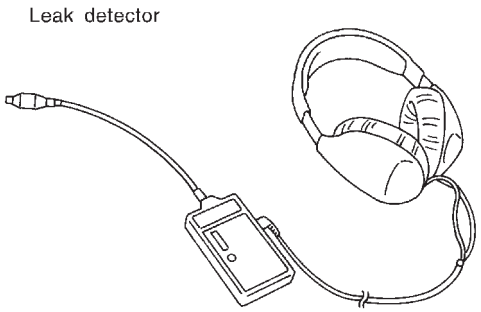
SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details about the leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.



SEF200U

OK or NG

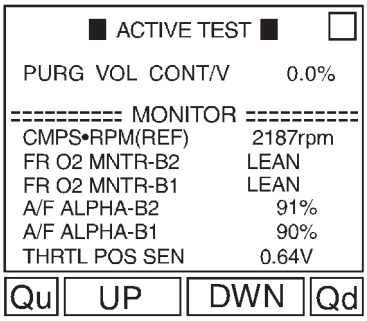
OK	▶	GO TO 12.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



SEF908U

Vacuum should exist.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-24.

OK or NG

OK	▶	GO TO 14.
NG	▶	Repair or reconnect the hose.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

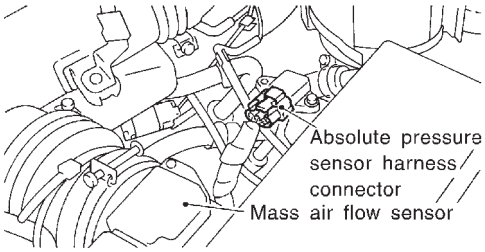
Refer to "Component Inspection", EC-383.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

15	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-166.



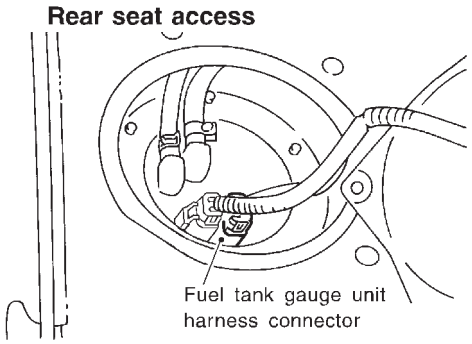
SEF748U

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace absolute pressure sensor.

16	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-319.



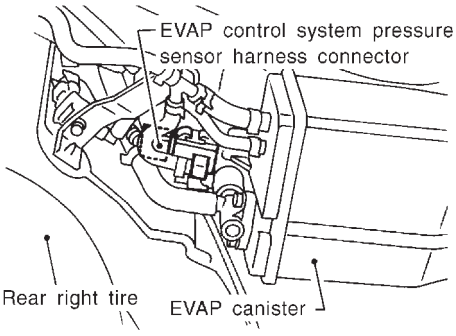
SEF751U

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace tank fuel temperature sensor.

17	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-399.



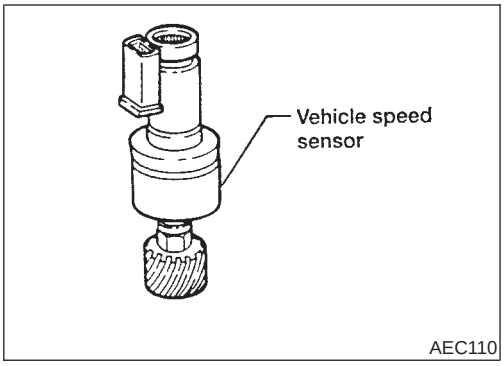
SEF495R

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

18	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



Component Description

NAEC0239

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

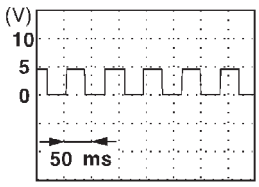
ECM Terminals and Reference Value

NAEC0240

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	W/L	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V  SEF996U

On Board Diagnosis Logic

NAEC0241

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500 0104	● The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connector (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

NAEC0242

CAUTION:

Always drive vehicle at a safe speed.

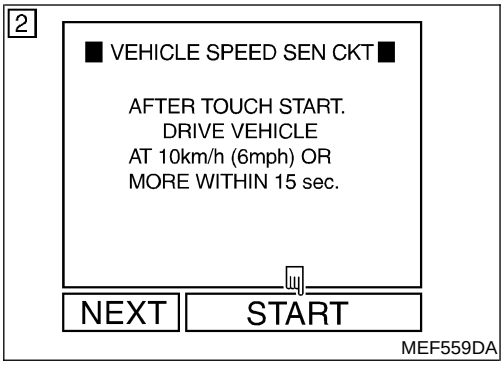
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

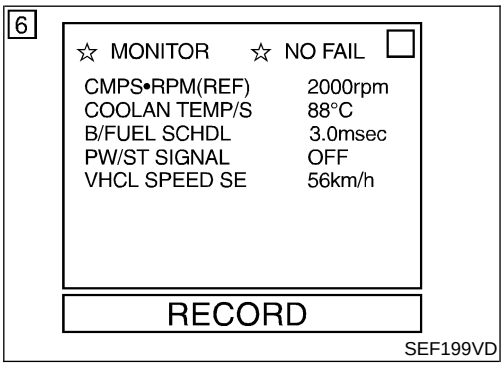
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

DTC Confirmation Procedure (Cont'd)



With CONSULT

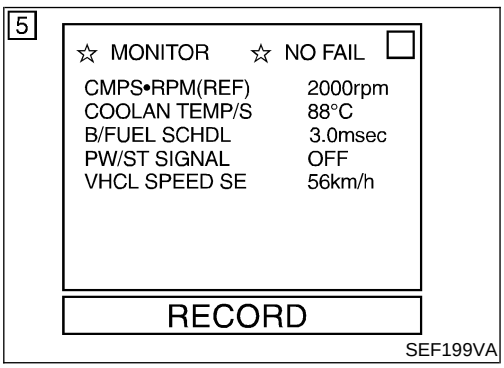
1) Start engine.
2) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.
3) If NG, go to "Diagnostic Procedure", EC-415.
   If OK, go to following step.



4) Select "DATA MONITOR" mode with CONSULT.
5) Warm engine up to normal operating temperature.
6) Maintain the following conditions for at least 10 consecutive seconds.

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T models) 2,000 - 3,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.3 - 4.5 msec (A/T models) 3.2 - 5.5 msec (M/T models)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-415.



With CONSULT

1) Start engine
2) Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to "Diagnostic Procedure", EC-415.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT.
4) Warm engine up to normal operating temperature.
5) Maintain the following conditions for at least 10 consecutive seconds.

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T models) 2,000 - 3,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.3 - 4.5 msec (A/T models) 3.2 - 5.5 msec (M/T models)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-415.

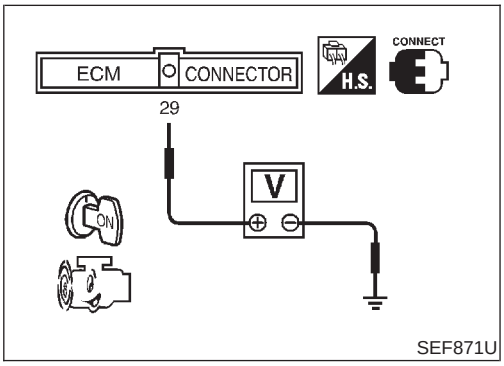
Overall Function Check

NAEC0468

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-415.



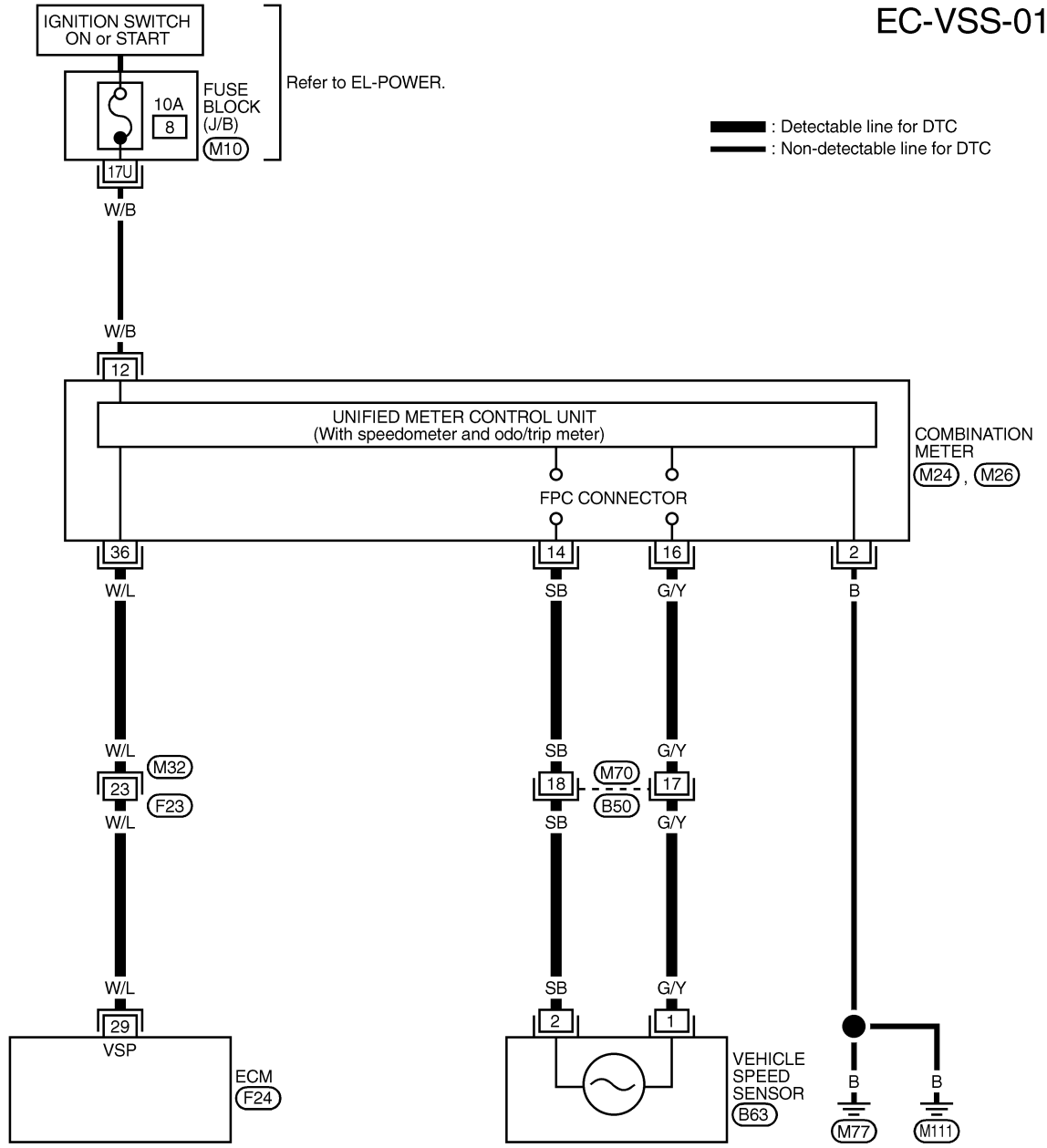
No Tools

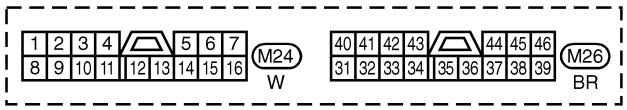
1) Lift up drive wheels.
2) Start engine.
3) Read the voltage signal between ECM terminal 29 (Vehicle speed sensor signal) and ground with oscilloscope.
4) Verify that the oscilloscope screen shows the signal wave as shown at “ECM Terminals and Reference Value” on the previous page.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-415.

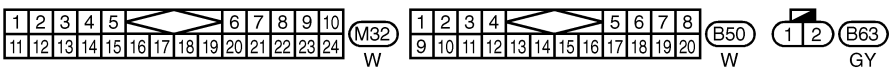
Wiring Diagram

NAEC0243

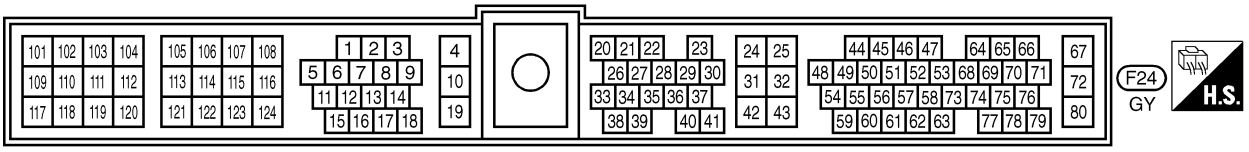
EC-VSS-01







Refer to last page (Foldout page).
M10



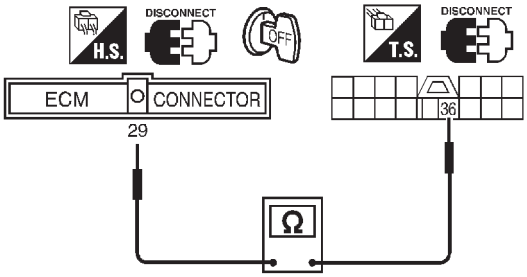
MEC673C

Diagnostic Procedure

NAEC0244

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 29 and meter terminal 36.



SEF712U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Harness for open or short between ECM and combination meter

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

3	CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK SPEEDOMETER CIRCUIT

Check the following.
- Harness connectors M70, B50
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK	▶	Check combination meter and vehicle speed sensor. Refer to EL section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-136.

	▶	**INSPECTION END**

Description

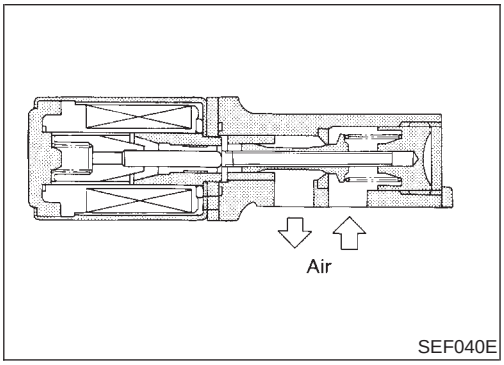
NAEC0245

SYSTEM DESCRIPTION

NAEC0245S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/Neutral position switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometic pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



SEF040E

COMPONENT DESCRIPTION

NAEC0245S02

IACV-AAC Valve

NAEC0245S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT Reference Value in Data Monitor Mode

NAEC0246

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	10 - 20%
		2,000 rpm	—

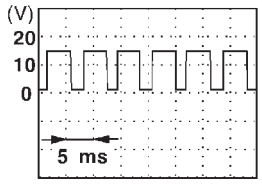
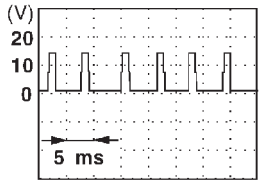
ECM Terminals and Reference Value

NAEC0247

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR	IACV-AAC valve	**[Engine is running]** • **Warm-up condition** • Idle speed	8 - 11V  SEF005V
			[Engine is running] • **Warm-up condition** • Engine speed is 3,000 rpm	2 - 3V  SEF692W

On Board Diagnosis Logic

NAEC0248

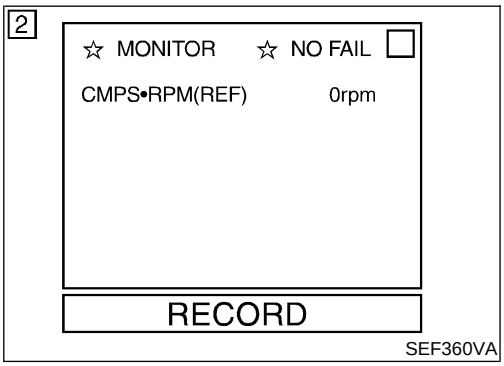
DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0505 0205	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DTC Confirmation Procedure

NAEC0249

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- **Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.**



PROCEDURE FOR MALFUNCTION A

NAEC0249S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

With CONSULT

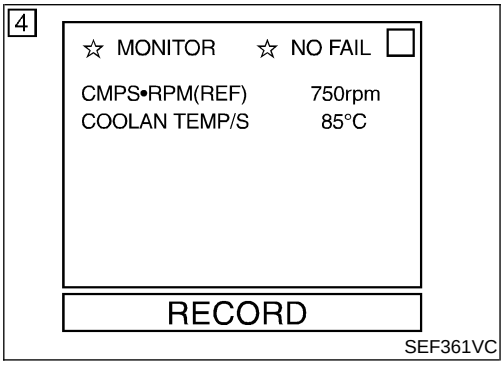
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Wait at least 2 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-421.

With GST

1) Turn ignition switch “ON” and wait at least 2 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-421.

No Tools

1) Turn ignition switch “ON” and wait at least 2 seconds.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-421.



PROCEDURE FOR MALFUNCTION B

NAEC0249S02

TESTING CONDITION:

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

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON” again and select “DATA MONITOR” mode with CONSULT.
4) Start engine and run it for at least 1 minute at idle speed.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Select "MODE 7" with GST.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421.

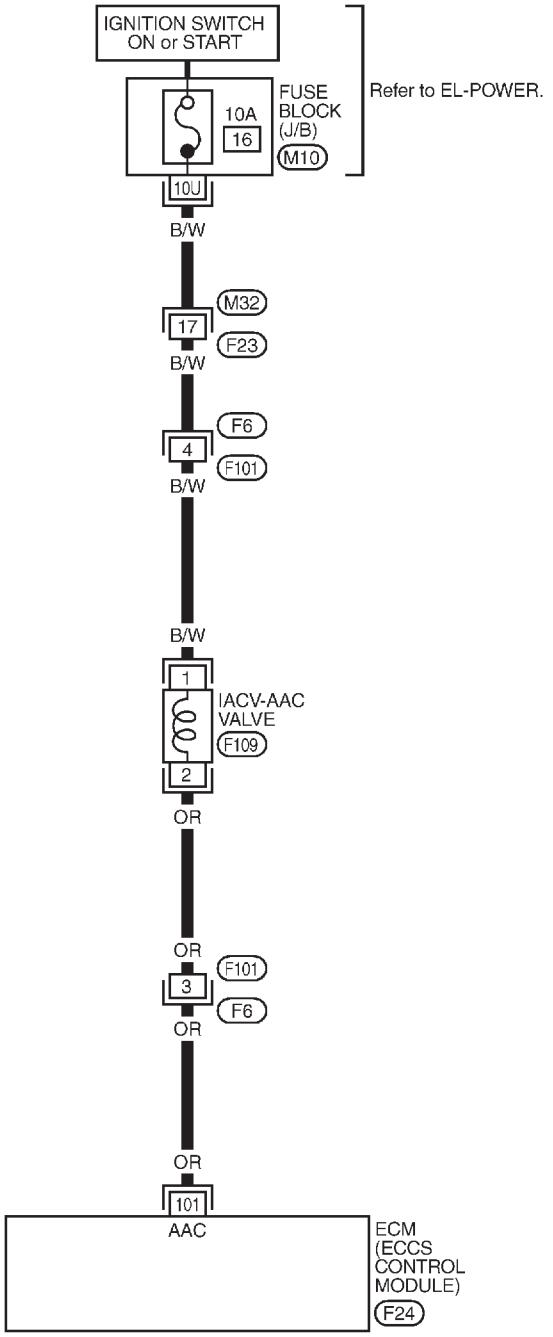
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421.

Wiring Diagram

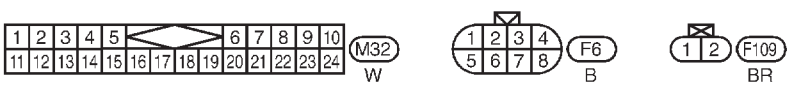
NAEC0250

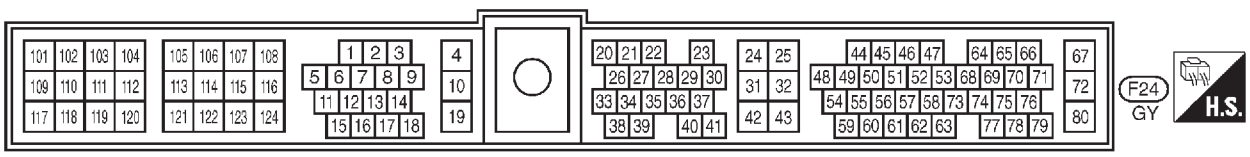
EC-AAC/V-01



: Detectable line for DTC
: Non-detectable line for DTC

Refer to last page (Foldout page).
M10





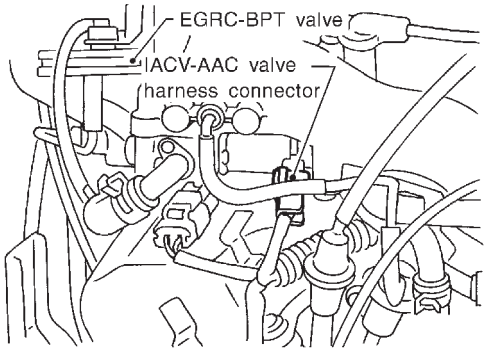
MEC069C

Diagnostic Procedure

NAEC0251

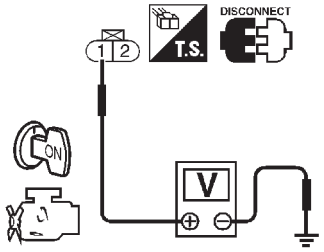
1	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF007S

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF713U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

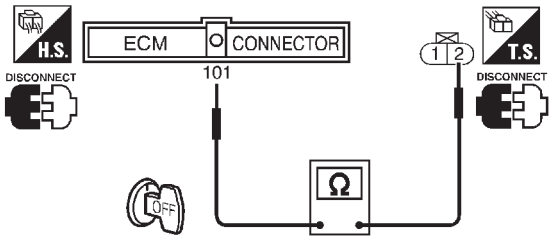
Check the following.
- Harness connectors F101, F6
- Harness connectors F23, M32
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and terminal 2.



SEF714U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, F101
- Harness for open or short between IACV-AAC valve and ECM

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

5	CHECK IACV-AAC VALVE

Refer to "Component Inspection", EC-422.

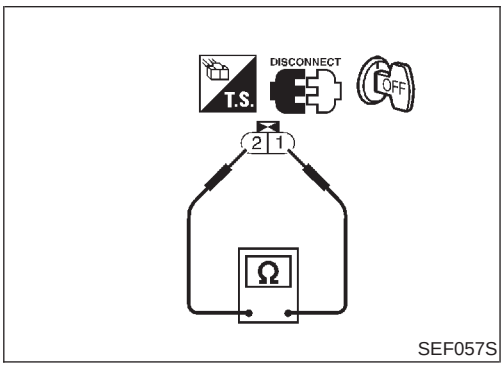
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace IACV-AAC valve.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF057S

Component Inspection

NAEC0252

IACV-AAC VALVE

NAEC0252S01

1. Disconnect IACV-AAC valve harness connector.
2. Remove IACV-AAC valve.
- Check IACV-AAC valve resistance.

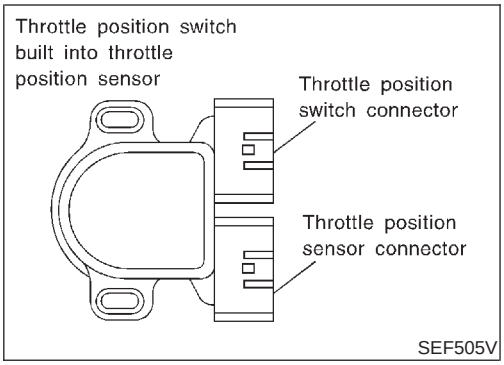
Resistance:

Approximately 10Ω [at 20°C (68°F)]

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

3. Supply battery voltage between IACV-AAC valve connector

terminals.
Plunger should move.



Component Description

NAEC0253

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT Reference Value in Data Monitor Mode

NAEC0523

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	• Engine: After warming up. • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

ECM Terminals and Reference Value

NAEC0255

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

CAUTION:

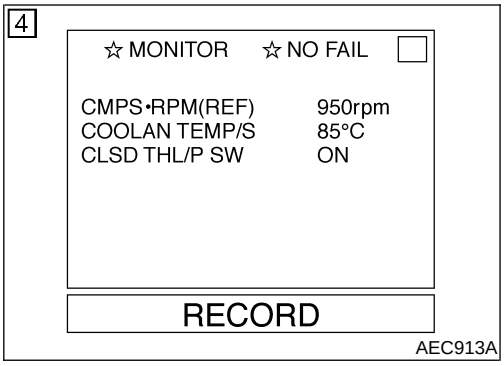
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

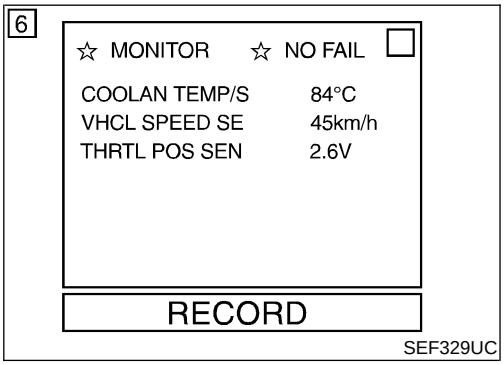
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	OR/W	Throttle position switch (Closed position)	**[Ignition switch "ON"]** • **Warm-up condition** • More than −40.0 kPa (−300 mmHg, −11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. • Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] • Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NAEC0256

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510 0203	• Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch • Throttle position sensor





DTC Confirmation Procedure

NAEC0257

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF", wait at least 5 seconds and then start engine.
3) Select "CLSD THL/P SW" in "DATA MONITOR" mode.
4) Check the signal under the following conditions.

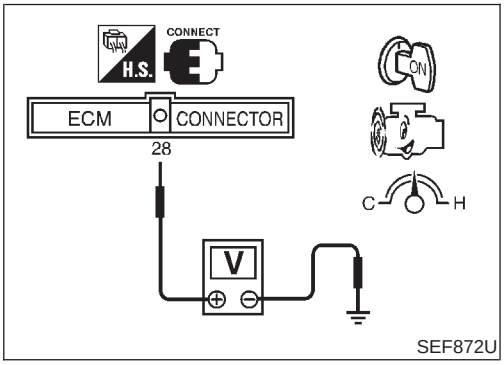
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to "Diagnostic Procedure", EC-427.
If OK, go to following step.

5) Select "DATA MONITOR" mode with CONSULT.
6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-427.



Overall Function Check

NAEC0469

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

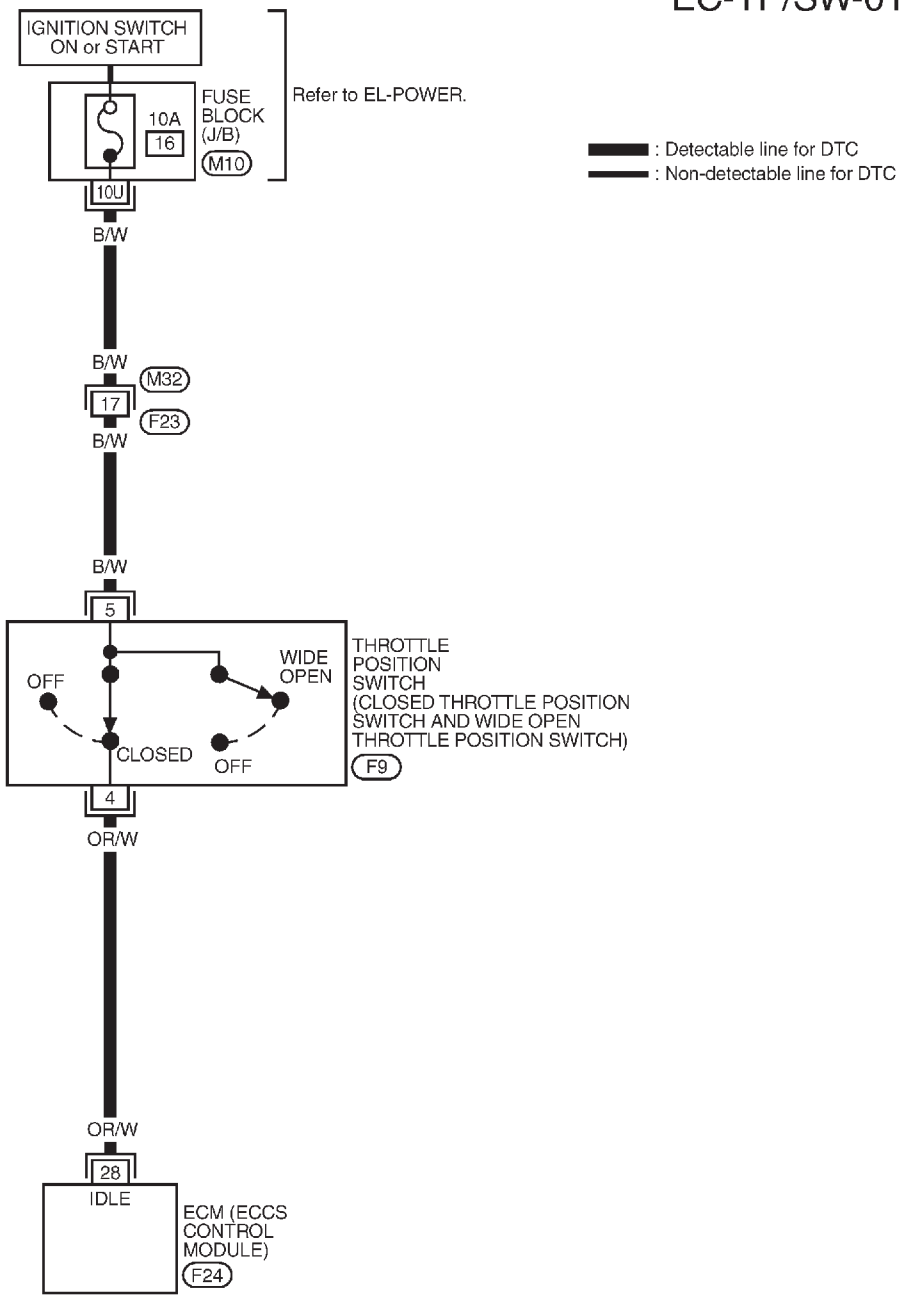
At 2,000 rpm: Approximately 0V

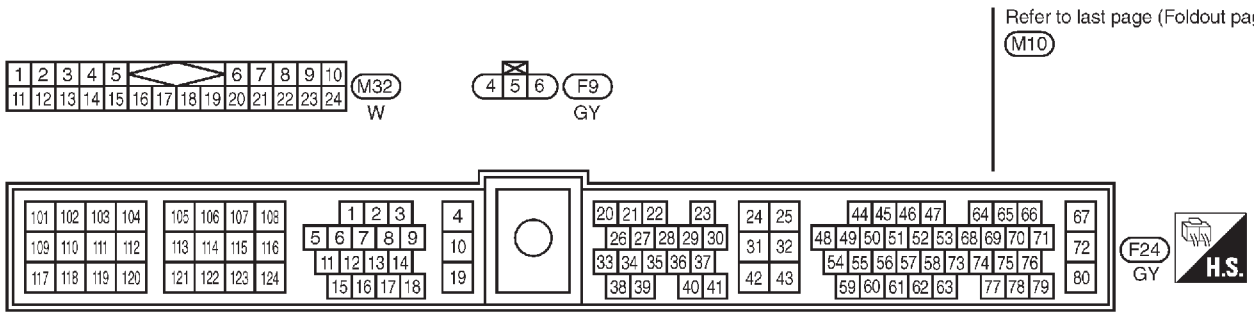
3) If NG, go to "Diagnostic Procedure", EC-427.

Wiring Diagram

NAEC0258

EC-TP/SW-01





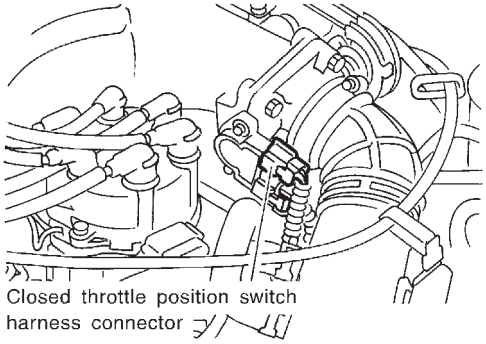
MEC070C

Diagnostic Procedure

NAEC0259

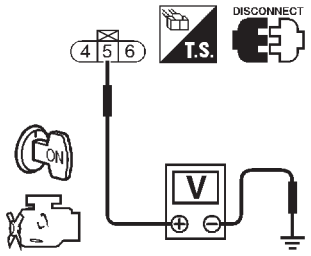
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



SEF753U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 5 and engine ground with CONSULT or tester.



SEF715U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

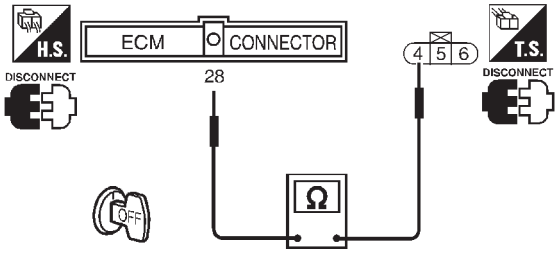
Check the following.
- Harness connectors M32, F23
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and terminal 4.



SEF716U

Continuity should exist.

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

OK or NG

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

4	ADJUST THROTTLE POSITION SWITCH
Perform BASIC INSPECTION, EC-99.	
▶	GO TO 5.

5	CHECK CLOSED THROTTLE POSITION SWITCH

Refer to "Component Inspection", EC-429.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace throttle position switch.

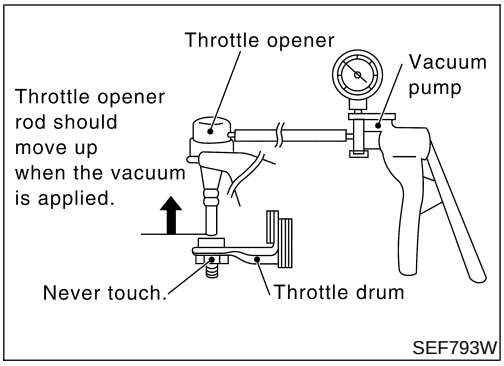
6	CHECK THROTTLE POSITION SENSOR

Refer to "Component Inspection", EC-192.

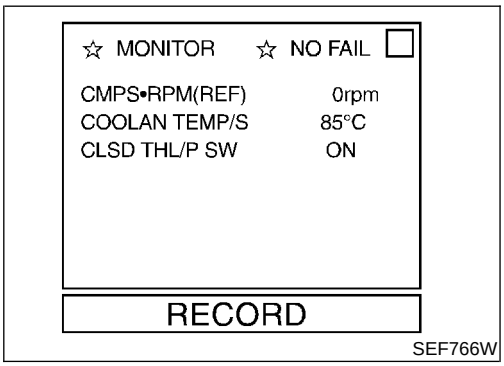
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position sensor.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF793W



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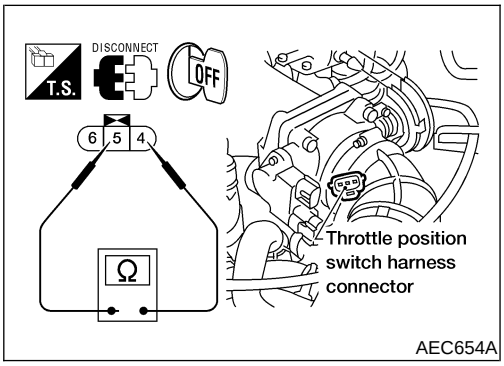
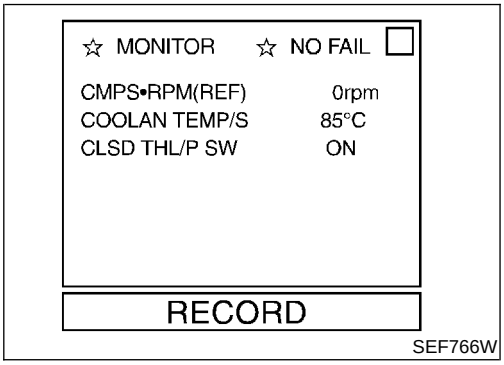
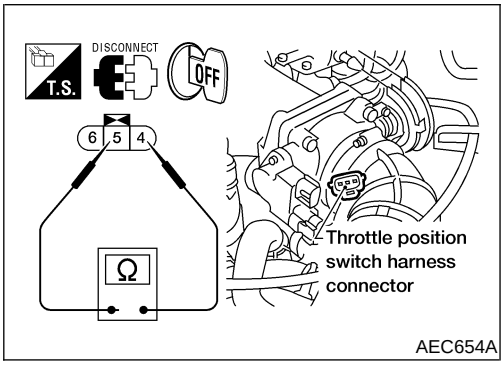


AEC654A



SEF766W



AEC654A

Component Inspection

NAEC0260

CLOSED THROTTLE POSITION SWITCH

NAEC0260S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF”.
3) Remove vacuum hose connected to throttle opener.
4) Connect suitable vacuum hose to vacuum pump and the throttle opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Turn ignition switch “ON”.
7) Select “DATA MONITOR” mode with CONSULT.
8) Check indication of “CLSD THL/P SW”.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

   If NG, adjust closed throttle position switch. Refer to “Basic Inspection”, EC-99.
9) If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace closed throttle position switch.

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF”.
3) Remove vacuum hose connected to throttle opener.
4) Connect suitable vacuum hose to vacuum pump and the throttle opener.
5) Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6) Disconnect closed throttle position switch harness connector.

Component Inspection (Cont'd)

7) Check continuity between closed throttle position switch terminals 4 and 5.
Resistance measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-99.

8) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

System Description

NAEC0261

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.
Voltage signals are exchanged between ECM and TCM (Transmission control module).

ECM Terminals and Reference Value

NAEC0262

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

CAUTION:

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

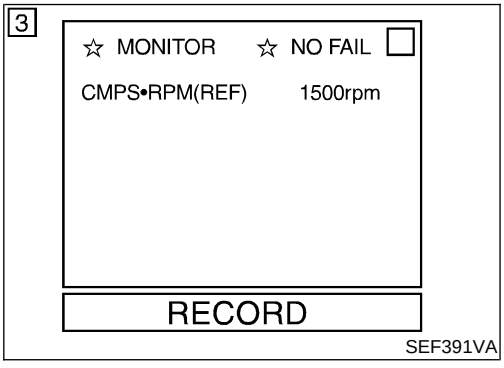
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
35	P	A/T signal No. 3	**[Ignition switch "ON"]**	0V

On Board Diagnosis Logic

NAEC0263

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	● ECM receives incorrect voltage from TCM (Transmission control module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



DTC Confirmation Procedure

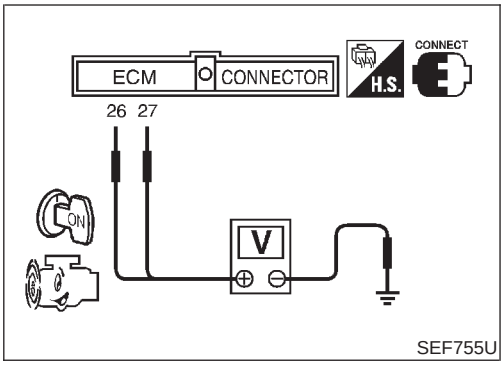
NAEC0264

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-434.



Overall Function Check

NAEC0265

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

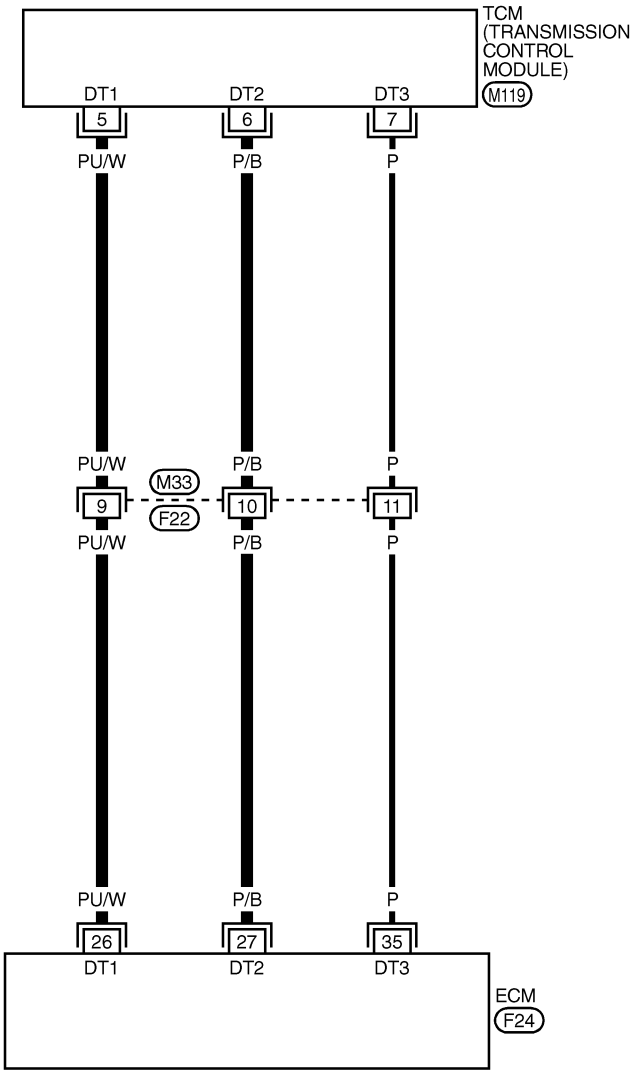
Without CONSULT

1) Start engine.
2) Check voltage between
   ECM terminal 26 and ground.
   ECM terminal 27 and ground.
   Voltage: 6 - 8V
3) If NG, go to “Diagnostic Procedure”, EC-434.

Wiring Diagram

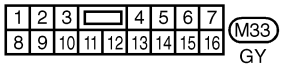
NAEC0266

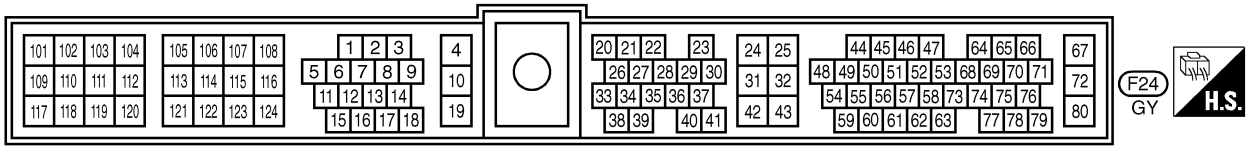
EC-AT/C-01



Refer to last page (Foldout page).

M119





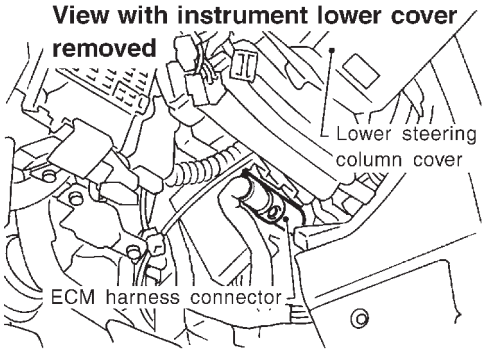
MEC674C

Diagnostic Procedure

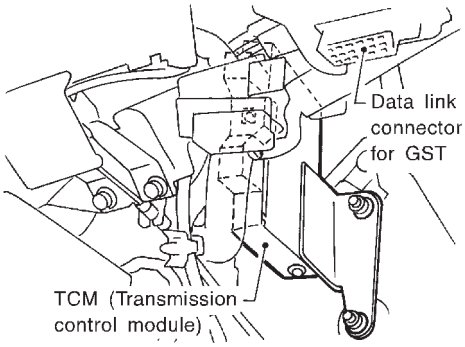
NAEC0267

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

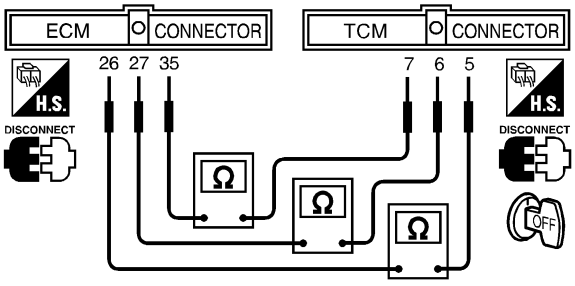


SEF981R



SEF008SB

3. Check harness continuity between ECM terminal 26 and terminal 5, ECM terminal 27 and terminal 6, ECM terminal 35 and terminal 7.



SEF853W

Continuity should exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

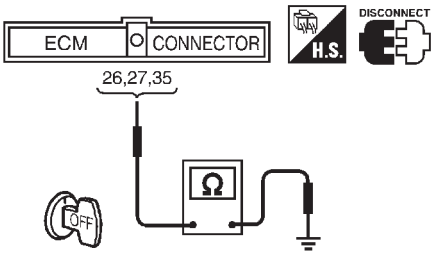
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness for open or short between ECM and TCM (Transmission control module)

	▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.



SEF718U

Continuity should not exist.

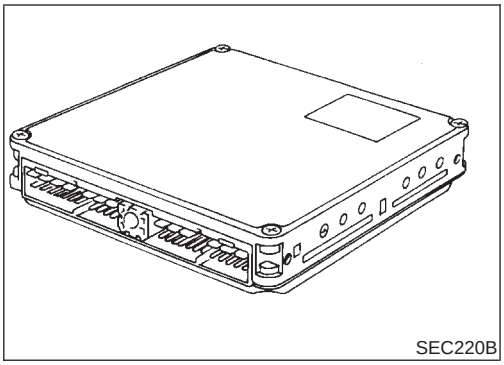
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission control module).	
▶	Repair open circuit or short to ground or short to power in harness.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	INSPECTION END


SEC220B

Component Description

NAEC0268

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NAEC0269

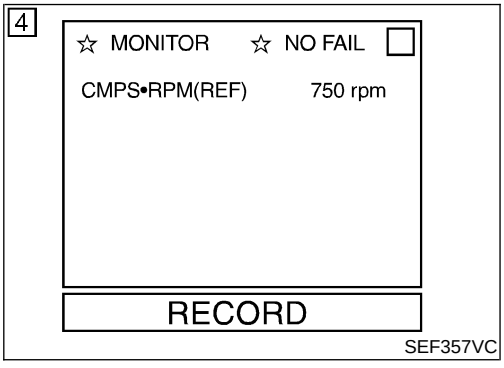
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605 0301	• ECM calculation function is malfunctioning.	• ECM

DTC Confirmation Procedure

NAEC0270

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



SEF357VC

With CONSULT

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Start engine.
4) Run engine for at least 2 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-437.

With GST

1) Turn ignition switch “ON”.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.
4) Select “Mode 7” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-437.

No Tools

1) Turn ignition switch “ON”.
2) Start engine and wait at least 2 seconds.
3) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
4) Perform “Diagnostic Test Mode II” (Self-diagnostic results) with ECM.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-437.

Diagnostic Procedure

NAEC0271

1	INSPECTION START	
With CONSULT 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-436. 5. Is the 1st trip DTC P0605 displayed again?		
With GST 1. Turn ignition switch "ON". 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-436. 5. Is the 1st trip DTC P0605 displayed again?		
No Tools 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-68. 3. **Perform "DTC Confirmation Procedure".** See EC-436. 4. Is the 1st trip DTC 0301 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

Description

NAEC0279

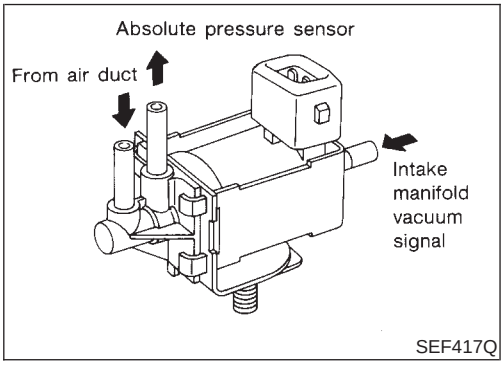
SYSTEM DESCRIPTION

NAEC0279S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	On board diagnosis	MAP/BARO switch solenoid valve
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

This system allows the absolute pressure sensor to monitor either ambient barometric pressure or intake manifold pressure. The MAP/BARO switch solenoid valve switches between two passages by ON-OFF pulse signals from the ECM. (One passage is from the intake air duct, the other is from the intake manifold.) Either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

Solenoid	Conditions
ON	● For 5 seconds after turning ignition switch ON (Engine is not running.) or ● For 5 seconds after starting engine or ● More than 5 minutes after the solenoid valve shuts OFF.



COMPONENT DESCRIPTION

NAEC0279S02

The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns “ON”. Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns “OFF”. Then, the sensor monitors intake manifold pressure.

CONSULT Reference Value in Data Monitor Mode

NAEC0280

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAP/BARO SW/V	● Ignition switch: ON (Engine stopped)		MAP
	● Engine speed: Idle	For 5 seconds after starting engine	BARO
		More than 5 seconds after starting engine	MAP

ECM Terminals and Reference Value

NAEC0281

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
118	G/OR	MAP/BARO switch solenoid valve	**[Ignition switch "ON"]** ● Engine is not running ● For 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (for 5 seconds after engine start)	0 - 1V
			[Ignition switch "ON"] ● Engine is not running ● More than 5 seconds after ignition switch is turned "ON" **[Engine is running]** ● Idle (More than 5 seconds after engine start)	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0282

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P1105 1302	A)	MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● MAP/BARO switch solenoid valve
	B)	There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● Hoses (Hoses are clogged, vent, kinked, disconnected or connected improperly.) ● Absolute pressure sensor ● MAP/BARO switch solenoid valve

DTC Confirmation Procedure

NAEC0283

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

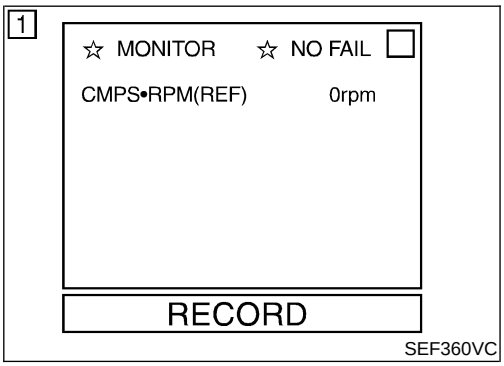
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NAEC0283S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".



With CONSULT

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Wait at least 10 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-443.

With GST

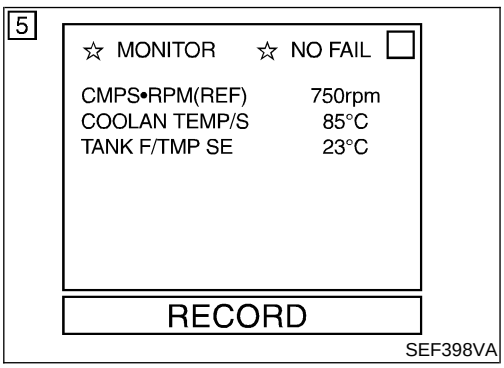
1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-443.

No Tools

1) Turn ignition switch "ON" and wait at least 10 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-443.

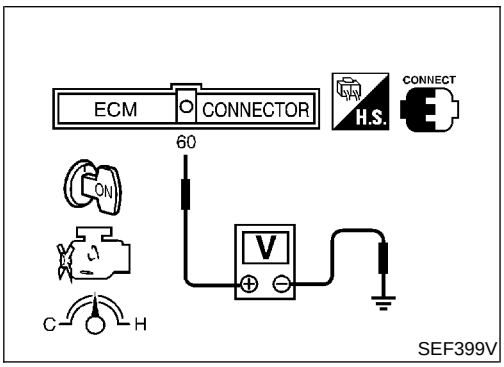
PROCEDURE FOR MALFUNCTION B

NAEC0283S02



With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
4) Make sure that "TANK F/TMP SE" is more than 0°C (32°F).
5) Start engine and let it idle for at least 10 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-445.



With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check that voltage between ECM terminal 60 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-445.

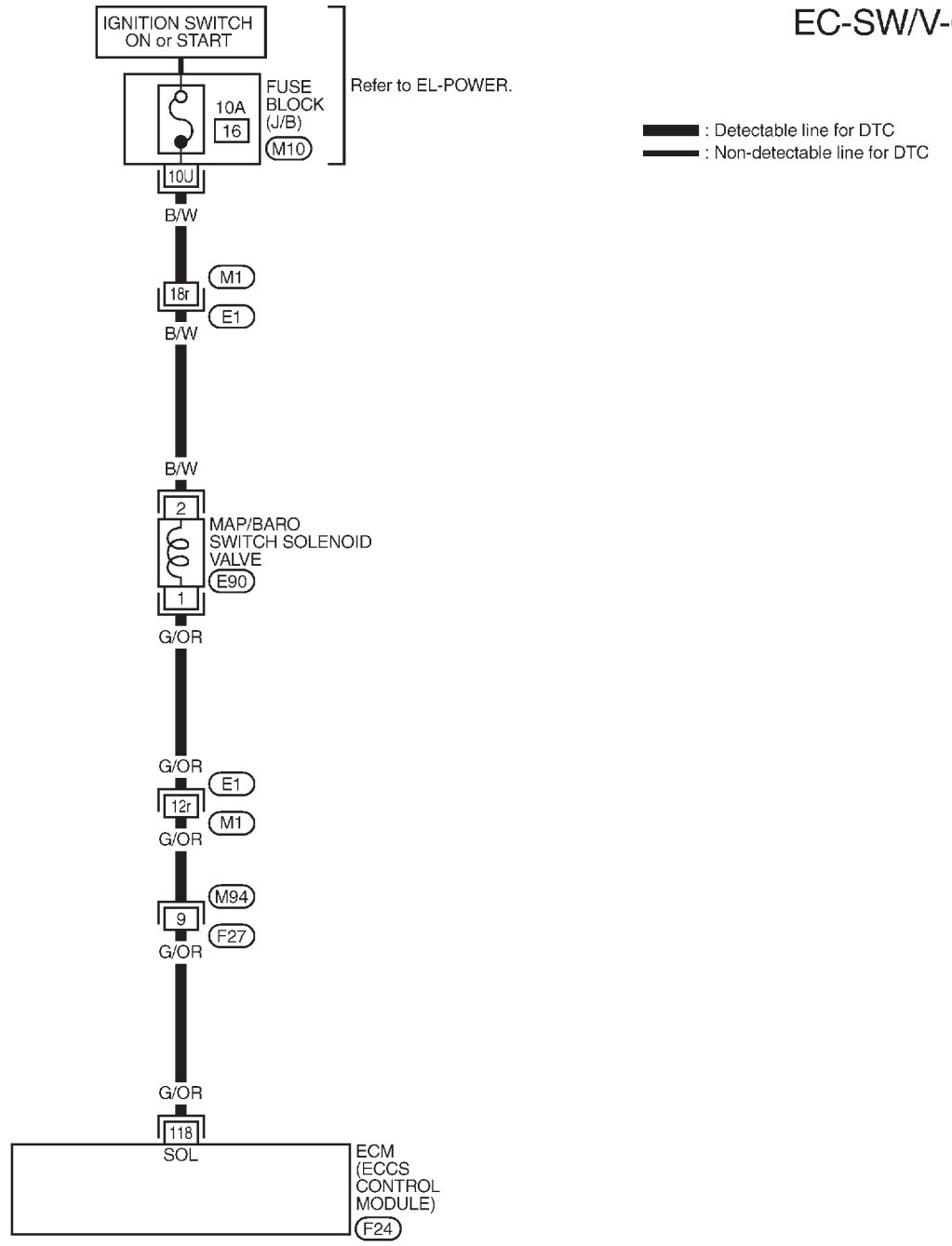
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check that voltage between ECM terminal 60 (Tank fuel temperature sensor signal) and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-445.

Wiring Diagram

NAEC0284

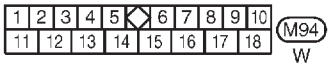
EC-SW/V-01

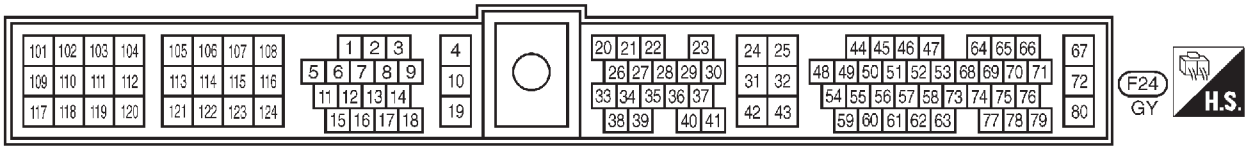


Refer to last page (Foldout page).

(E1), (M1)

(M10)





MEC074C

Diagnostic Procedure

NAEC0285

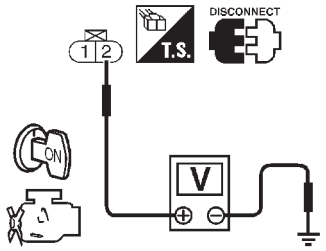
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" on next page.

PROCEDURE A

NAEC0285S01

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF719U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

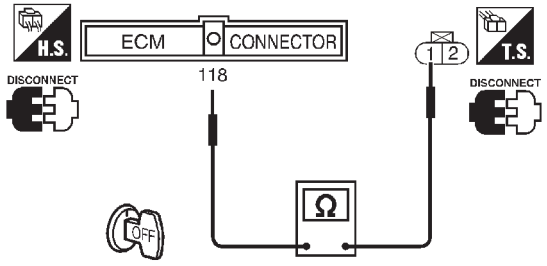
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M1, E1
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 118 and terminal 1 with CONSULT or tester.



SEF720U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M94, F27 ● Harness for open or short between MAP/BARO switch solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK MAP/BARO SWITCH SOLENOID VALVE
Refer to "Component Inspection", EC-450.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace MAP/BARO switch solenoid valve.

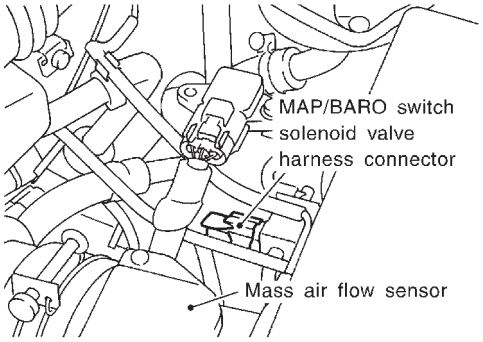
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**

PROCEDURE B

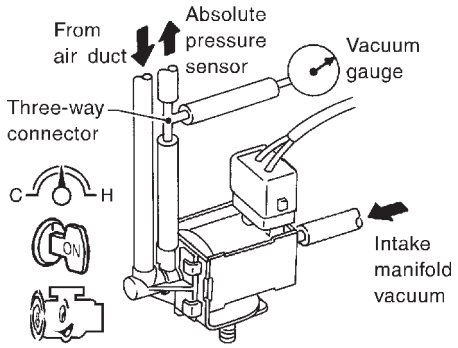
=NAEC0285S02

1	INSPECTION START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Attach the vacuum gauge between MAP/BARO switch solenoid valve and rubber tube connected to absolute pressure sensor.



SEF756U



SEF676T

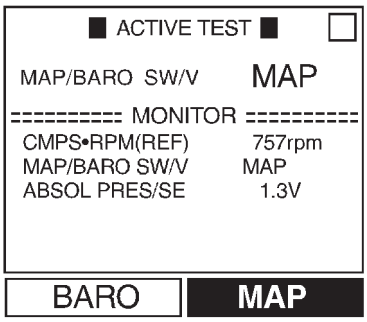
Models with CONSULT	▶	GO TO 2.
Models without CONSULT	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

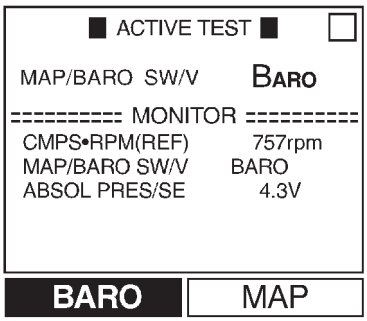
2	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

With CONSULT

1. Start engine and let it idle.
2. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "MAP" and "BARO" alternately and check for vacuum.



SEF396V



SEF397V

MAP/BARO SW/V	Vacuum
BARO	Should not exist
MAP	Should exist

MTBL0079

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

3	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

Without CONSULT

1. Start engine and let it idle.
2. Check for vacuum under the following condition.

Condition	Vacuum
For 5 seconds after starting engine	Should not exist
More than 5 seconds after starting engine	Should exist

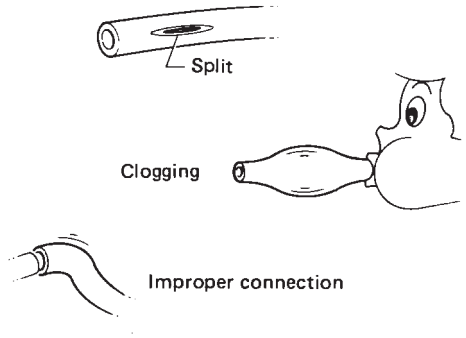
MTBL0080

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

4	CHECK VACUUM HOSE

1. Turn ignition switch "OFF".
2. Check hose for clogging, cracks, disconnection or improper connection.



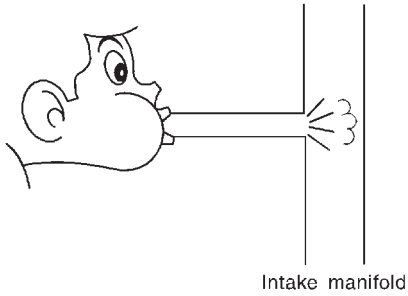
SEF109L

OK or NG

OK	▶	GO TO 5.
NG	▶	Clean, repair or reconnect the hose.

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

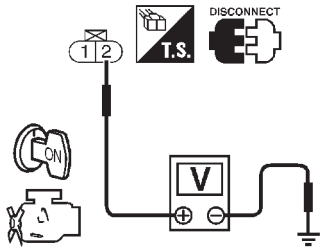
OK or NG

OK	▶	GO TO 6.
NG	▶	Clean or repair the vacuum port.

Diagnostic Procedure (Cont'd)

6	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF719U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

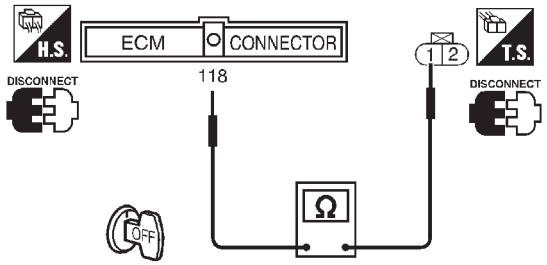
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M1, E1
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

8	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 118 and terminal 1 with CONSULT or tester.



SEF720U

Continuity should exist.

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

OK or NG

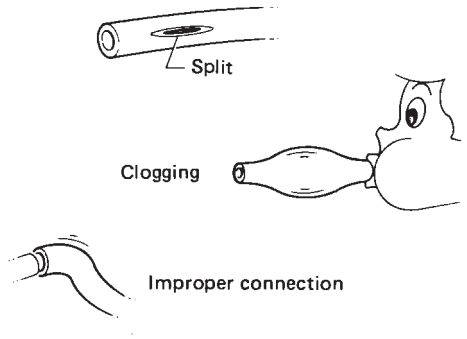
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M94, F27 ● Harness for open or short between MAP/BARO switch solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK MAP/BARO SWITCH SOLENOID VALVE
Refer to "Component Inspection", EC-450.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace MAP/BARO switch solenoid valve.

11	CHECK INTAKE SYSTEM
Check intake system for air leaks.	
OK or NG	
OK ▶	GO TO 15.
NG ▶	Repair it.

12	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE
Check hose for clogging, cracks, disconnection or improper connection.	



SEF109L

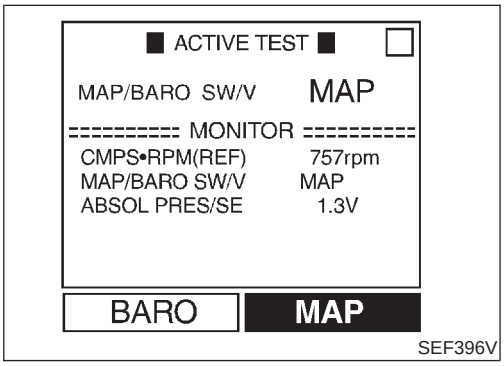
OK or NG	
OK ▶	GO TO 13.
NG ▶	Repair or reconnect hose.

13	CHECK HARNESS CONNECTOR
1. Disconnect absolute pressure sensor harness connector. 2. Check sensor harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 14.
NG ▶	Repair or replace harness connector.

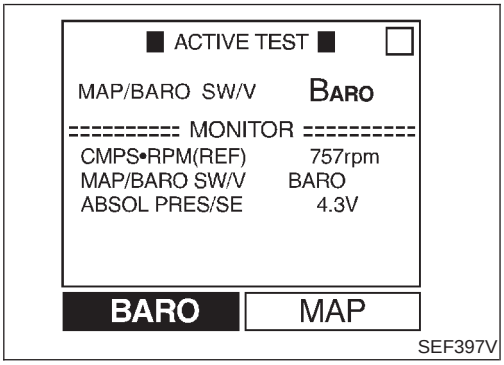
Diagnostic Procedure (Cont'd)

14	CHECK ABSOLUTE PRESSURE SENSOR	
Refer to "Component Inspection", EC-166.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Replace absolute pressure sensor.

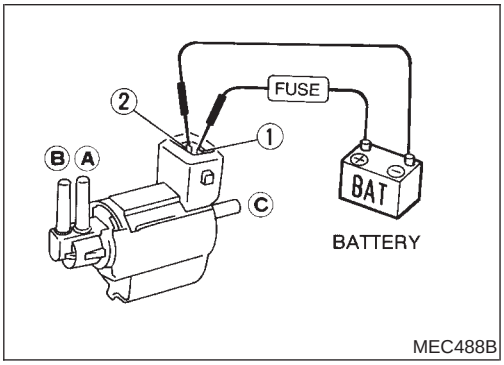
15	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**



SEF396V



SEF397V



MEC488B

Component Inspection

NAEC0286

MAP/BARO SWITCH SOLENOID VALVE

NAEC0286S01

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT.
3) Check the following.

- Condition: At idle under no-load
- CONSULT display

MAP/BARO	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

- Time for voltage to change

MAP/BARO SW/V	Time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

4) If NG, check solenoid valve as shown below.

Without CONSULT

1) Remove MAP/BARO switch solenoid valve.
2) Check air passage continuity.

Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

3) If NG or operation takes more than 1 second, replace solenoid valve.

On Board Diagnosis Logic

NAEC0470

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148 0307 (Right bank)	• The closed loop control function for right bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor circuit is open or shorted. • Front heated oxygen sensor • Front heated oxygen sensor heater
P1168 0308 (Left bank)	• The closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor circuit is open or shorted. • Front heated oxygen sensor • Front heated oxygen sensor heater

DTC Confirmation Procedure

NAEC0471

CAUTION:

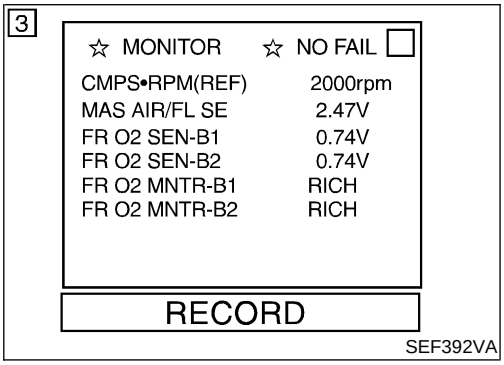
Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,200 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**



With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Select “DATA MONITOR” mode with CONSULT.
3) Hold engine speed at 2,000 rpm and check one of the following.

- “FR O2 SENSOR” voltage should go above 0.70V at least once.
- “FR O2 SENSOR” voltage should go below 0.21V at least once.

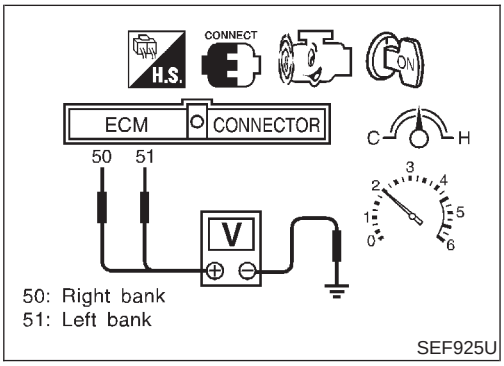
If the check result is NG, perform “Diagnosis Procedure”, EC-453.

If the check result is OK, perform the following step.

4) Let engine idle at least 3 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	1.7 ms or more (A/T models) 2.0 ms or more (M/T models)
CMPS·RPM (POS)	1,600 - 3,000 rpm (A/T models) 1,900 - 3,000 rpm (M/T models)
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

6) If DTC is detected, go to "Diagnostic Procedure", EC-453.



Overall Function Check

NAEC0472

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (front heated oxygen sensor right bank signal) or 51 (front heated oxygen sensor left bank signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no-load.

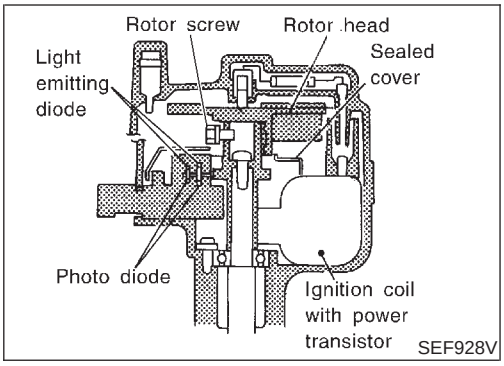
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to "Diagnostic Procedure", EC-453.

Diagnostic Procedure

NAEC0473

Perform trouble diagnosis for "DTC P0133, P0153", EC-224.



Component Description

NAEC0287

IGNITION COIL & POWER TRANSISTOR

NAEC0287S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

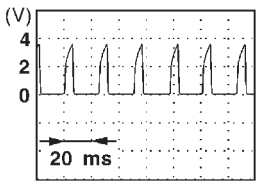
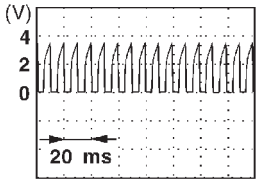
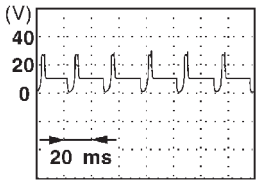
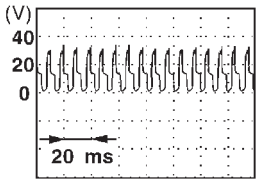
ECM Terminals and Reference Value

NAEC0289

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

CAUTION:

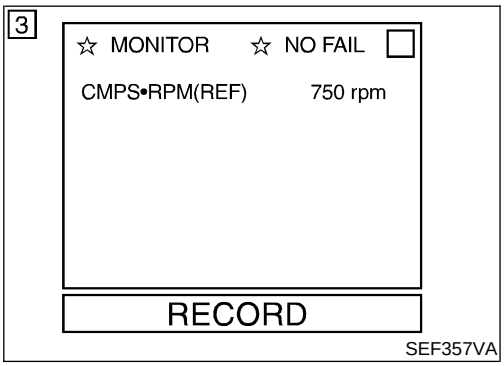
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	**[Engine is running]** ● Idle speed	0.7V  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V  SEF989U
2	W/G	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 12V  SEF990U
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 11V  SEF991U

On Board Diagnosis Logic

NAEC0290

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit. • Resistor • Camshaft position sensor • Camshaft position sensor circuit



DTC Confirmation Procedure

NAEC0291

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- **If DTC P1320 (0201) is displayed with P0340 (0101), perform trouble diagnosis for DTC P0340 first. Refer to EC-339.**

With CONSULT

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-457.

With GST

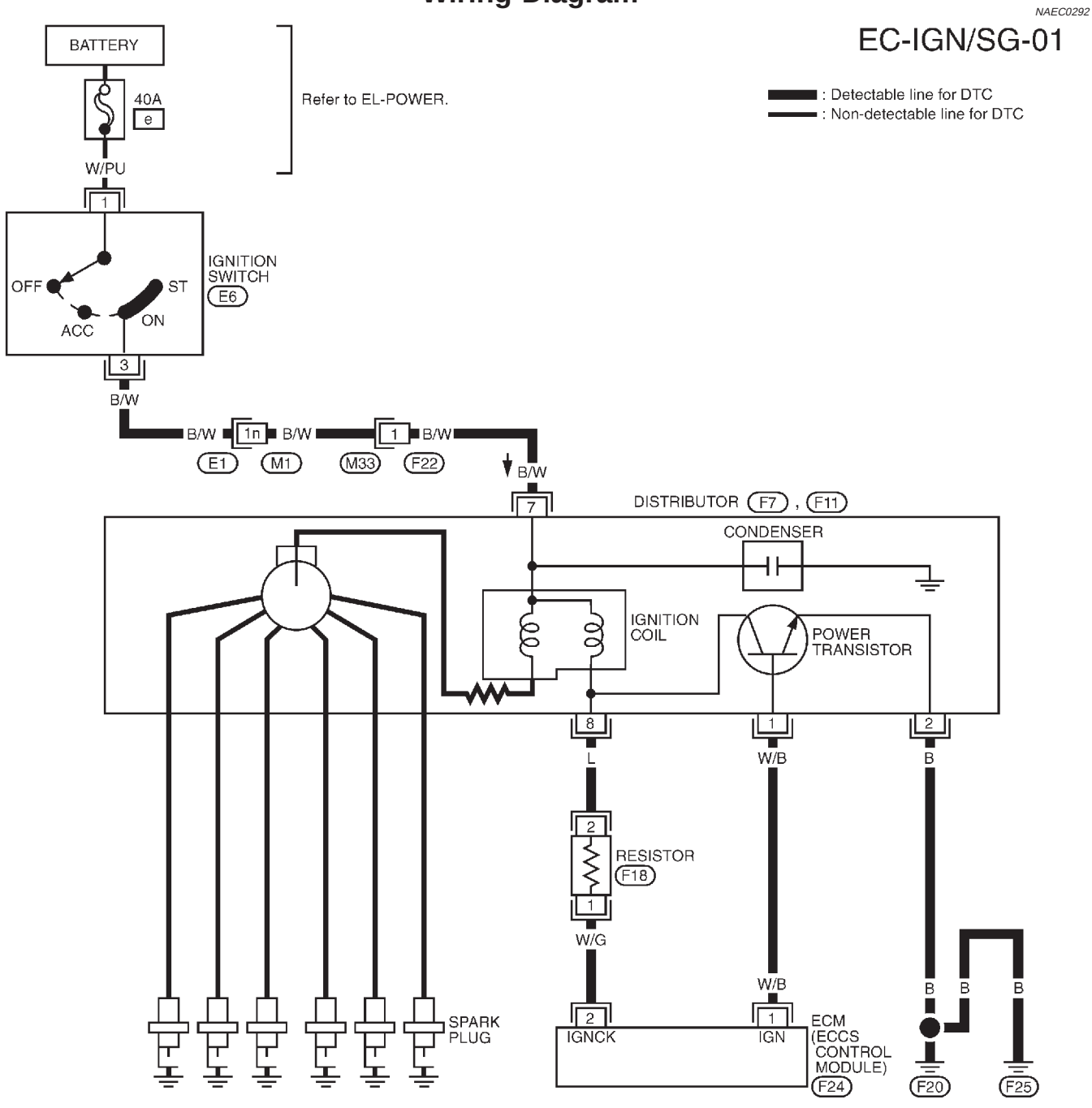
1) Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
2) Select MODE 7 with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-457.

No Tools

1) Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
2) Turn ignition switch “OFF” and wait at least 5 seconds, then turn “ON”.
3) Perform “Diagnostic Test Mode II” (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-457.

Wiring Diagram

NAEC0292



MEC075C

Diagnostic Procedure

NAEC0293

1	CHECK ENGINE START

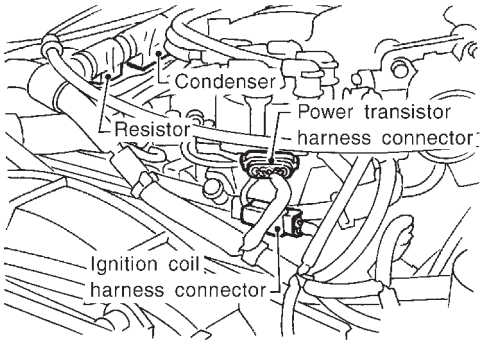
Turn ignition switch “OFF”, and restart engine.
Is engine running?

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 2.

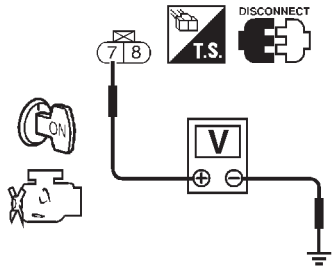
2	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect ignition coil harness connector.



SEF012S

3. Turn ignition switch “ON”.
4. Check voltage between terminal 7 and ground with CONSULT or tester.



SEF721U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

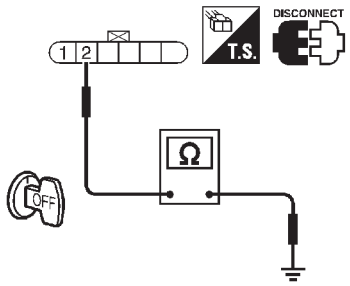
Check the following.
- Harness connectors F22, M33
- Harness connectors M1, E1
- Harness for open or short between ignition coil and ignition switch

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect power transistor harness connector.
3. Check harness continuity between terminal 2 and engine ground.



SEF722U

Continuity should exist.

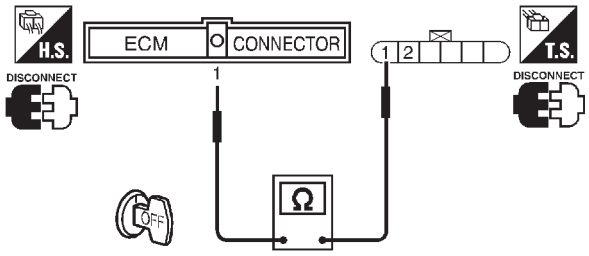
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 1 and power transistor terminal 1.



SEF723U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IGNITION COIL AND POWER TRANSISTOR

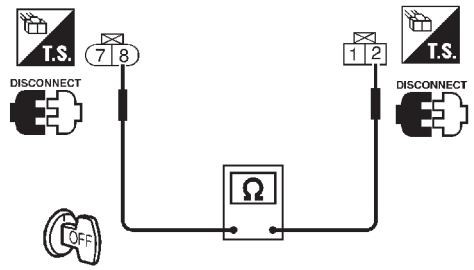
Refer to "Component Inspection", EC-460.

OK or NG

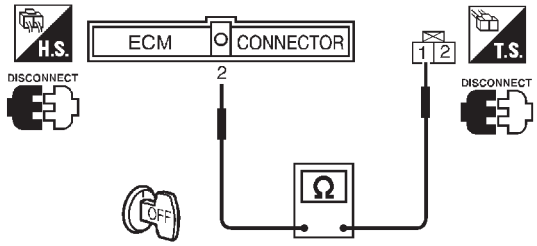
OK	▶	GO TO 9.
NG	▶	Replace malfunctioning component(s).

7	CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor and condenser.
4. Disconnect resistor harness connector.
5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 8 and resistor terminal 2, resistor terminal 1 and ECM terminal 2.



SEF724U



SEF725U

Continuity should exist.

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

OK or NG

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

8	CHECK RESISTOR

Refer to "Component Inspection", EC-460.

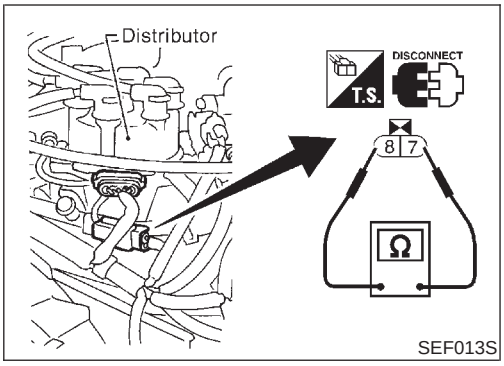
OK or NG

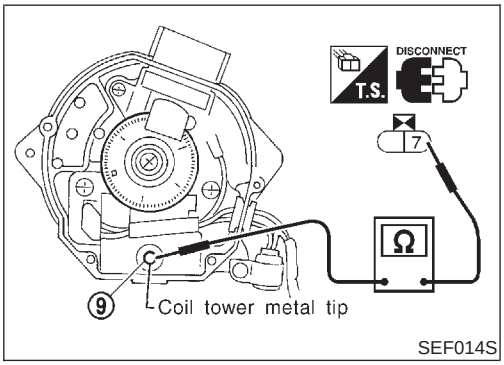
OK	▶	GO TO 9.
NG	▶	Replace resistor.

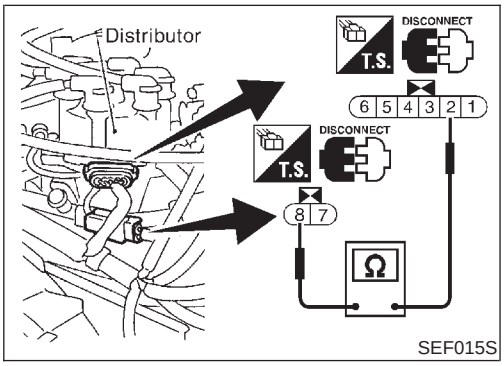
9	CHECK INTERMITTENT INCIDENT

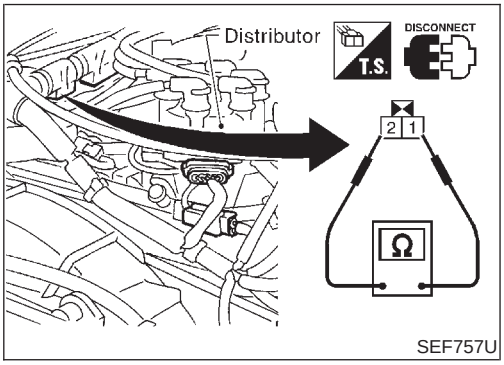
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**









Component Inspection

NAEC0294

IGNITION COIL

NAEC0294S01

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

Terminal	Resistance [at 25°C (77°F)]
7 - 8 (Primary coil)	0.5 - 1.0 Ω
7 - 9 (Secondary coil)	Approximately 12 kΩ

For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.
If NG, replace distributor assembly as a unit.

POWER TRANSISTOR

NAEC0294S02

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0 Ω	NG

If NG, replace distributor assembly.

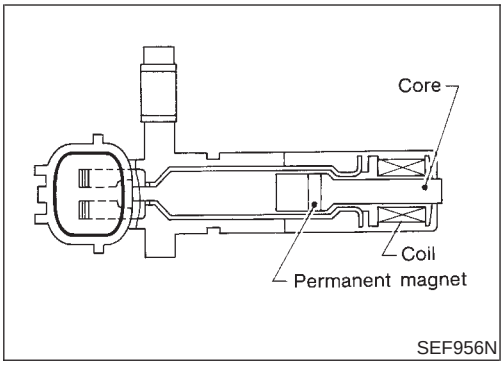
RESISTOR

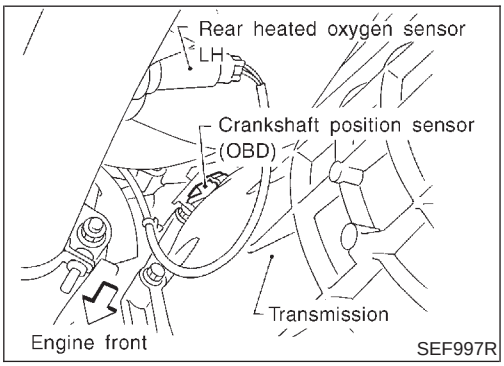
NAEC0294S03

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

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]

If NG, replace resistor.





Component Description

NAEC0295

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis.

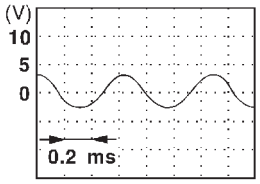
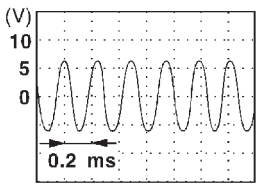
ECM Terminals and Reference Value

NAEC0296

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	2 - 4V (AC range)  SEF691W

On Board Diagnosis Logic

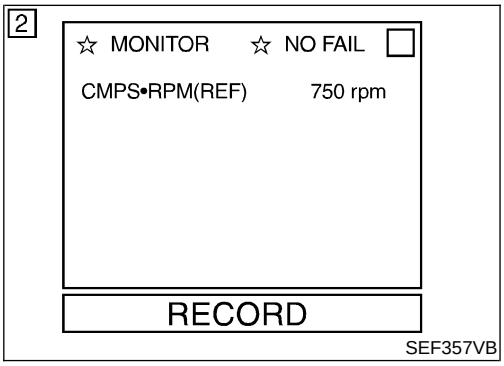
NAEC0297

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336 0905	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • Drive plate/Flywheel

DTC Confirmation Procedure

NAEC0298

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



With CONSULT

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT.
2) Start engine and run it for at least 2 minutes at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-464.

With GST

1) Start engine and run it for at least 2 minutes at idle speed.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-464.

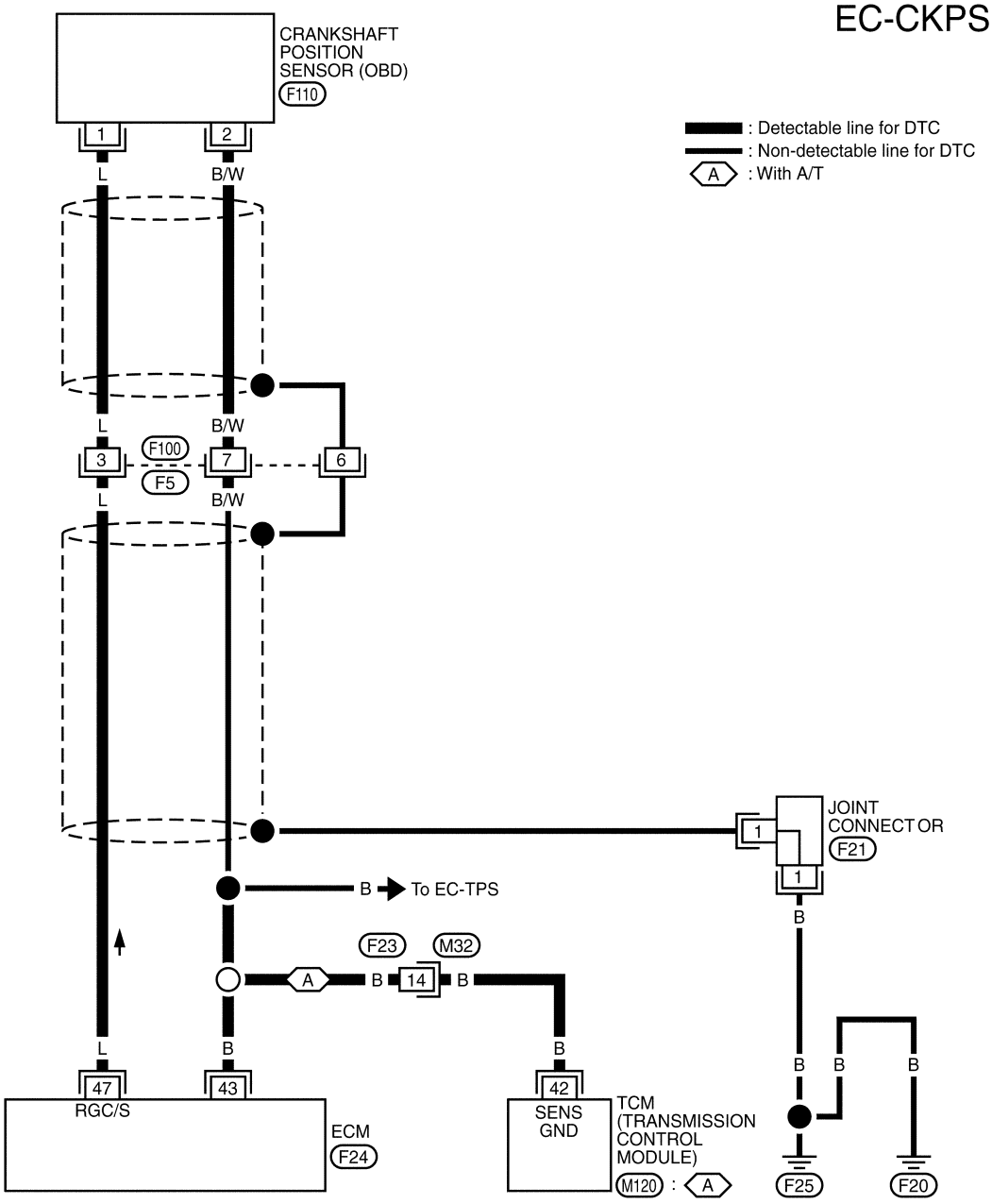
No Tools

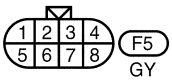
1) Start engine and run it for at least 2 minutes at idle speed.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II” (Self-diagnostic results) with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-464.

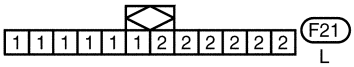
Wiring Diagram

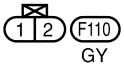
NAEC0299

EC-CKPS-01

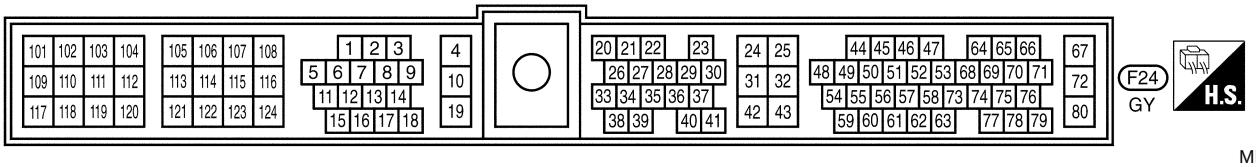








Refer to last page (Foldout page).
M120



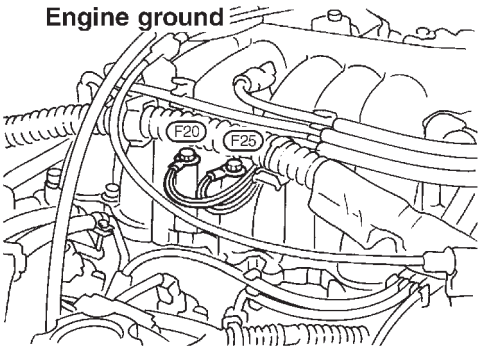
MEC667C

Diagnostic Procedure

NAEC0300

1	RETIGHTEN GROUND SCERWS

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

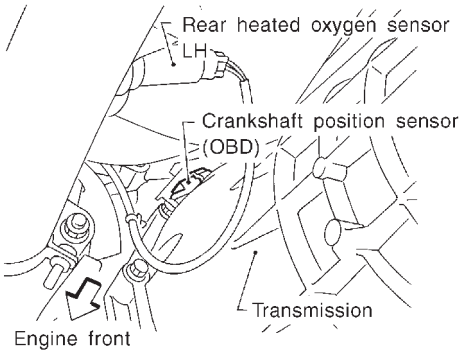


SEF031S

▶ GO TO 2.

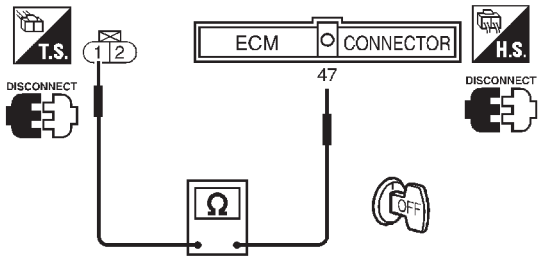
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF997R

2. Check continuity between ECM terminal 47 and terminal 1.



SEF706U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

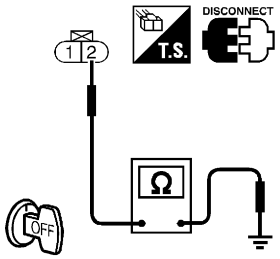
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F100, F5
- Harness for open or short between ECM and crankshaft position sensor (OBD)

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

4	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connectors.
2. Check harness continuity between terminal 2 and engine ground.



SEF707U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F100, F5
- Harness connectors F23, M32
- Harness for open or short between crankshaft position sensor (OBD) and ECM
- Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission control module)

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

6	CHECK IMPROPER INSTALLATION

1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).
2. Perform "DTC Confirmation Procedure", EC-462 again.

Is a 1st trip DTC P1336 (0905) detected?

Yes	▶	GO TO 7.
No	▶	INSPECTION END

7	CHECK CRANKSHAFT POSITION SENSOR (OBD)

Refer to "Component Inspection", EC-466.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (OBD).

8	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors F38, F102.
2. Check harness continuity between harness connector F38 and engine ground.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

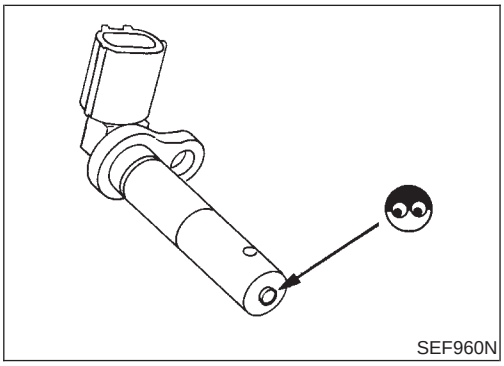
OK or NG

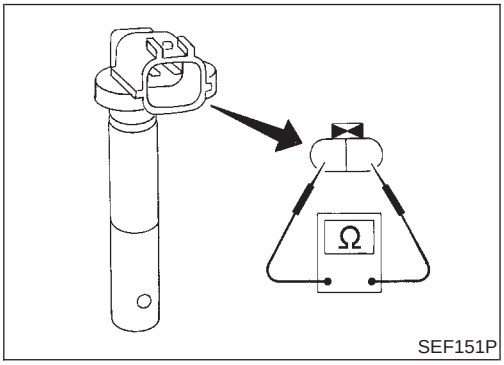
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F38, F102 ● Joint connector-1 ● Harness for open or short between harness connector F38 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK GEAR TOOTH	
Visually check for chipping flywheel or drive plate gear tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**


SEF960N



SEF151P

Component Inspection

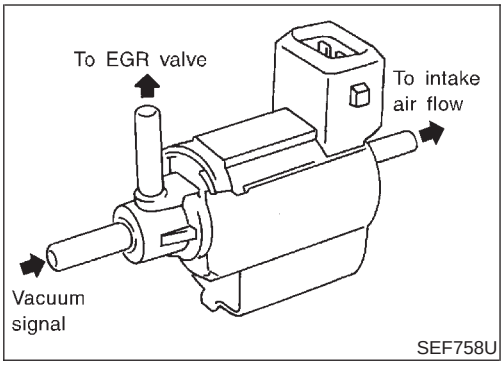
NAEC0301

CRANKSHAFT POSITION SENSOR (OBD)

NAEC0301S01

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

Resistance: Approximately 166.5 - 203.5Ω [at 20°C (68°F)]



Component Description

NAEC0302

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold collector) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal.

CONSULT Reference Value in Data Monitor Mode

NAEC0303

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	OFF
		Engine speed: Revving from idle up to 3,000 rpm quickly	ON

ECM Terminals and Reference Value

NAEC0304

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

CAUTION:

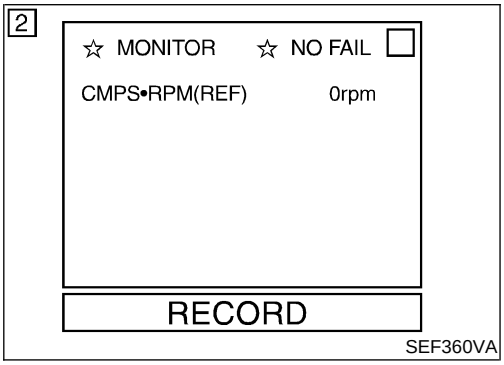
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	L/W	EGRC-solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • Revving engine from idle up to 3,000 rpm quickly	0 - 1.5V

On Board Diagnosis Logic

NAEC0305

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400 1005	• The improper voltage signal is sent to ECM through EGRC-solenoid valve.	• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve



DTC Confirmation Procedure

NAEC0306

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT and wait at least 5 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-470.

With GST

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 7" with GST.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-470.

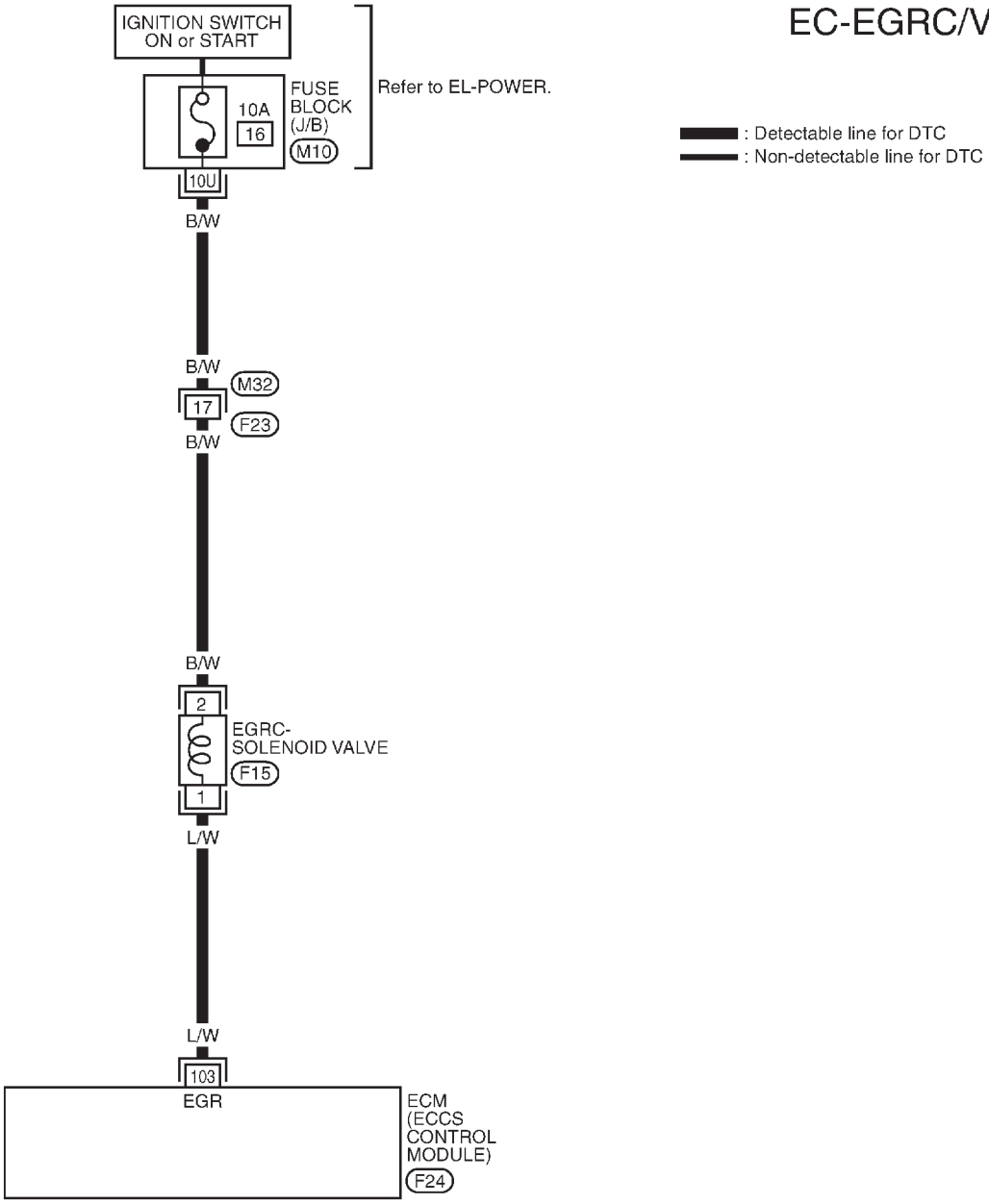
No Tools

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-470.

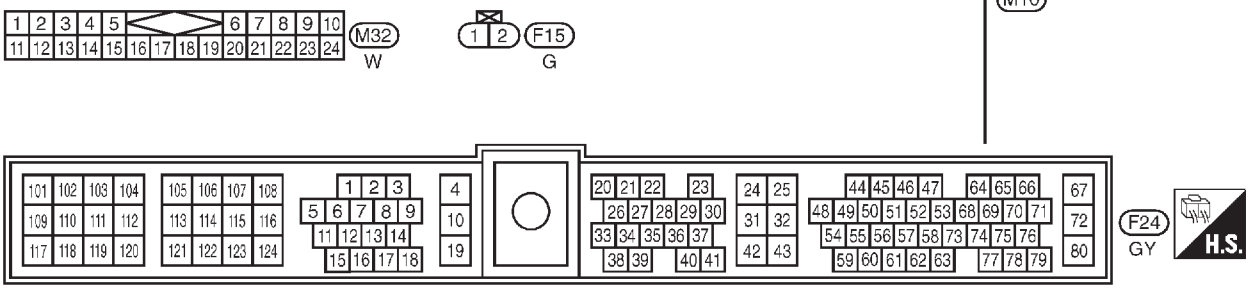
Wiring Diagram

NAEC0307

EC-EGRC/V-01



Refer to last page (Foldout page).
M10



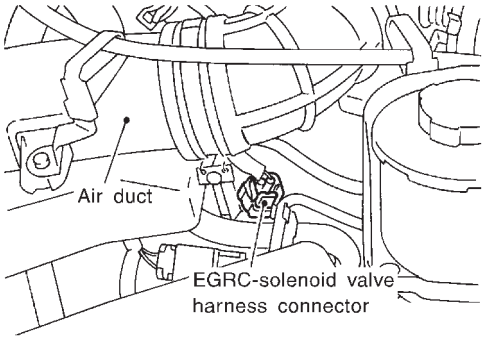
MEC077C

Diagnostic Procedure

NAEC0308

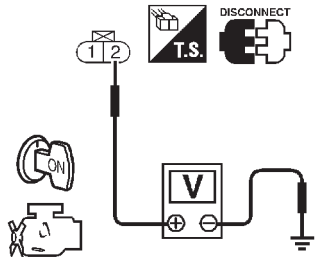
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect EGRC-solenoid valve harness connector.



SEF759U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF726U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

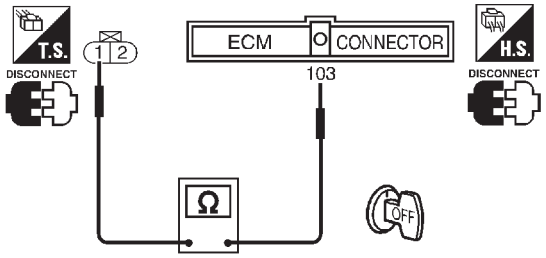
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M32
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 103 and terminal 1.



SEF727U

Continuity should exist.

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

OK or NG

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

4	CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-471.

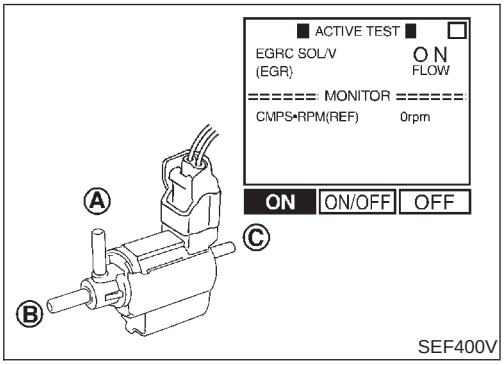
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGRC-solenoid valve.

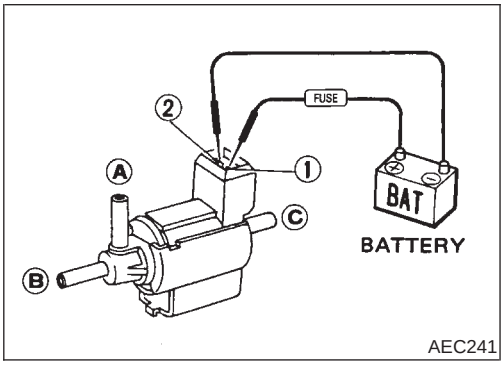
5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF400V



AEC241

Component Inspection

NAEC0309

EGRC-SOLENOID VALVE

NAEC0309S01

Check air passage continuity.

With CONSULT

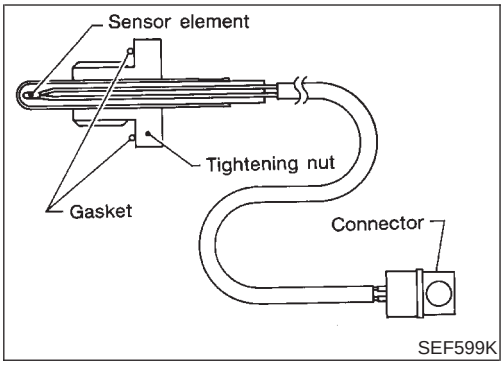
Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

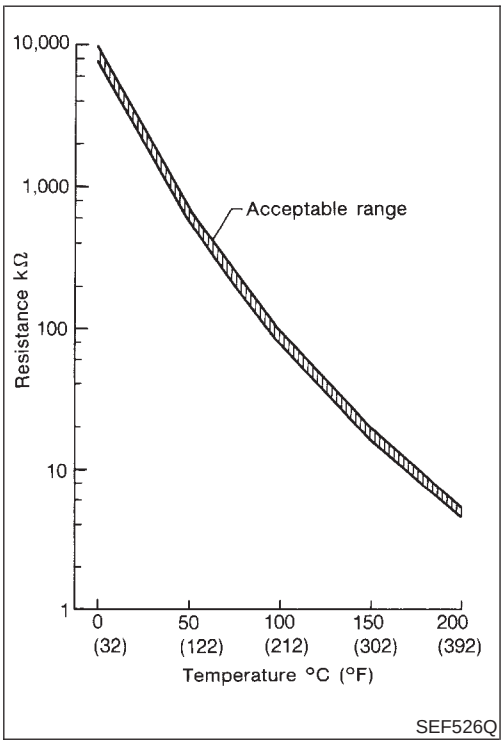
Conditions	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Without CONSULT

Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace solenoid valve.





Component Description

NAEC0310

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.

This sensor is not used to control the engine system. It is used only for the on board diagnosis.

<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ground.

When EGR system is operating.

Voltage: 0 - 1.5V

CAUTION:

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

On Board Diagnosis Logic

NAEC0311

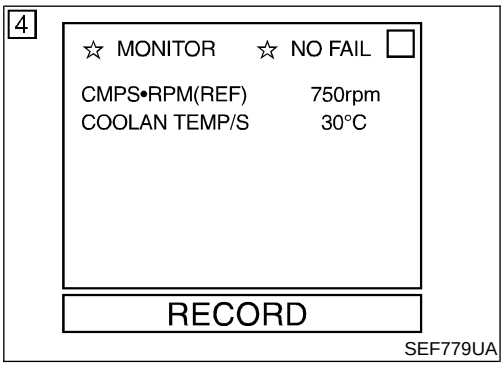
DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P1401 0305	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	• Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

DTC Confirmation Procedure

NAEC0474

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

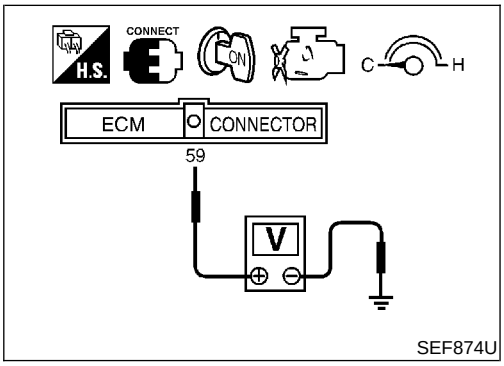


PROCEDURE FOR MALFUNCTION A

NAEC0474S01

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Verify that "COOLAN TEMP/S" is less than 40°C (104°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-476.

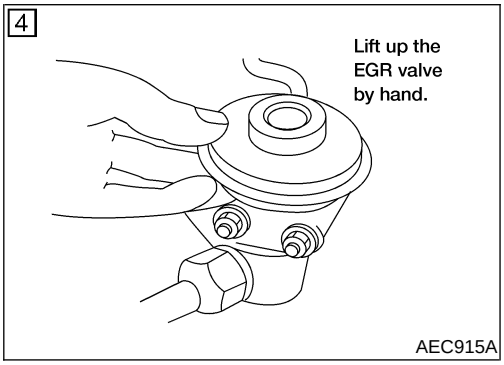


With GST

1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Verify that engine coolant temperature is less than 40°C (104°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-476.

No Tools

1) Turn ignition switch "ON".
2) Verify that voltage between ECM terminal 59 (engine coolant temperature sensor signal) is more 1.5V.
   If the voltage is below the range, cool the engine down.
3) Start engine and let it idle for at least 8 seconds.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-476.



PROCEDURE FOR MALFUNCTION B

NAEC0474S02

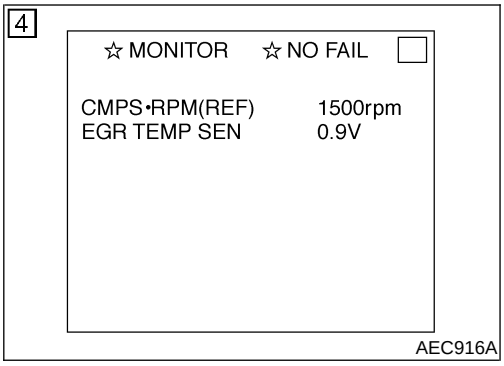
CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Always perform the test at a temperature of 5°C (41°F) or higher.

With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting at idle.
   If the check result is NG, go to trouble diagnoses for "DTC P1402". (See pageEC-478.)

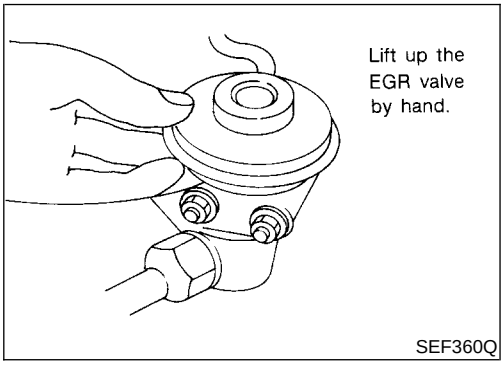
DTC Confirmation Procedure (Cont'd)

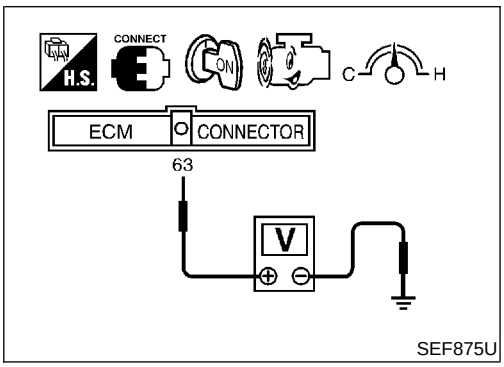


3) Select "DATA MONITOR" mode with CONSULT.
4) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
   Voltage should decrease to less than 1.5V.
   If the check result is NG, go to "Diagnostic Procedure", EC-476.
   If the check result is OK, go to following step.
5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Turn ignition switch "ON".
7) Check the output voltage of "THRTL POS SEN" at closed throttle position and note it.
8) Start engine.
9) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	1,600 - 2,400 rpm (A/T models) 1,800 - 2,600 rpm (M/T models)
B/FUEL SCHDL	3.0 - 4.5 msec
THRTL POS SEN	X − (X + 0.70) V (A/T models) X − (X + 0.66) V (M/T models) X = Voltage value measured at step 7
Selector lever	Suitable position

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-476.





Overall Function Check

NAEC0312

Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION B

NAEC0312S01

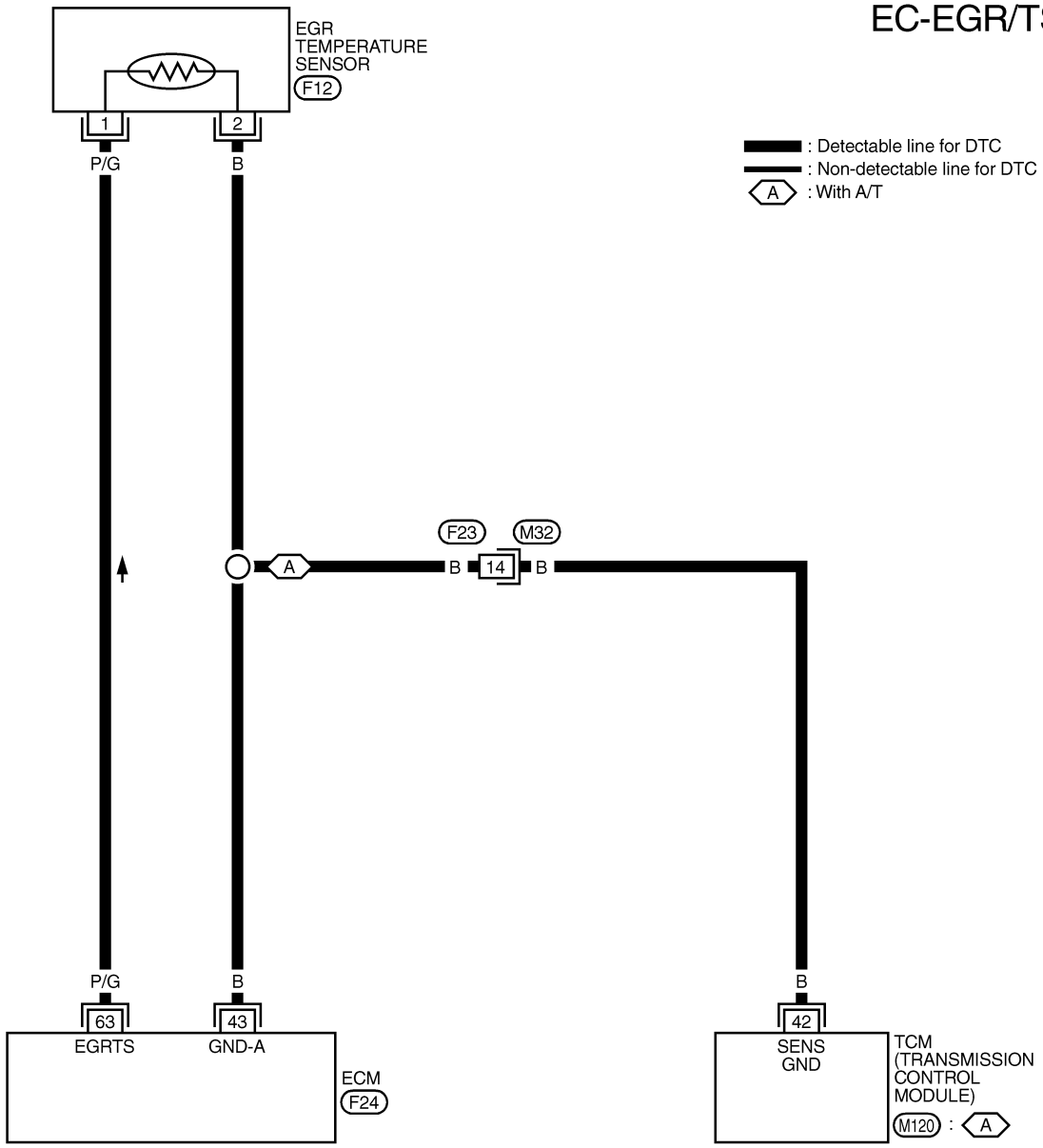
Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting. If NG, go to trouble diagnoses for DTC P0400 and P0402 (See pages EC-347 and 358).
3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.5V.
4) If step 4 is OK, perform trouble diagnoses for "DTC P0400 and P1400" (See pages EC-347 and 467).

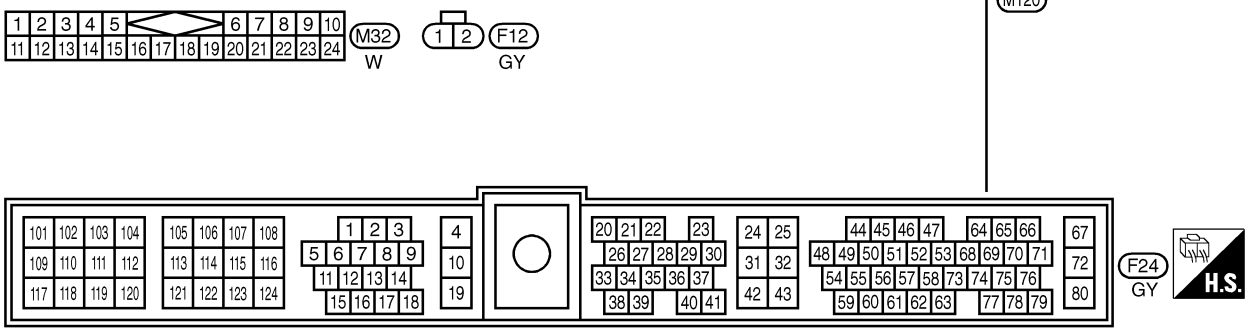
Wiring Diagram

NAEC0313

EC-EGR/TS-01



Refer to last page (Foldout page).
M120



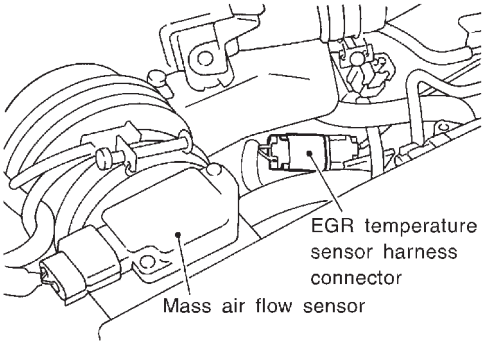
MEC675C

Diagnostic Procedure

NAEC0314

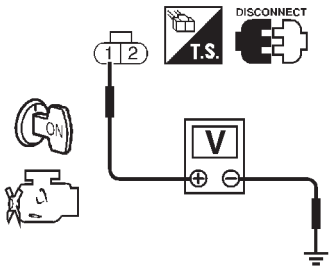
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect EGR temperature sensor harness connector.



SEF760U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF728U

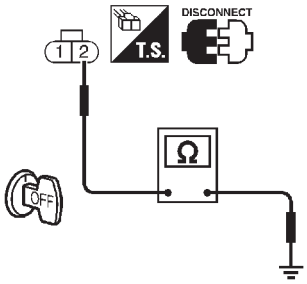
Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between terminal 2 and engine ground.



SEF729U

Continuity should exist.

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

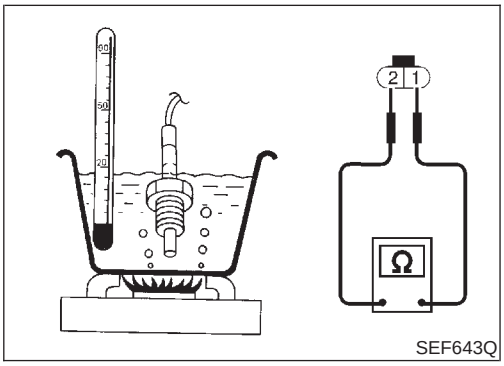
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

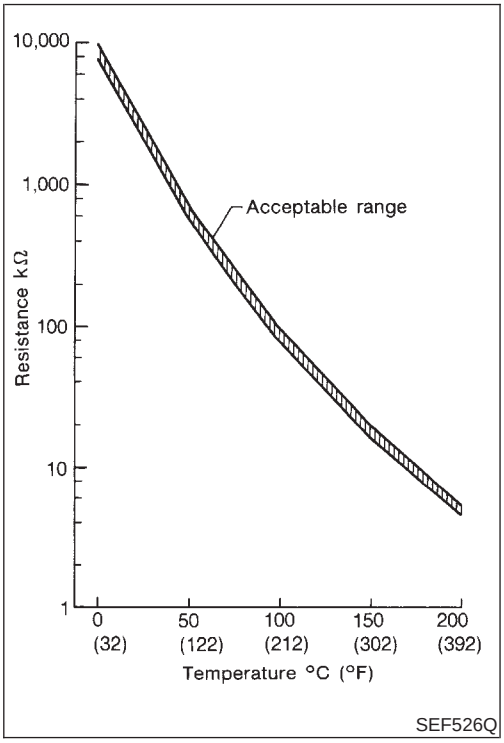
3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F23, M32 ● Harness for open or short between ECM and EGR temperature sensor ● Harness for open or short between TCM (Transmission control module) and EGR temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connector.

4	CHECK EGR TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-477.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF643Q



SEF526Q

Component Inspection

NAEC0315

EGR TEMPERATURE SENSOR

NAEC0315S01

Check resistance change and resistance value.

<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.

Description

NAEC0475

SYSTEM DESCRIPTION

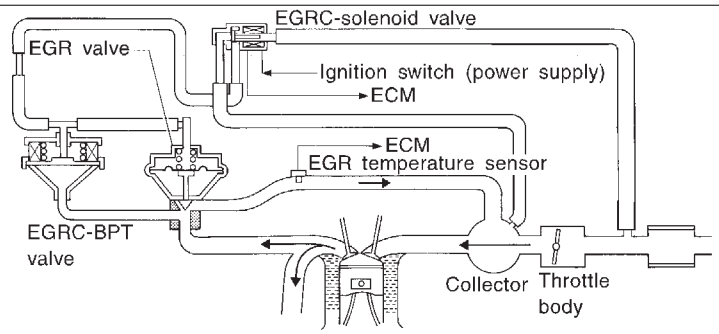
NAEC0475S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

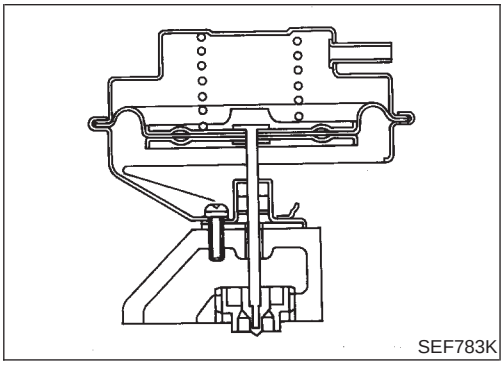
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current does not flow through the solenoid valve. This causes the intake manifold vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum



SEF317U



SEF783K

COMPONENT DESCRIPTION

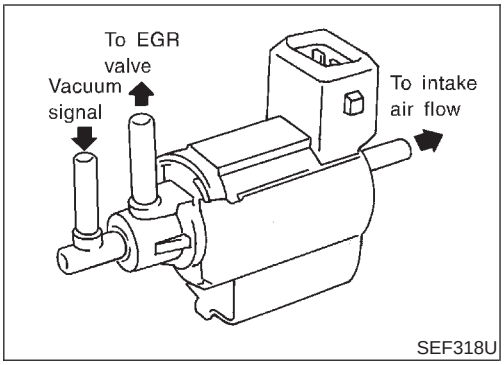
NAEC0475S02

Exhaust Gas Recirculation (EGR) Valve

NAEC0475S0201

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

Description (Cont'd)

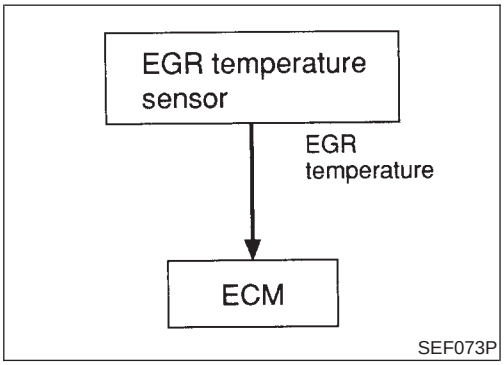


SEF318U

EGRC-solenoid Valve

NAEC0475S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold colletctor) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal.



SEF073P

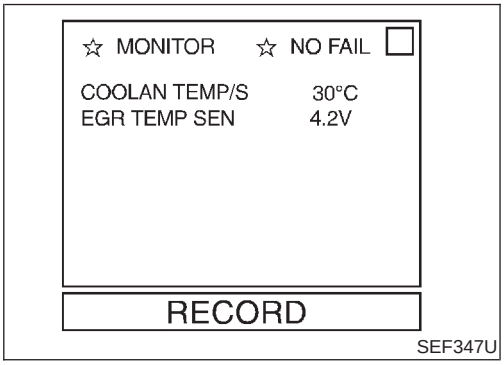
On Board Diagnosis Logic

NAEC0476

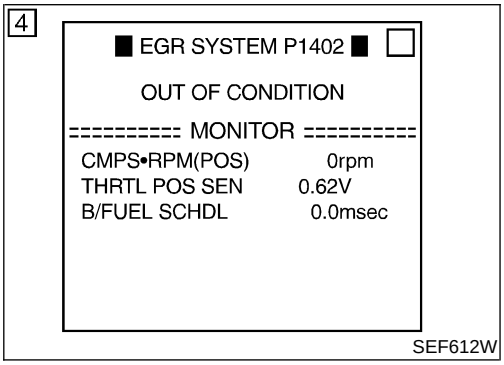
If the EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

NOTE:
Diagnosis for this DTC will end when engine coolant temperature is approx. 50 to 60°C (122 to 140°F). Ignition switch must be turned "ON" (engine start) with engine coolant temperature below 40°C (104°F) when starting DTC confirmation procedure.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402 0514	EGR flow is detected under conditions that do not call for EGR.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor • EGRC-BPT valve



SEF347U



SEF612W

DTC Confirmation Procedure

NAEC0477

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform the test at a temperature of −10°C (14°F) or higher.**
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**

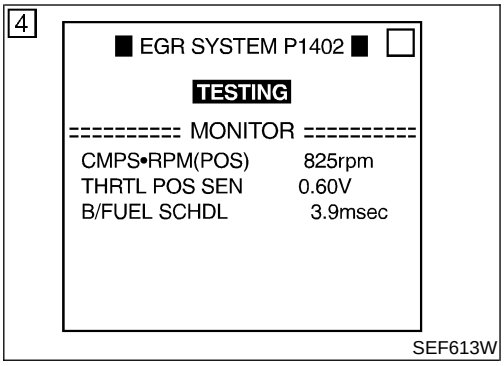
  COOLAN TEMP/S: −10 to 30°C (14 to 86°F)*

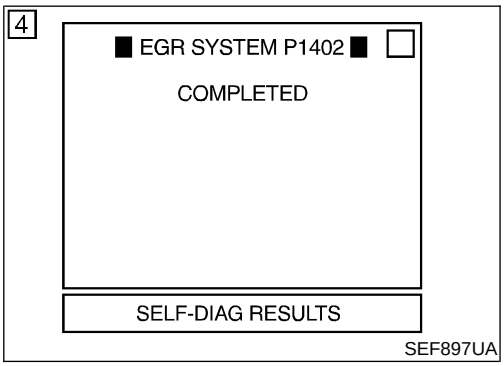
  EGR TEMP SEN: Less than 4.8V

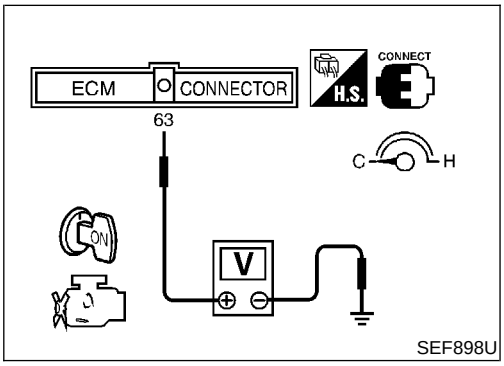
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant temperature or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

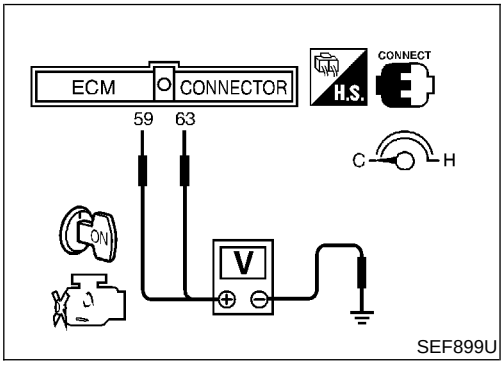
*: Although CONSULT screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

DTC Confirmation Procedure (Cont'd)









With CONSULT

1) Turn ignition switch "OFF", and wait at least 5 seconds, and then turn "ON".
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
3) Follow the CONSULT instructions.
4) Start engine and let it idle until "TESTING" on CONSULT screen is turned to "COMPLETED". (It will take 60 seconds or more.)
   If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of −10 to 30°C (14 to 86°F). Retry from step 1.
5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-482.

With GST

1) Turn ignition switch "ON" and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 30°C (14 to 86°F).
3) Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
4) Start engine and let it idle for at least 60 seconds.
5) Stop engine.
6) Perform from step 1 to 4.
7) Select "MODE 3" with GST.
8) If DTC is detected, go to "Diagnostic Procedure", EC-482.

No Tools

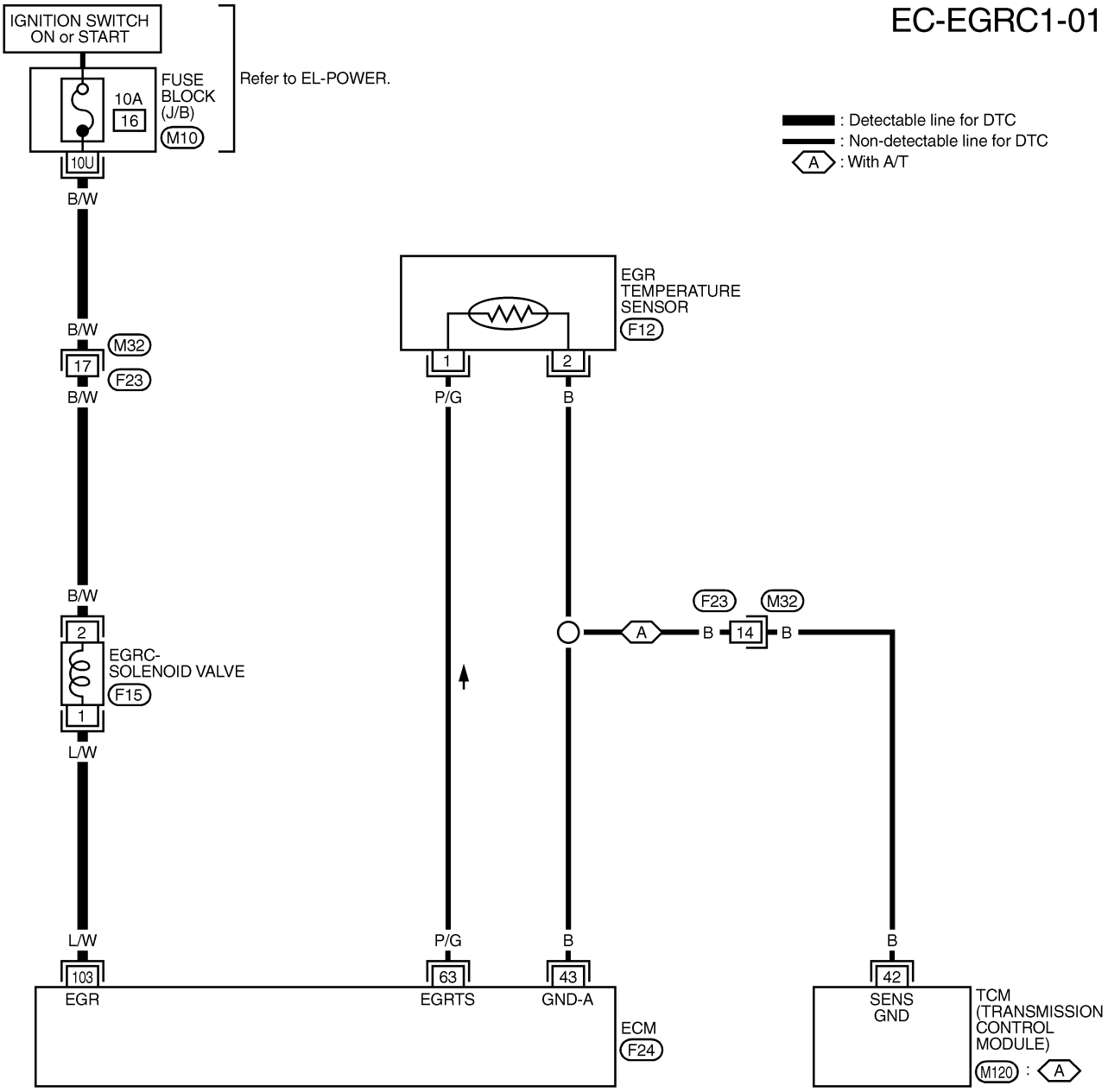
1) Turn ignition switch "ON".
2) Check the following voltages.
   ECM terminal 59 (engine coolant temperature sensor signal) and ground:
   3.2 - 4.4V
   ECM terminal 63 (EGR temperature sensor signal) and ground:
   Less than 4.8V
3) Start engine and let it idle for at least 60 seconds.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If NG, go to "Diagnostic Procedure", EC-482.

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

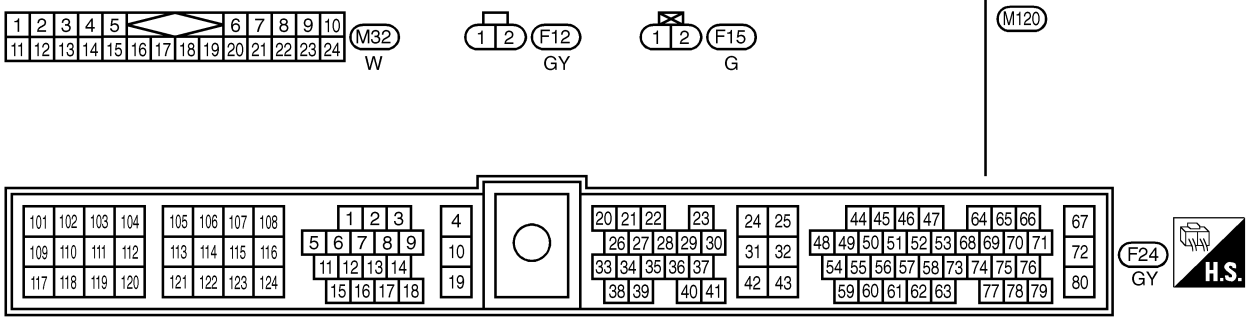
Wiring Diagram

NAEC0478

EC-EGRC1-01



Refer to last page (Foldout page).
M10
M120



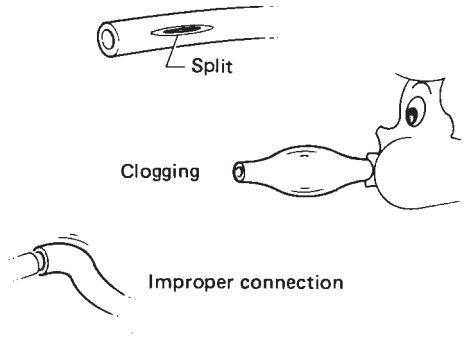
MEC669C

Diagnostic Procedure

NAEC0479

1	CHECK VACUUM HOSE

1. Turn ignition switch “OFF”.
2. Check vacuum hose for clogging, cracks or improper connection. Refer to “Vacuum Hose Drawing”, EC-24.



SEF109L

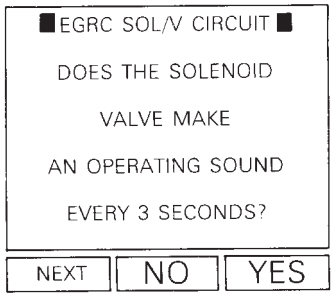
OK or NG

OK (with CONSULT)	▶	GO TO 2.
OK (without CONSULT)	▶	GO TO 3.
NG	▶	Repair or replace vacuum hose.

2	CHECK EGRC-SOLENOID VALVE

With CONSULT

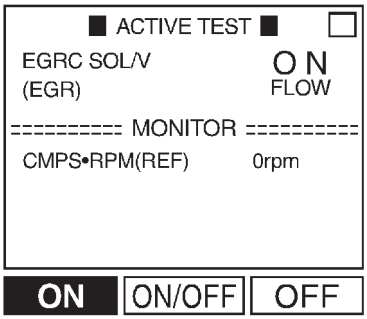
1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.



MEF957D

With CONSULT

1. Turn ignition switch "ON".
2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.



SEF789U

Clicking noise should be heard.

OK or NG

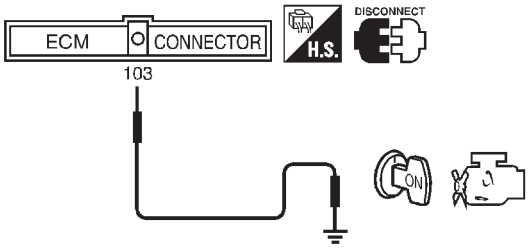
OK	▶	GO TO 4.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

Diagnostic Procedure (Cont'd)

3	CHECK EGRC-SOLENOID VALVE

Without CONSULT

1. Disconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Connect a suitable jumper wire between ECM terminal 103 and engine ground.



SEF354V

4. Check operating sound of EGRC-solenoid valve when disconnecting and connecting the jumper wire.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M32, F23
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and fuse
- Harness for open or short between EGRC-solenoid valve and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connector.

5	CHECK EGRC-SOLENOID VALVE

Refer to "Component Inspection", EC-471.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGRC-solenoid valve.

6	CHECK EGR VALVE

Refer to "Component Inspection", EC-485.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGR valve.

7	CHECK EGRC-BPT VALVE

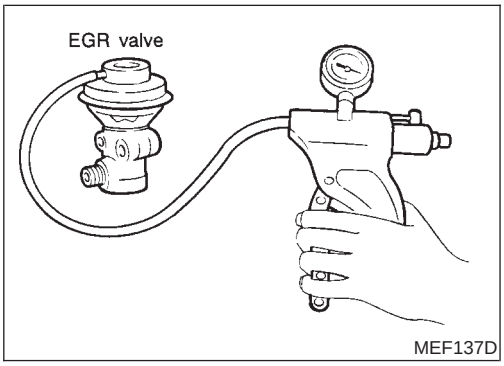
Refer to "Component Inspection", EC-485.

OK or NG

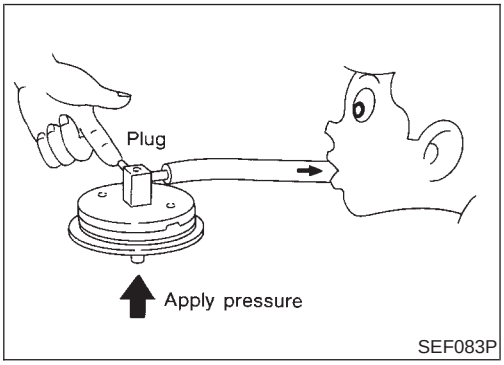
OK	▶	GO TO 8.
NG	▶	Replace EGRC-BPT valve.

8	CHECK EGR TEMPERATURE SENSOR	
Refer to "Component Inspection", EC-477. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Replace EGR temperature sensor.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**



MEF137D



SEF083P

Component Inspection

NAEC0480

EGR VALVE

NAEC0480S01

Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.

- Check for sticking.

If NG, repair or replace EGR valve.

EGRC-BPT VALVE

NAEC0480S04

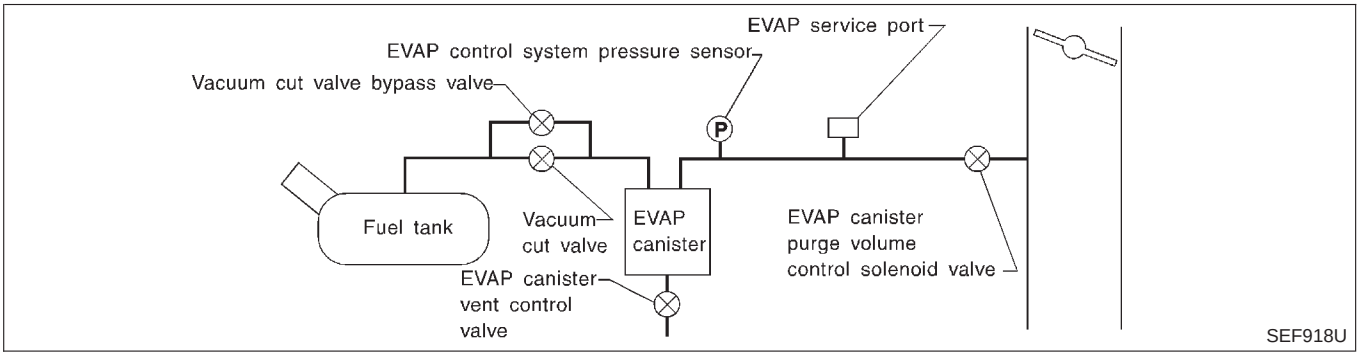
1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

On Board Diagnosis Logic

NAEC0481

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for "DTC P1448" first. (See EC-518.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1440 0213	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve • Absolute pressure sensor • Fuel tank temperature sensor • MAP/BARO switch solenoid valve • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor

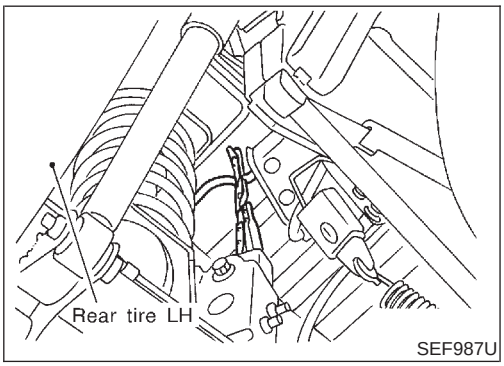
CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

NAEC0482

NOTE:

- **If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-518.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



SEF987U

With CONSULT

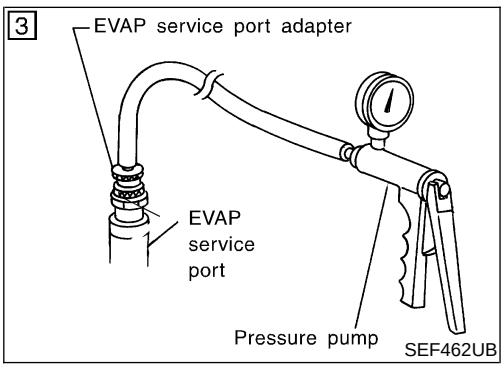
CAUTION:

- **Never use compressed air or high pressure pump. Otherwise, EVAP system may be damaged.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**
- **Do not start engine.**

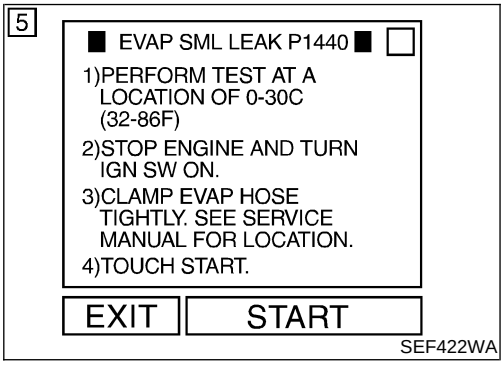
NOTE:

- Always remove EVAP service port adapter from EVAP service port after applying air up to 0.69 to 1.38 kPa (5.14 to 10.34 mmHg, 0.202 to 0.407 inHg).
- During the test, clamp the EVAP hose tightly as shown at left.

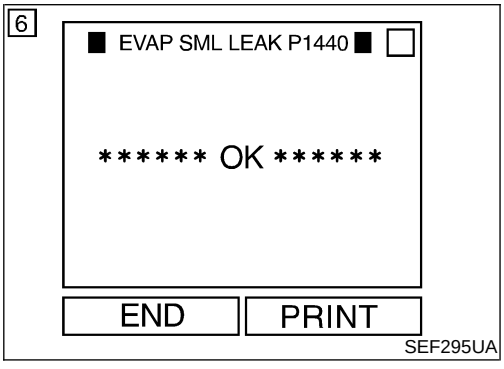
1) Turn ignition switch "OFF".
2) Clamp the EVAP hose as shown at left.
3) Install EVAP service port adapter and pressure pump to EVAP service port securely.
4) Turn ignition switch "ON".
5) Select "EVAP SML LEAK P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.
6) Make sure that "OK" is displayed. If "NG" is displayed, refer to "Diagnostic Procedure", EC-488.



SEF462UB



SEF422WA



SEF295UA

With GST

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that fuel level is low.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-62.
8) Stop vehicle.
9) Select "MODE 3" with GST.
   - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-369.
   - If P1440 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1440", EC-488.

- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-512.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

No Tools

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-62 before driving vehicle.
- It is better that the fuel level is low.

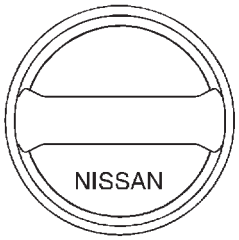
1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-62.
3) Stop vehicle.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-488.

Diagnostic Procedure

NAEC0483

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with a genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

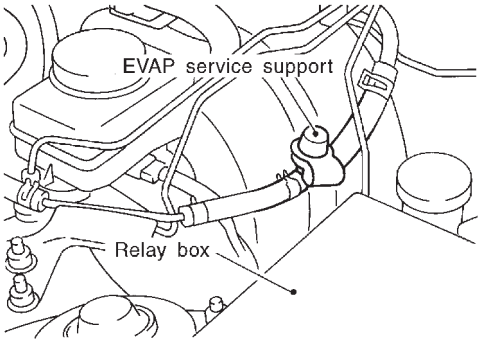
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

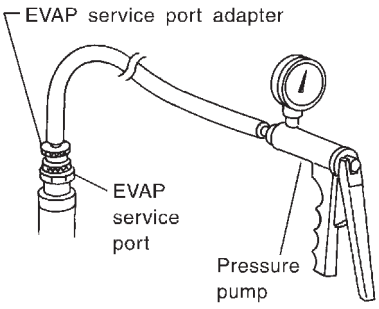
4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)
Refer to "Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)", EC-31.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF907U



SEF916U

- **Improper installation of EVAP service port adapter to EVAP service port may cause leaking.**

Models with CONSULT ▶	GO TO 6.
Models without CONSULT ▶	GO TO 7.

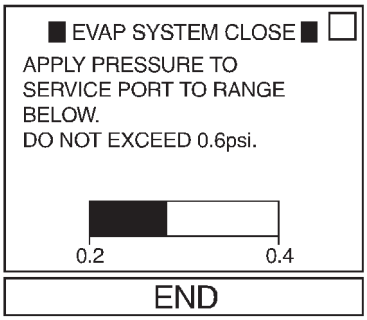
6	CHECK FOR EVAP LEAK

With CONSULT

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

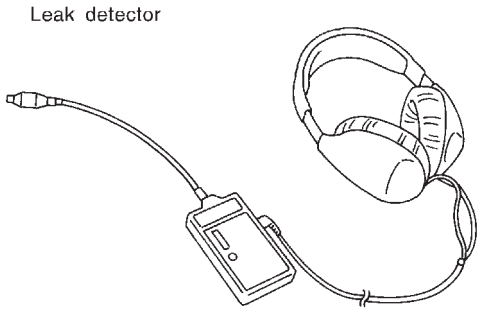
NOTE:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



SEF917U

4. Remove EVAP service port adapter and pressure pump.
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "Evaporative Emission Line Drawing", EC-34.



SEF200U

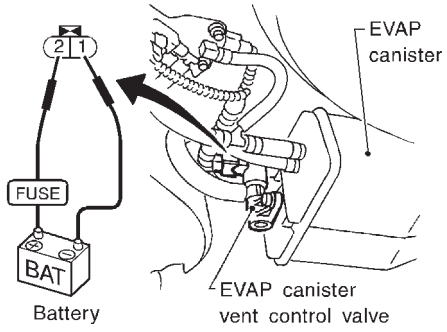
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

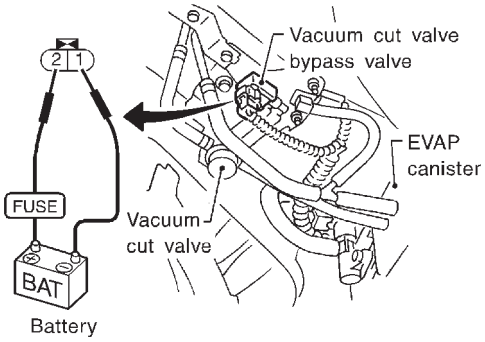
Without CONSULT

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



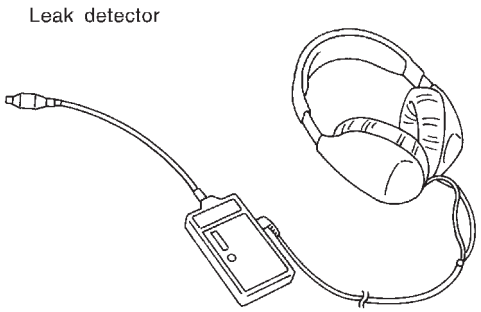
SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).

NOTE:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

5. Remove EVAP service port adapter and pressure pump.
6. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "Evaporative Emission Line Drawing", EC-34.

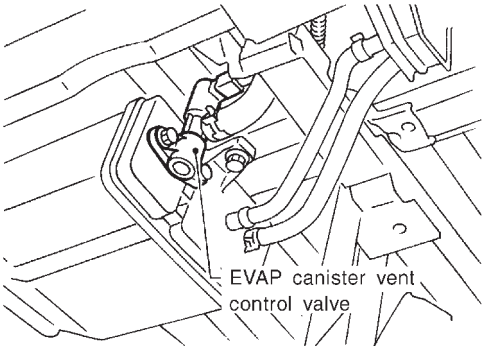


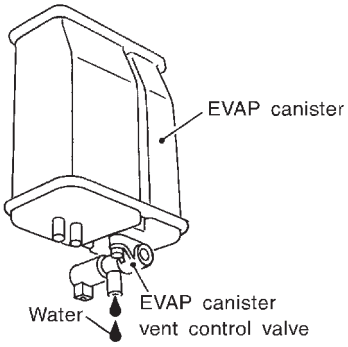
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR	
Refer to "Component Inspection", EC-509.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-385.		
 SEF143S		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

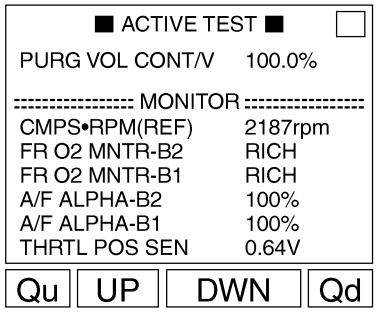
10	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
 SEF596U		
Yes or No		
Yes	▶	GO TO 11.
No (With CONSULT)	▶	GO TO 13.
No (Without CONSULT)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT) ▶	GO TO 13.
OK (Without CONSULT) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100.0%
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



AEC912A

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

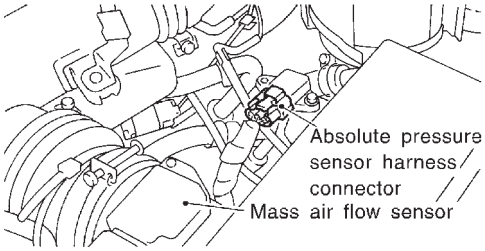
Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

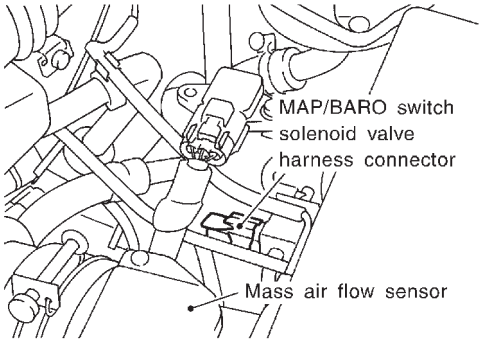
OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-24.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

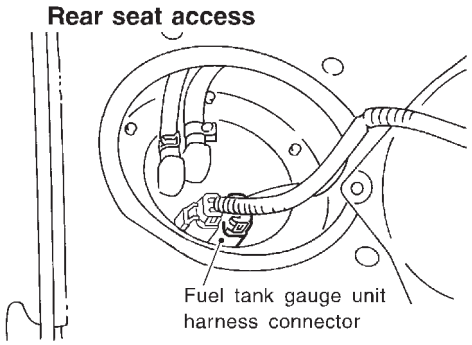
16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-503.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

17	CHECK ABSOLUTE PRESSURE SENSOR	
Refer to "Component Inspection", EC-166.		
 SEF748U		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Replace absolute pressure sensor.

18	CHECK MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT	
Refer to "Component Inspection", EC-450.		
 SEF756U		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace MAP/BARO switch solenoid valve.

19	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-319.



SEF751U

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel tank temperature sensor.

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-399.

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-30.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 23.

23	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**

Description

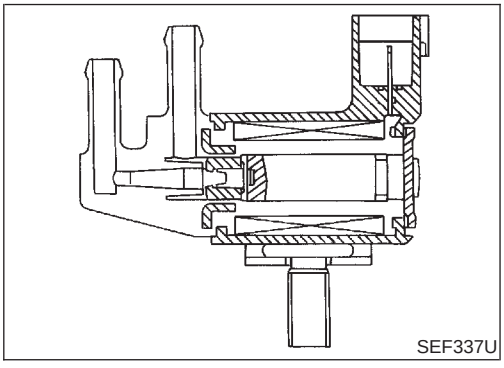
NAEC0325

SYSTEM DESCRIPTION

NAEC0325S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NAEC0325S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT Reference Value in Data Monitor Mode

NAEC0326

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “P” or “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

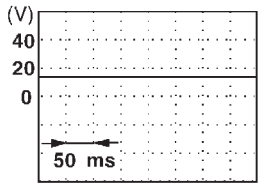
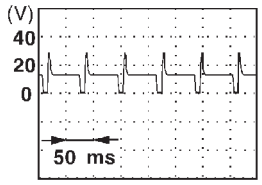
ECM Terminals and Reference Value

NAEC0327

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shutoff)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	LG/B	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0328

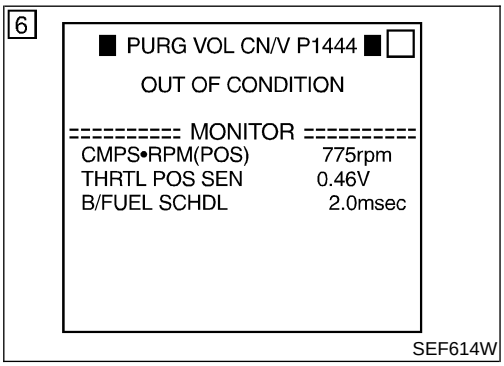
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444 0214	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

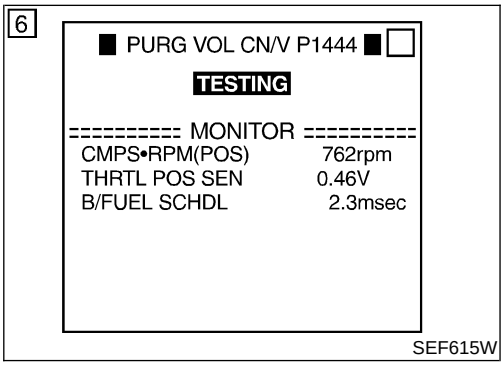
DTC Confirmation Procedure

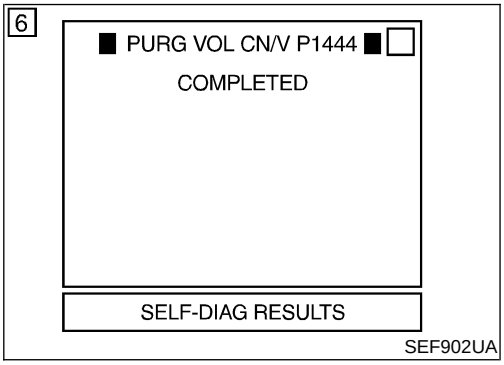
NAEC0329

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.







With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON”.
4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT.
5) Touch “START”.
6) Start engine and let it idle until “TESTING” on CONSULT changes to “COMPLETED”. (It will take for approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-500.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-500.

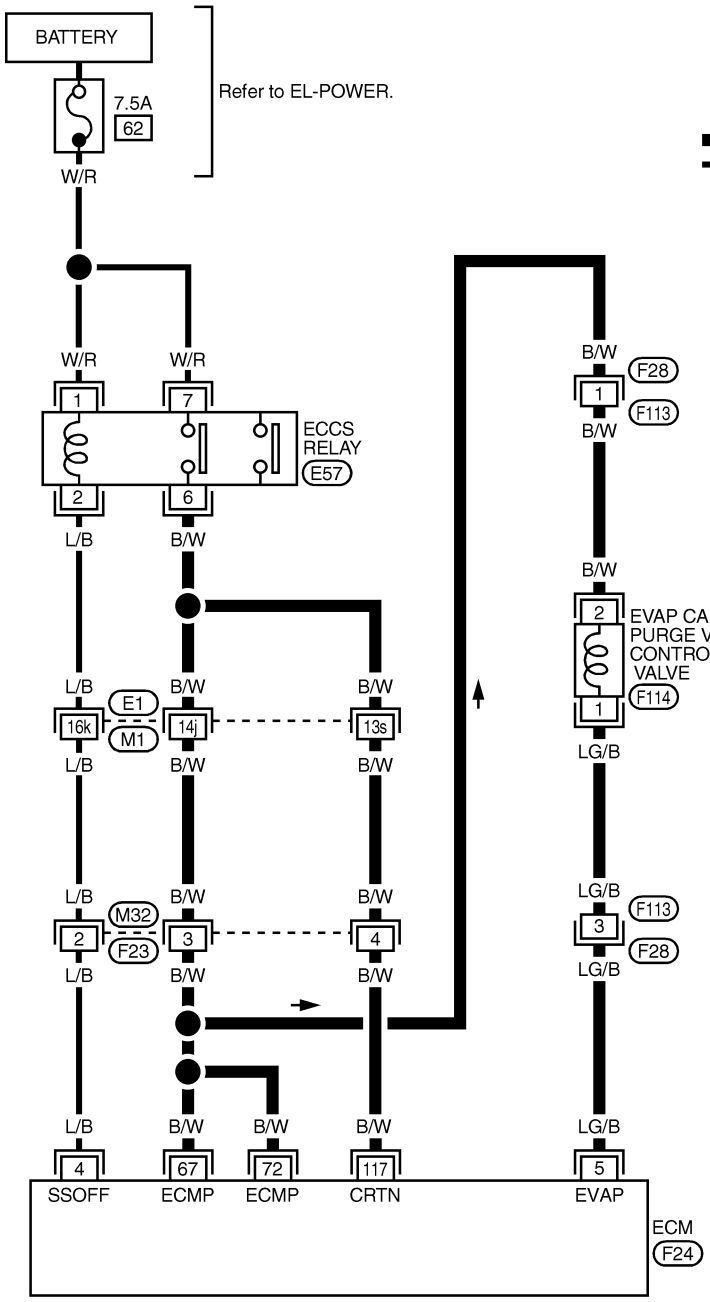
No Tools

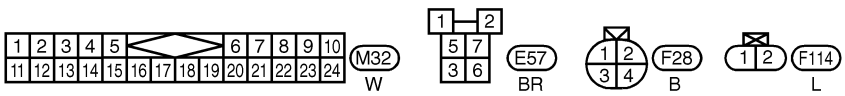
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Turn ignition switch “OFF” and wait at least 5 seconds.
5) Turn ignition switch “ON” and perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-500.

Wiring Diagram

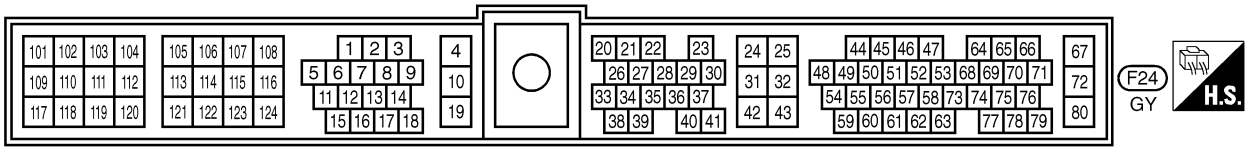
NAEC0330

EC-PGC/V-01





Refer to last page (Foldout page).
M1 , E1



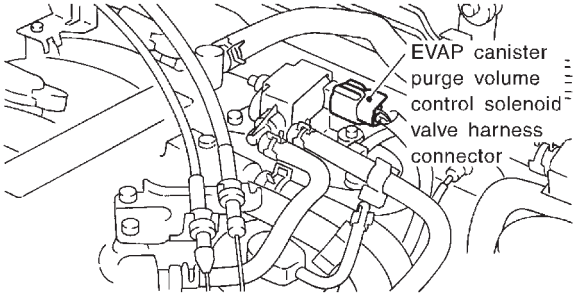
MEC670C

Diagnostic Procedure

NAEC0331

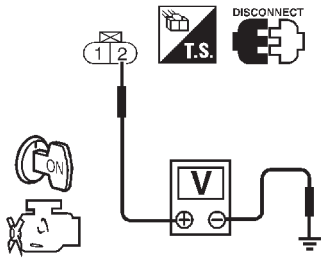
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF879U

3. Turn ignition switch “ON”.
4. Check voltage between terminal 2 and engine ground with CONSULT or tester.



SEF880U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

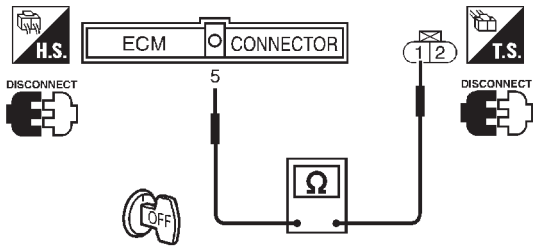
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness connectors F28, F113
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECCS relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and terminal 1.



SEF881U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, F113
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

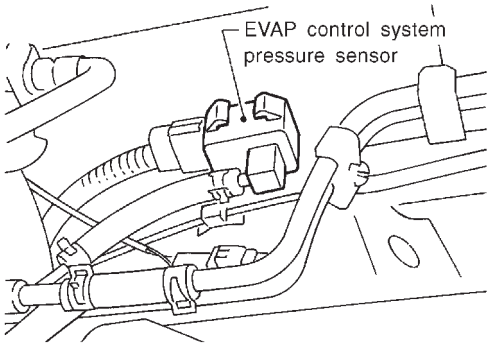
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair it.

6	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF190S

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

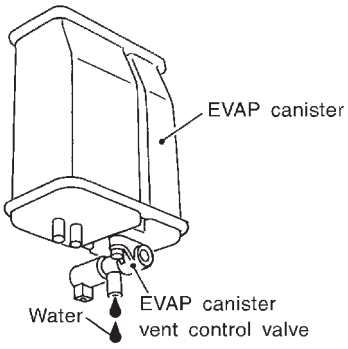
Diagnostic Procedure (Cont'd)

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to "Component Inspection", EC-399.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-503.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to "Component Inspection", EC-509.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP canister vent control valve.

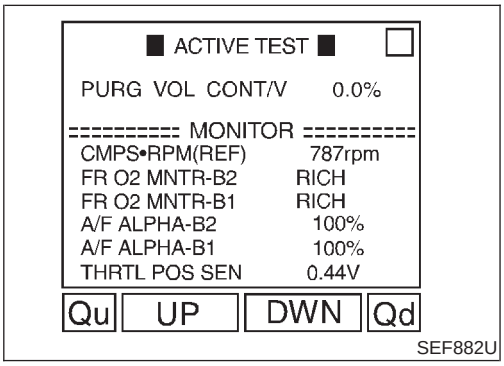
10	CHECK RUBBER TUBE	
Check for obstructed water separator and rubber tube connected to EVAP canister vent control valve and clean the rubber tube using air blower. For water separator, refer to EC-509.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

11	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
 SEF596U		
Yes or No		
Yes	▶	GO TO 12.
No	▶	GO TO 14.

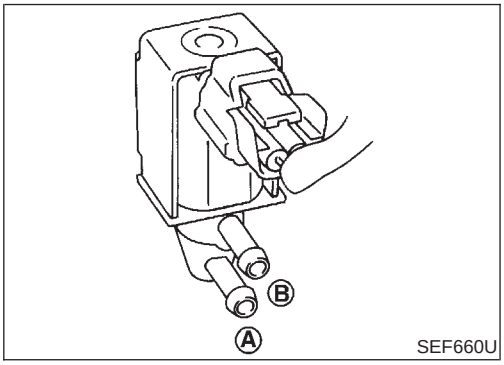
12	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK ▶	GO TO 14.
NG ▶	GO TO 13.

13	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separater for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

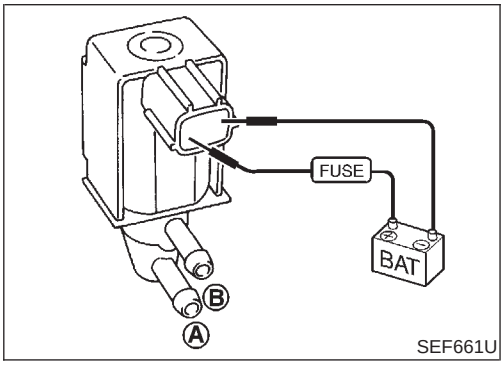
14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	INSPECTION END



SEF882U



SEF660U



SEF661U

Component Inspection

NAEC0332

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

NAEC0332S01

With CONSULT

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

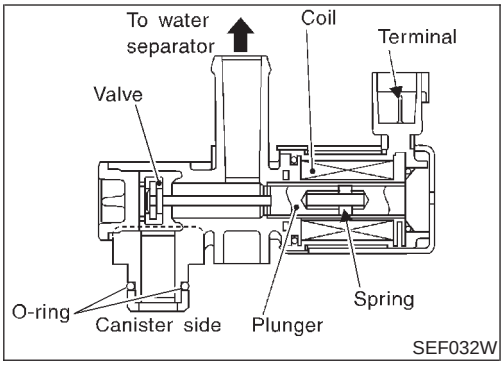
If NG, replace the EVAP canister purge volume control solenoid valve.

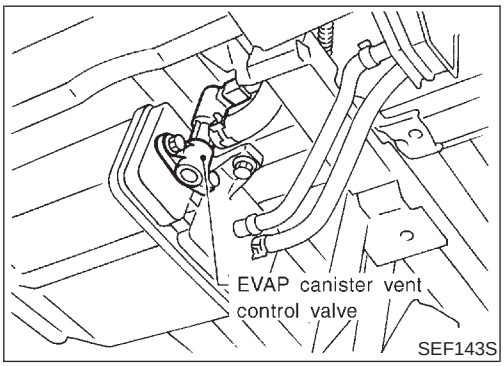
Without CONSULT

Check air passage continuity.

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace solenoid valve.





Component Description

NAEC0484

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT Reference Value in Data Monitor Mode

NAEC0485

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0486

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

CAUTION:

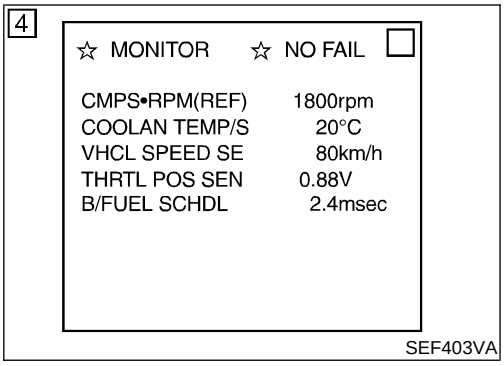
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	G/R	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0487

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446 0215	• EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water.



DTC Confirmation Procedure

NAEC0488

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine.
4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-507.

With GST

1) Start engine.
2) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-507.

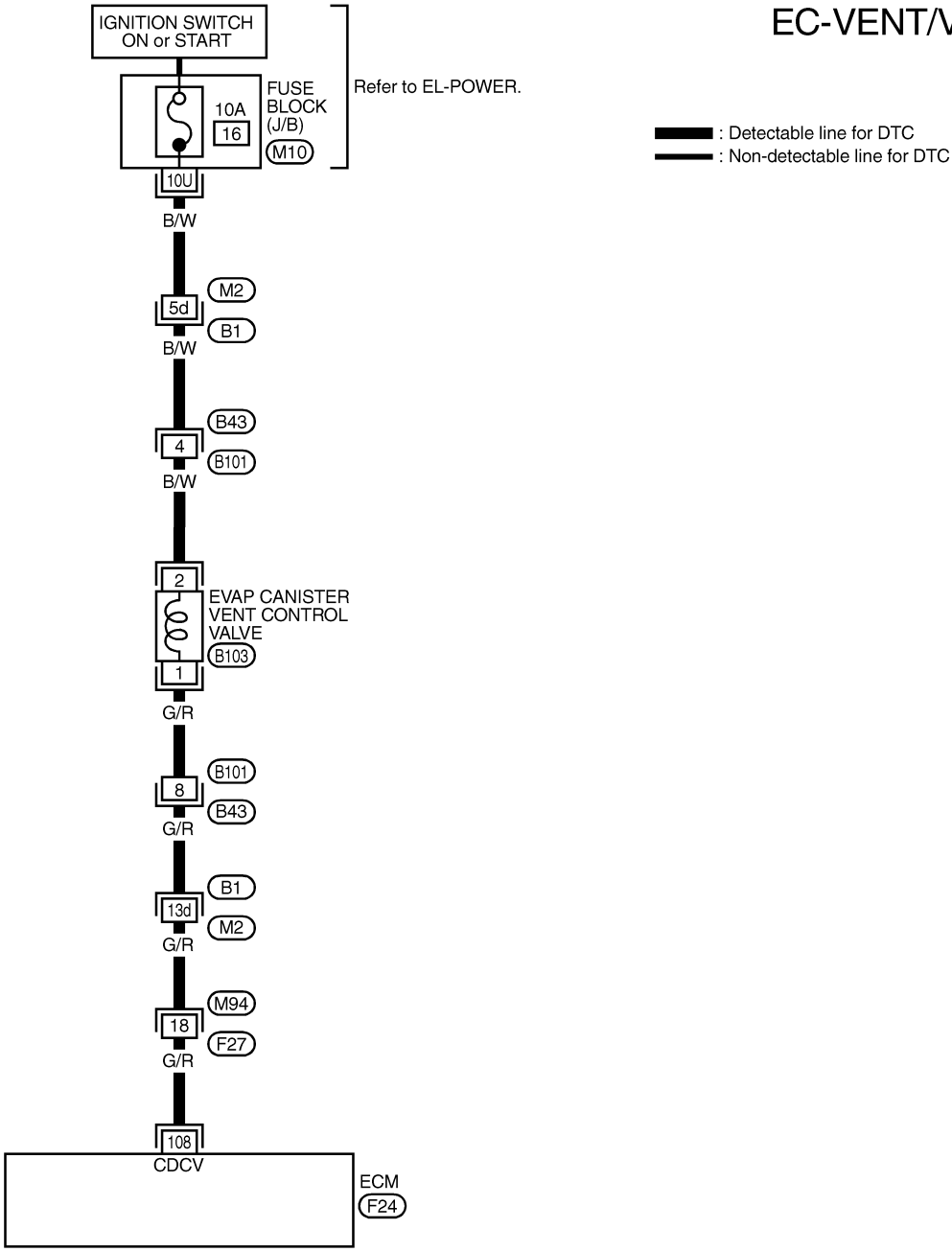
No Tools

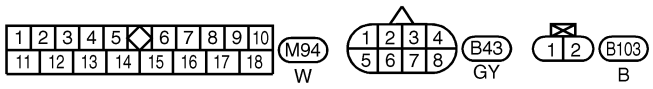
1) Start engine.
2) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON" and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-507.

Wiring Diagram

NAEC0489

EC-VENT/V-01

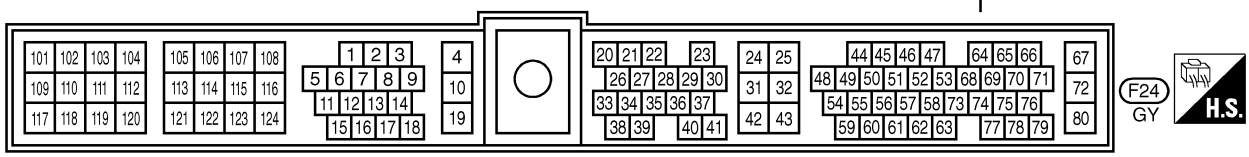




Refer to last page (Foldout page).

M2 , B1

M10



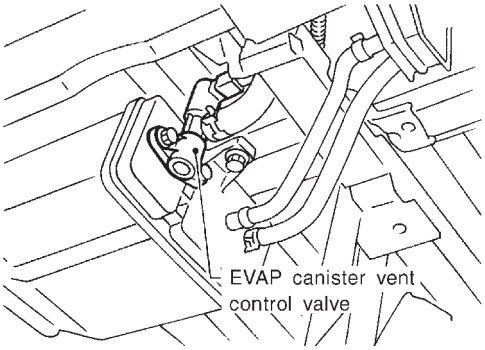
MEC671C

Diagnostic Procedure

NAEC0490

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check obstructed water separator and rubber tube connected to EVAP canister vent control valve.
3. Clean the rubber tube using air blower. For water separator, refer to EC-509.



SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

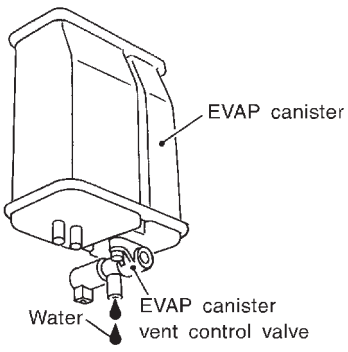
Refer to “Component Inspection”, EC-509.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

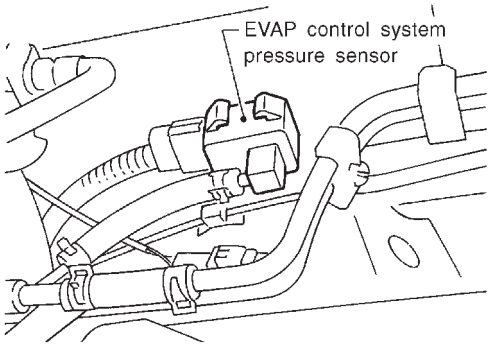
Yes	▶	GO TO 4.
No	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

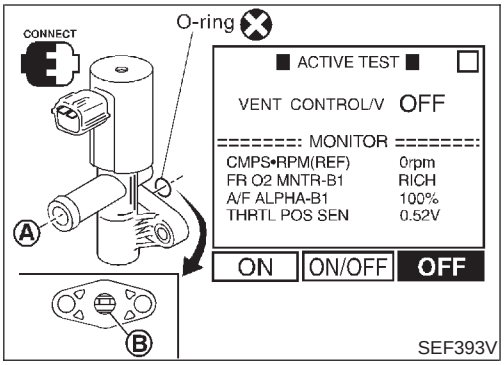
5	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

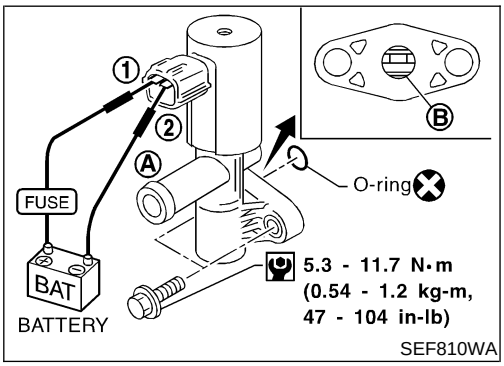
6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**	
OK ▶	GO TO 7.
NG ▶	Repair it.

7	CHECK CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.  SEF190S 2. Check connectors for water. **Water should not exist.** **OK or NG**	
OK ▶	GO TO 8.
NG ▶	Replace EVAP control system pressure sensor.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-392. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Replace EVAP control system pressure sensor.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**





Component Inspection

NAEC0491

EVAP CANISTER VENT CONTROL VALVE

NAEC0491S01

Check air passage continuity.

With CONSULT

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

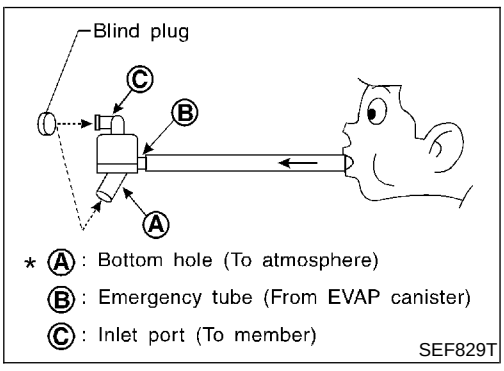
Without CONSULT

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

Make sure new O-ring is installed properly.



WATER SEPARATOR

NAEC0491S02

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

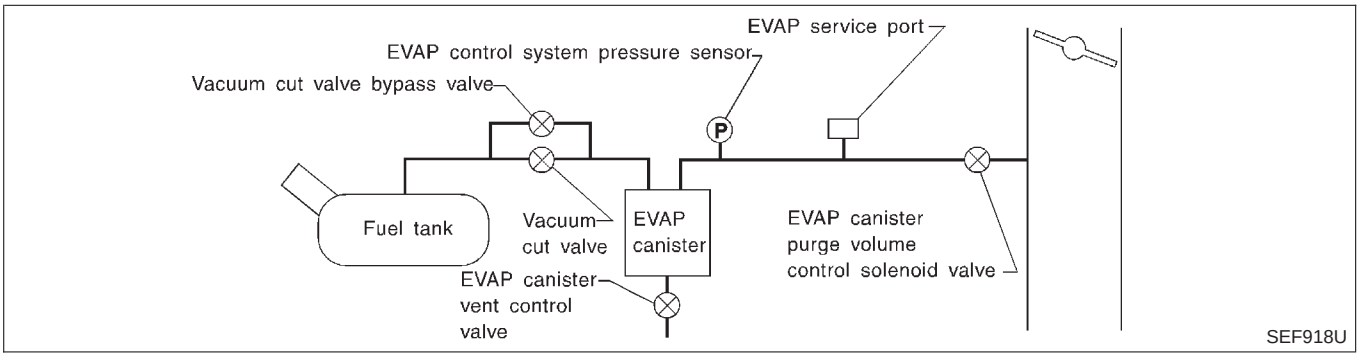
NOTE:

- Do not disassemble water separator.

System Description

NAEC0333

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for “DTC P0510” first. (See EC-424.)



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

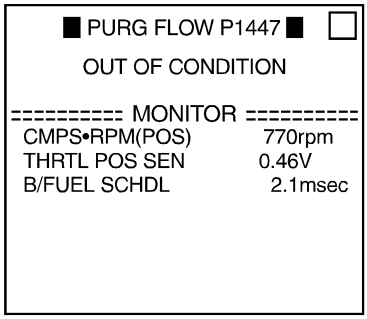
On Board Diagnosis Logic

NAEC0334

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447 0111	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Closed throttle position switch • Blocked purge port • EVAP canister vent control valve

5



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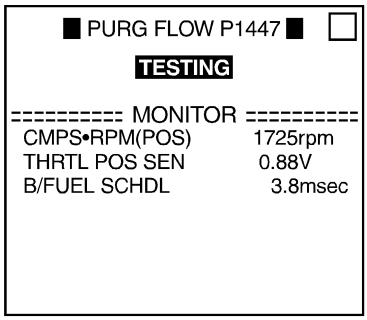
6



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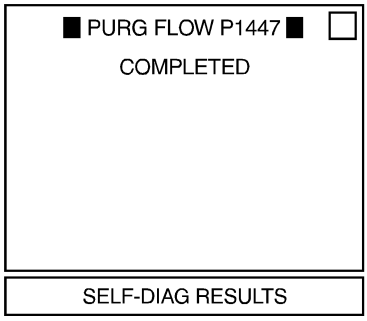
6



SEF905UA

DTC Confirmation Procedure

NAEC0335

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 0°C (32°F) or more.

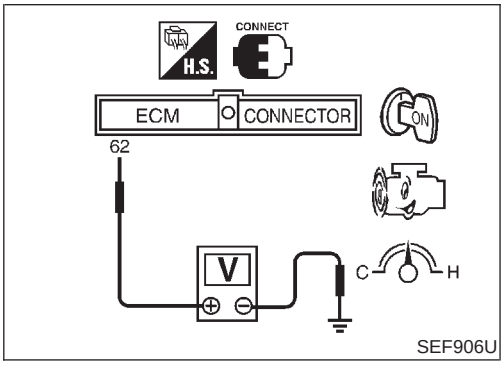
With CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
5) Touch "START".
   If "COMPLETED" is displayed, go to step 7.
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
CMPS·RPM (POS)	500 - 3,400 rpm
B/FUEL SCHDL	Less than 4 msec
Engine coolant temperature	More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-512.



SEF906U

Overall Function Check

NAEC0492

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Lift up drive wheels.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF", wait at least 5 seconds.
4) Start engine and wait at least 70 seconds.
5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.

Overall Function Check (Cont'd)

6) Check EVAP control system pressure sensor value at idle speed and note it.
7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch		ON
Steering wheel		Fully turned
Headlamp switch		ON
Rear window defogger switch		ON
Engine speed		Approx. 3,000 rpm
Gear position	M/T models	Any position other than "Neutral" or "Reverse"
	A/T models	Any position other than "P", "N" or "R"

8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9) If NG, go to "Diagnostic Procedure", EC-512.

Diagnostic Procedure

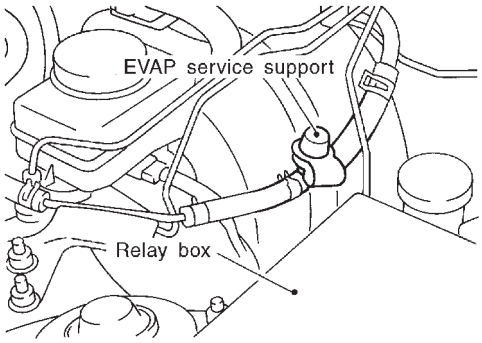
NAEC0336

1	CHECK EVAP CANISTER	
1. Turn ignition switch "OFF". 2. Check EVAP canister for cracks. **OK or NG**		
OK (With CONSULT)	▶	GO TO 2.
OK (Without CONSULT)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

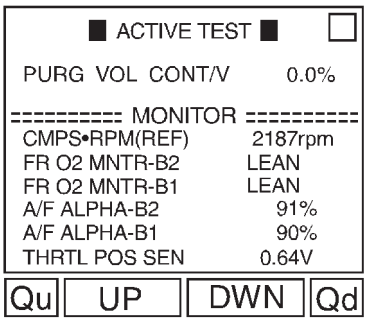
With CONSULT

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF907U

2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.



SEF908U

4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/V" opening.
   100.0%: Vacuum should exist.
   0.0%: Vacuum should not exist.

OK or NG

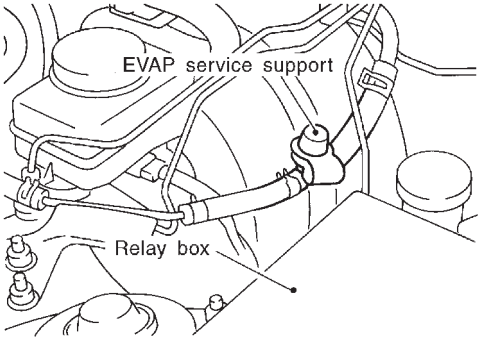
OK	▶	GO TO 7.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF907U

4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.
   Vacuum should exist.
6. Release the accelerator pedal fully and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

4	CHECK EVAP PURGE LINE

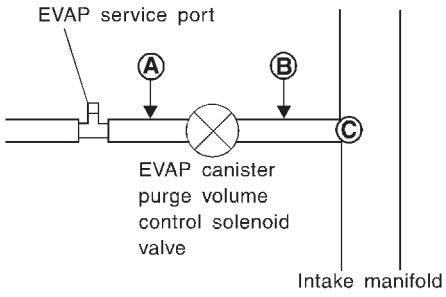
Check EVAP purge line for improper connection or disconnection.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

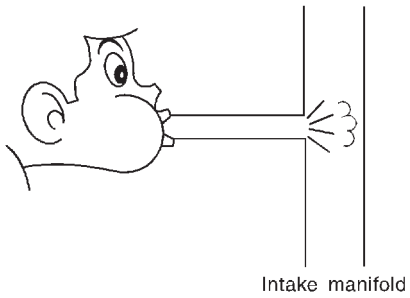
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-503.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

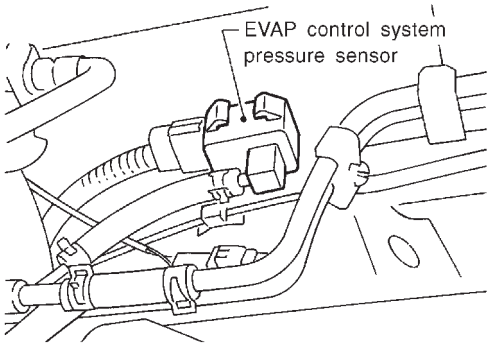
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

8	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF190S

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT

Refer to "DTC Confirmation Procedure" for DTC P0450, EC-392.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-509.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK CLOSED THROTTLE POSITION SWITCH

Refer to "Component Inspection", EC-429.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position switch with throttle position sensor.

12	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-34.

OK or NG

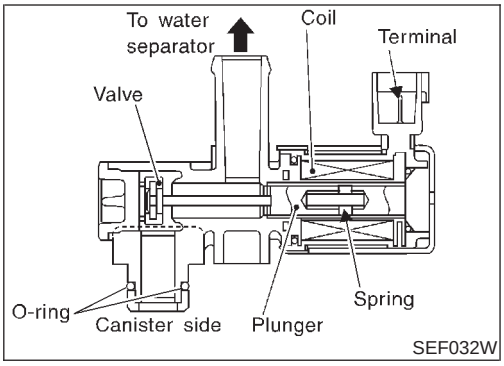
OK	▶	GO TO 13.
NG	▶	Replace it.

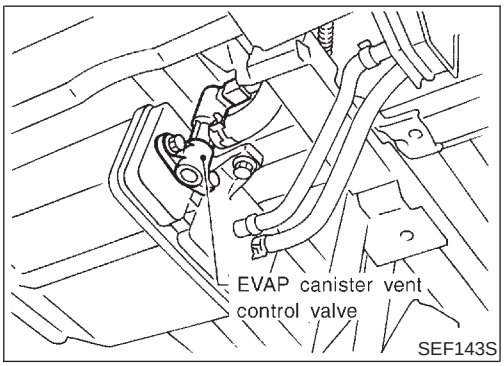
Diagnostic Procedure (Cont'd)

13	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 14.

14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**

Component Description





Component Description

NAEC0493

NOTE:
If DTC P1448 is displayed with P0440, perform trouble diagnosis for "DTC P1448" first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT Reference Value in Data Monitor Mode

NAEC0494

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0495

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	G/R	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0496

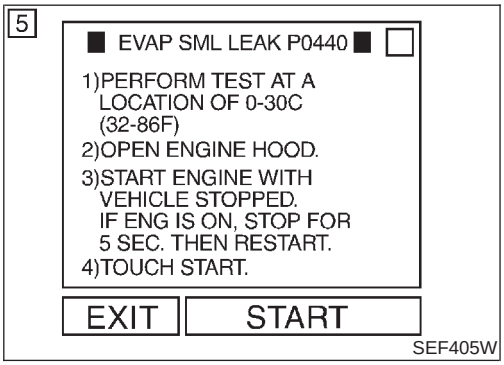
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448 0309	• EVAP canister vent control valve remains opened under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water. • Vacuum cut valve

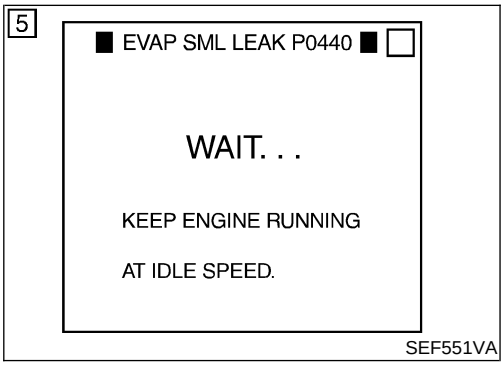
DTC Confirmation Procedure

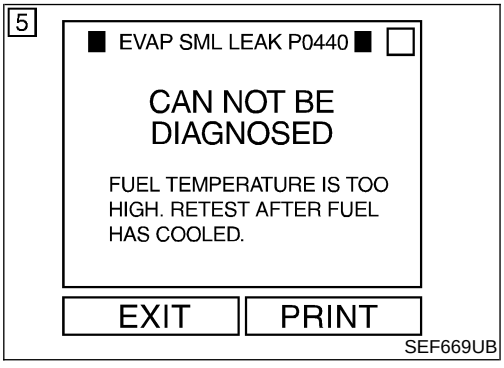
NAEC0497

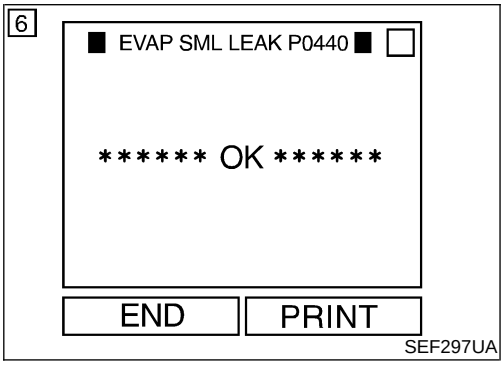
NOTE:

- **If DTC P1448 is displayed with P0440 or P0455, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.









With CONSULT

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT. Follow the instruction displayed.

NOTE:

- **If the CONSULT screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest.**
  (Use a fan to reduce the stabilization time.)
- **If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to "Basic Inspection", EC-99.**
- **The engine idle portion of this test (See illustration at left.) will take approximately 5 minutes.**

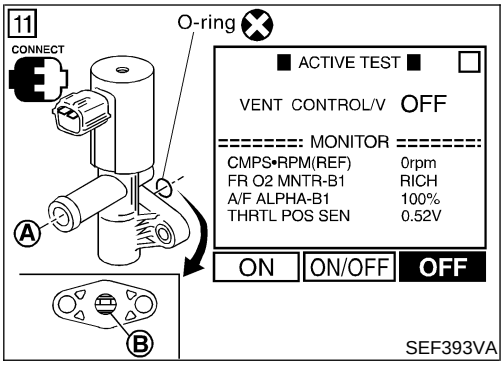
6) Make sure that "OK" is displayed.
   If "NG" is displayed, go to the following step.

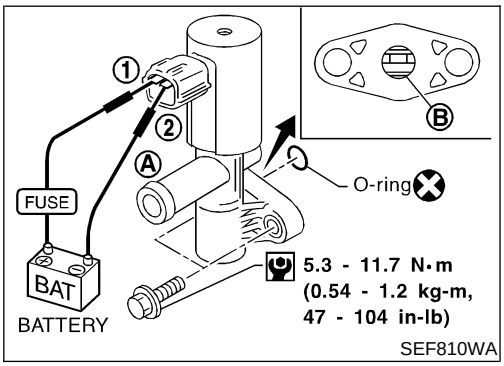
NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7) Stop engine and wait at least 5 seconds, then turn "ON".
8) Disconnect hose from water separator.
9) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT.
10) Touch "ON" and "OFF" alternately.

DTC Confirmation Procedure (Cont'd)





11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

If the result is NG, go to "Diagnostic Procedure", EC-522.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-369.

Overall Function Check

NAEC0498

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

Without CONSULT

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

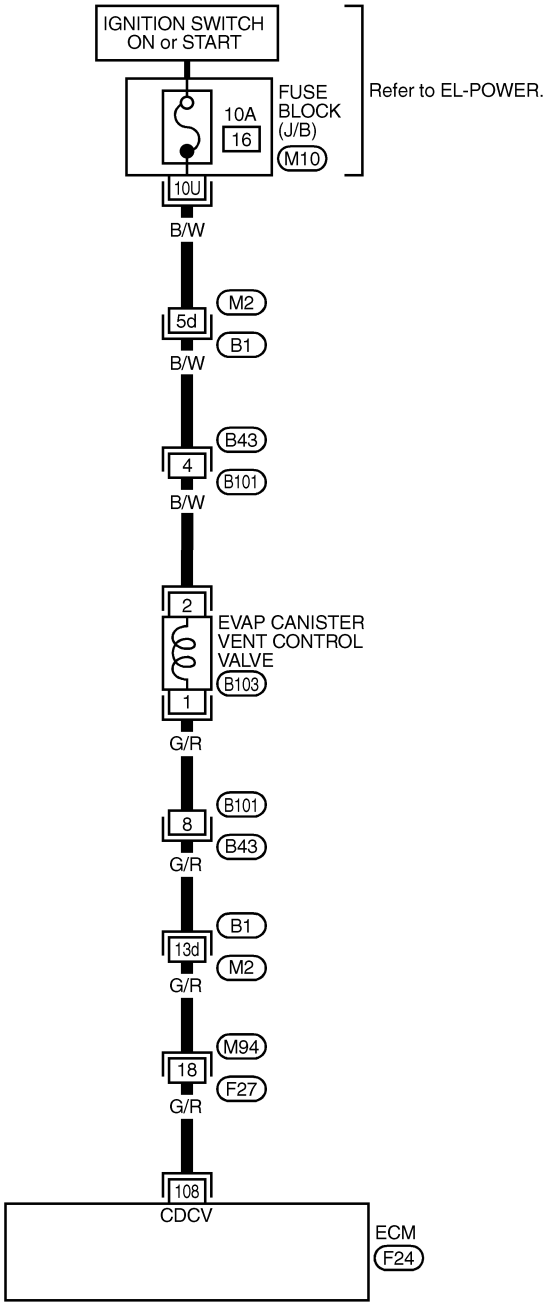
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-522.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-369.

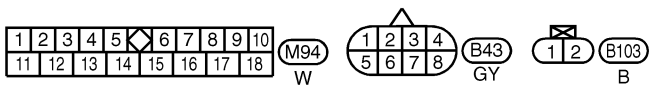
Wiring Diagram

NAEC0499

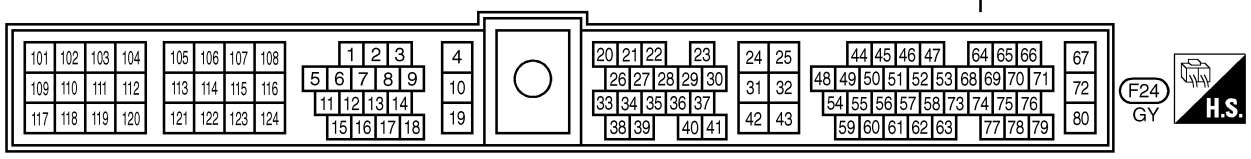
EC-VENT/V-01



: Detectable line for DTC
: Non-detectable line for DTC



Refer to last page (Foldout page).
M2 , B1
M10



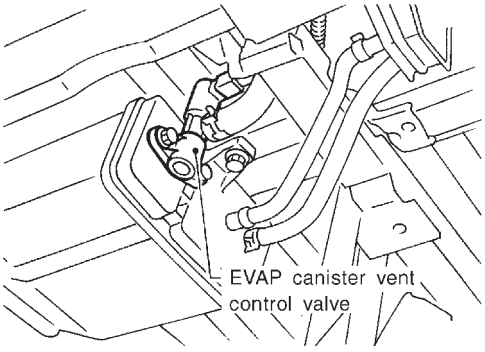
MEC671C

Diagnostic Procedure

NAEC0500

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check obstructed water separator and rubber tube connected to EVAP canister vent control valve.
3. Clean the rubber tube using air blower. For water separator, refer to EC-524.



SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to “Component Inspection”, EC-524.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	CHECK VACUUM CUT VALVE

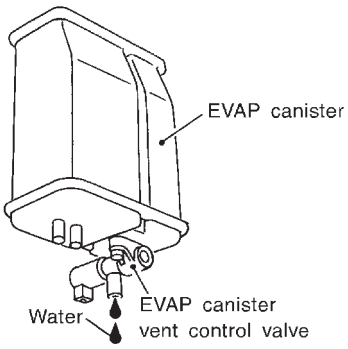
Refer to “Component Inspection”, EC-539.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace vacuum cut valve.

4	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

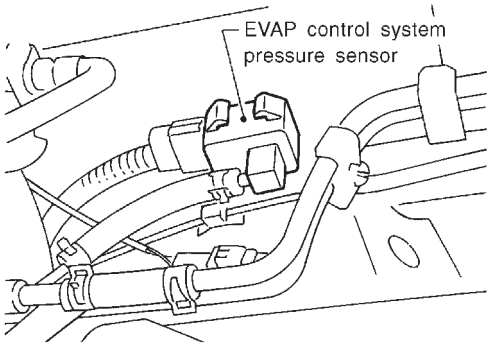
Yes	▶	GO TO 5.
No	▶	GO TO 7.

5	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK ▶	GO TO 7.
NG ▶	Replace the EVAP canister.

6	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**	
OK ▶	GO TO 8.
NG ▶	Repair it.

8	CHECK CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	



SEF190S

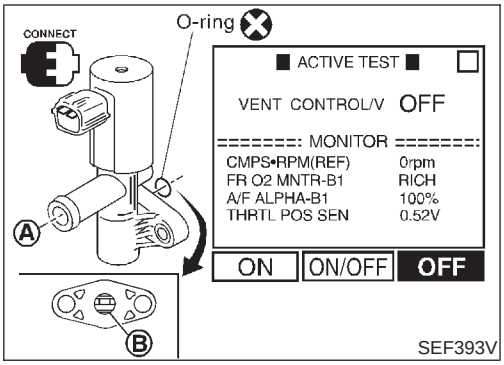
2. Check connectors for water.
   Water should not exist.

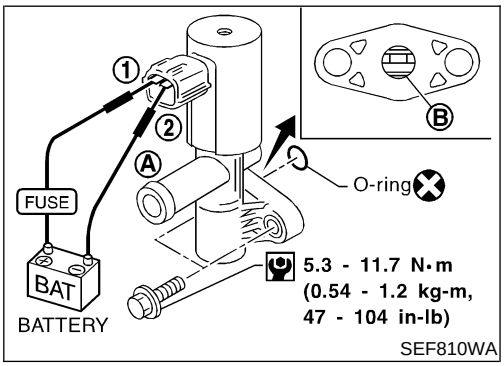
OK or NG

OK ▶	GO TO 9.
NG ▶	Replace EVAP control system pressure sensor.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-392. **OK or NG**	
OK ▶	GO TO 10.
NG ▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**





Component Inspection

NAEC0501

EVAP CANISTER VENT CONTROL VALVE

NAEC0501S01

Check air passage continuity.

With CONSULT

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

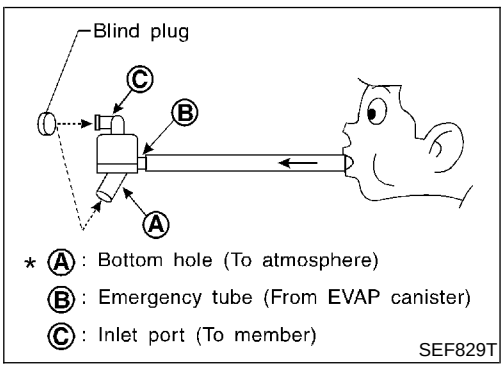
Without CONSULT

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

Make sure new O-ring is installed properly.



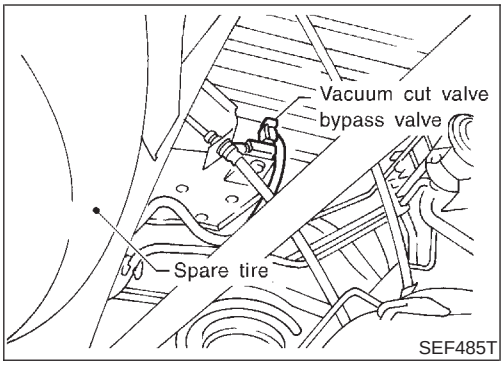
WATER SEPARATOR

NAEC0501S02

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



Description

NAEC0502

COMPONENT DESCRIPTION

NAEC0502S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

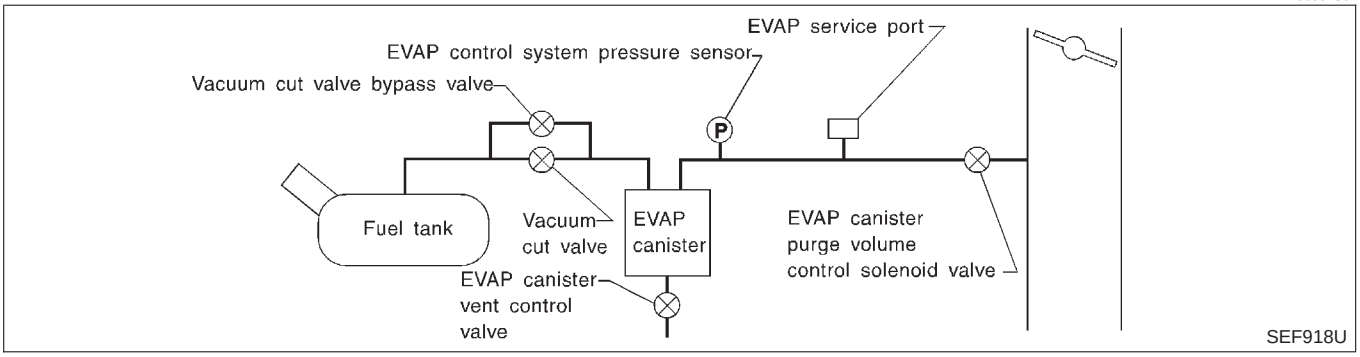
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC0502S02



CONSULT Reference Value in Data Monitor Mode

NAEC0503

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0504

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	G/R	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0505

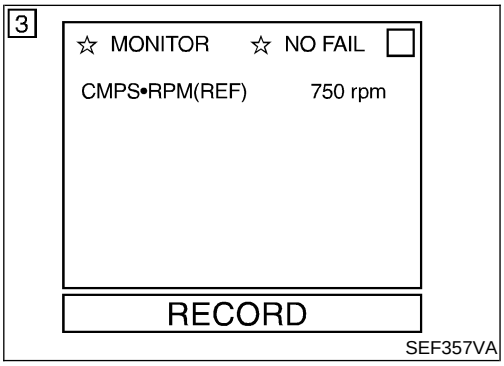
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490 0801	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	• Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) • Vacuum cut valve bypass valve

DTC Confirmation Procedure

NAEC0506

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

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



With CONSULT
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-528.

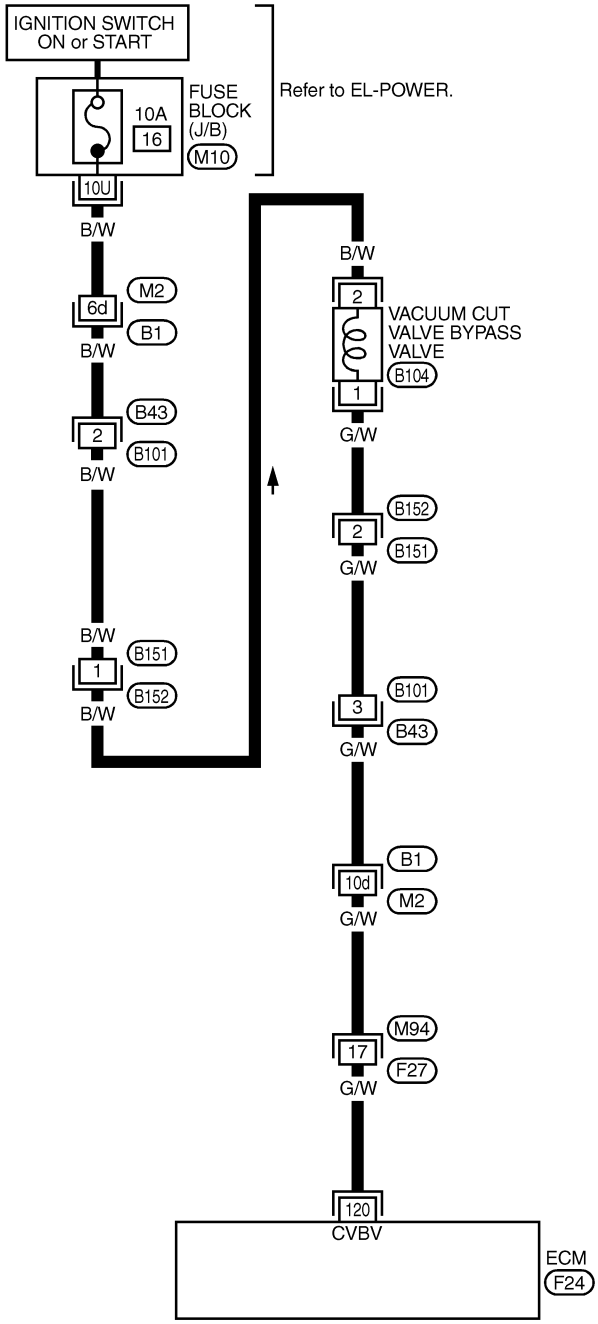
With GST
1) Start engine and wait at least 5 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-528.

No Tools
1) Start engine and wait at least 5 seconds.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-528.

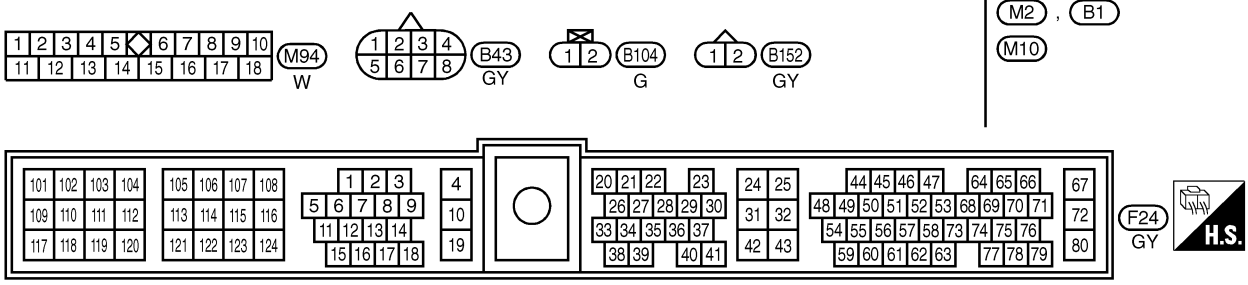
Wiring Diagram

NAEC0507

EC-BYPS/V-01



: Detectable line for DTC
: Non-detectable line for DTC



Refer to last page (Foldout page).
M2 , B1
M10

MEC676C

Diagnostic Procedure

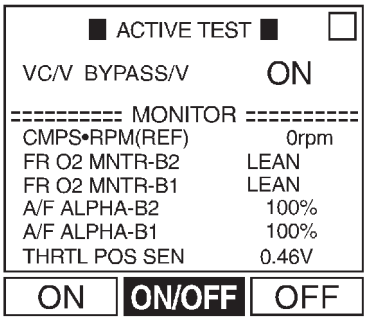
NAEC0508

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

With CONSULT

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT.
3. Touch “ON/OFF” on CONSULT screen.



SEF909U

4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

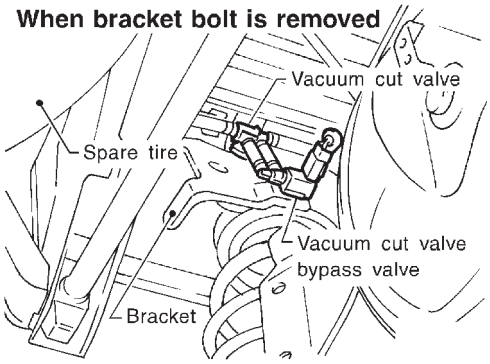
OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

3	CHECK POWER SUPPLY

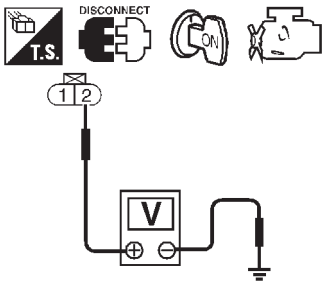
Without CONSULT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF486T

3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF877T

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

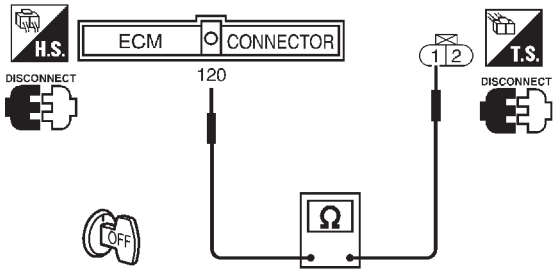
Check the following.

- Harness connectors M2, B1
- Harness connectors B43, B101
- Harness connectors B151, B152
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

	▶	Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 120 and terminal 1.



SEF394V

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B151, B152
- Harness connectors B101, B43
- Harness connectors B1, M2
- Harness connectors M94, F27
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7	CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to "Component Inspection", EC-539.

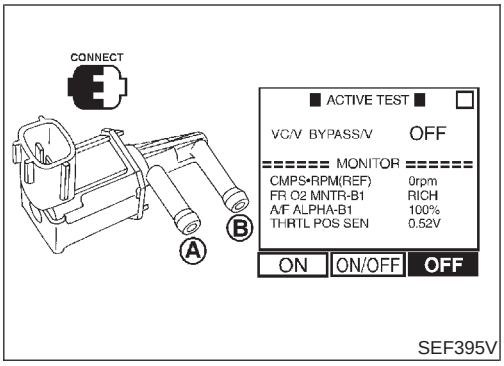
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

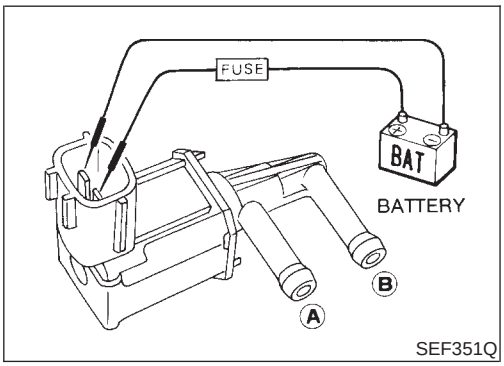
8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF395V



SEF351Q

Component Inspection

NAEC0509

VACUUM CUT VALVE BYPASS VALVE

NAEC0509S01

Check air passage continuity.

With CONSULT

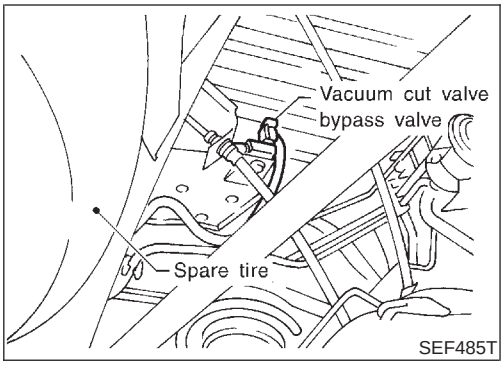
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.



Description

NAEC0510

COMPONENT DESCRIPTION

NAEC0510S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

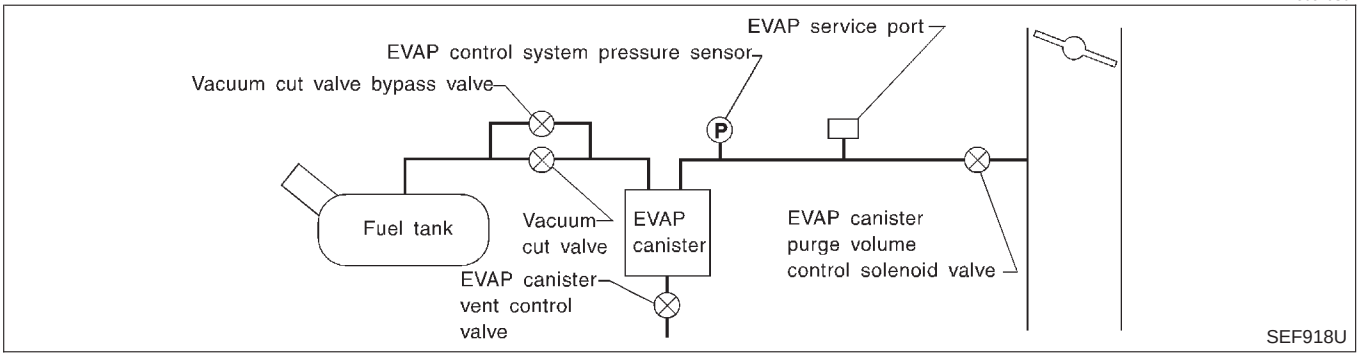
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC0510S02



CONSULT Reference Value in Data Monitor Mode

NAEC0511

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0512

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

CAUTION:

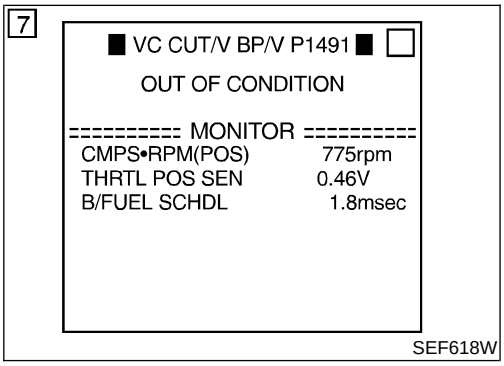
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	G/R	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

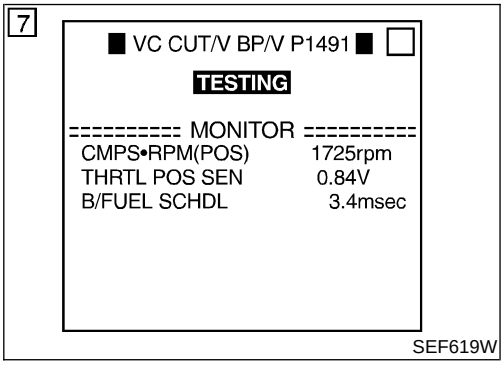
On Board Diagnosis Logic

NAEC0513

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491 0311	Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor and circuit • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging



SEF618W



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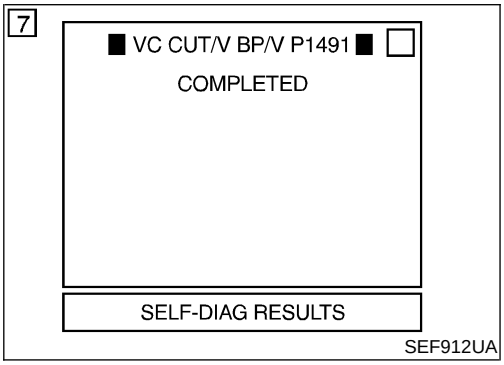


SEF912UA

DTC Confirmation Procedure

NAEC0514

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 0 to 30°C (32 to 86°F).

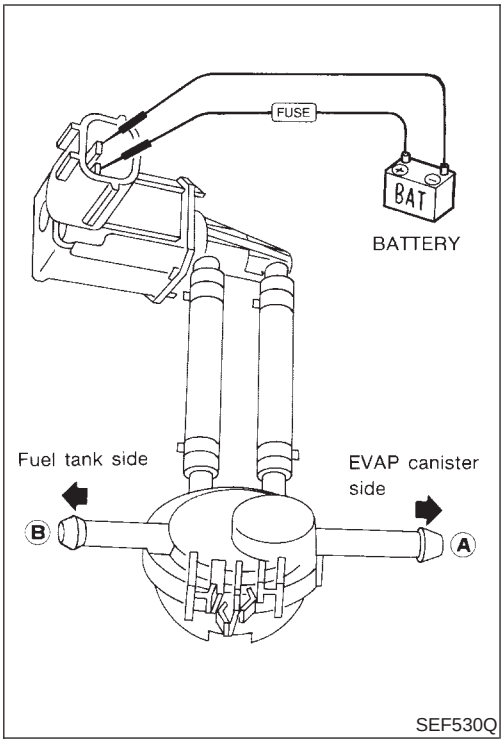
With CONSULT

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
6) Touch "START".
7) When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS·RPM (POS)	500 - 3,300 rpm (M/T) 500 - 3,000 rpm (A/T)
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 5 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-536.



Overall Function Check

NAEC0515

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

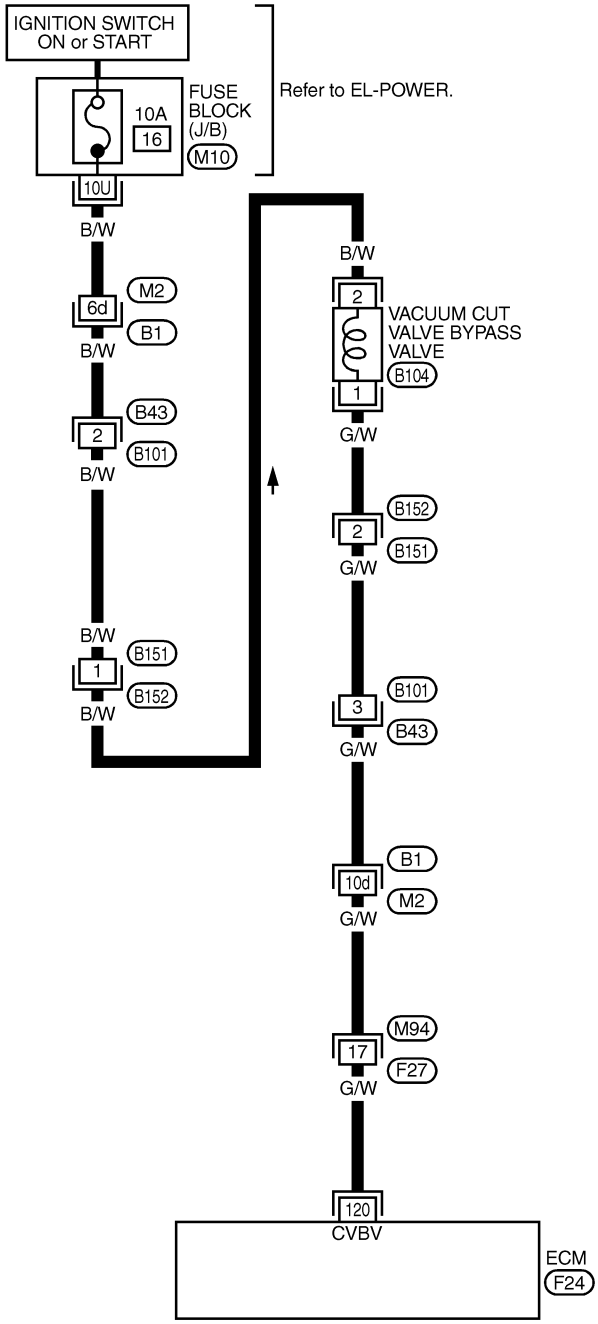
Without CONSULT

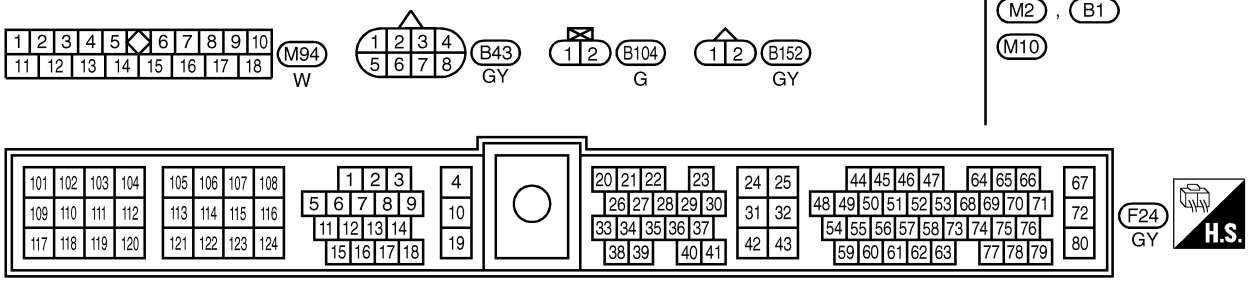
1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5) Supply battery voltage to the terminal.
6) Blow air in port **A** and check that air flows freely out of port **B**.
7) Blow air in port **B** and check that air flows freely out of port **A**.
8) If NG, go to “Diagnostic Procedure”, EC-536.

Wiring Diagram

NAEC0516

EC-BYPS/V-01





Refer to last page (Foldout page).
M2 , B1
M10

MEC676C

Diagnostic Procedure

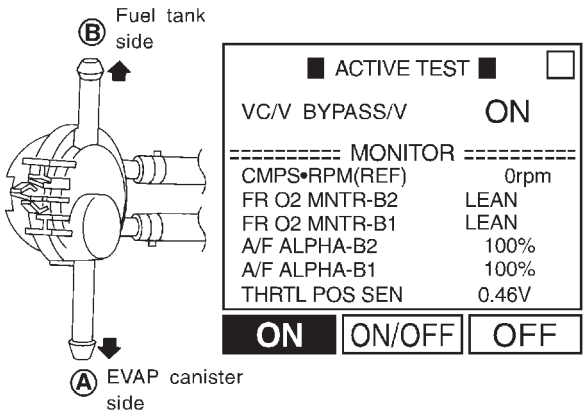
NAEC0517

1	INSPECTION START	
Do you have CONSULT?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION	

With CONSULT

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



SEF913U

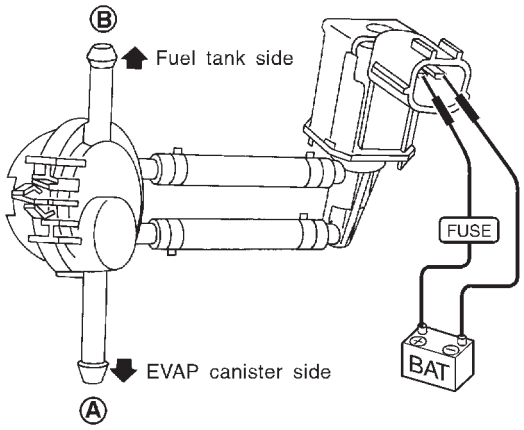
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT

1. Turn ignition switch "OFF".
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-31.

OK or NG

OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

5	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

6	CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to "Component Inspection", EC-539.

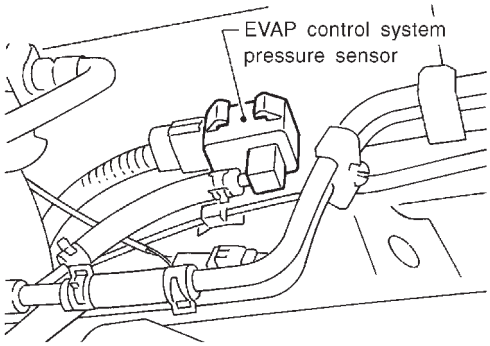
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

Diagnostic Procedure (Cont'd)

7	CHECK VACUUM CUT VALVE	
Refer to "Component Inspection", EC-539.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve.

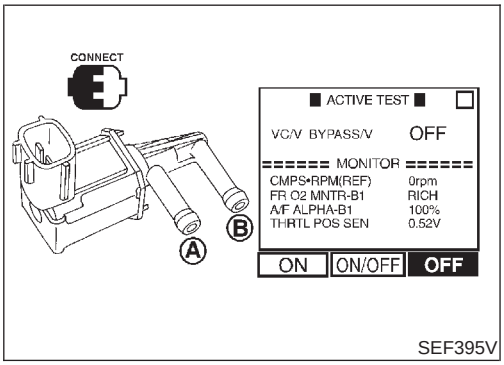
8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it

9	CHECK CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
 SEF190S		
2. Check connectors for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

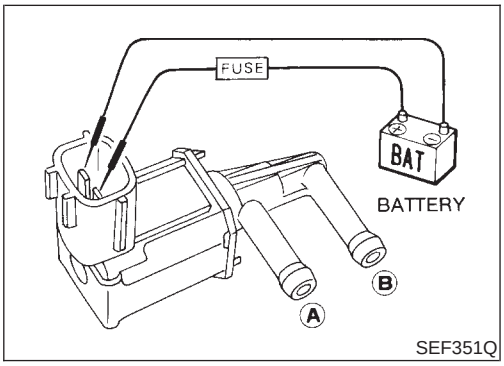
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-392.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to "Component Inspection", EC-524.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

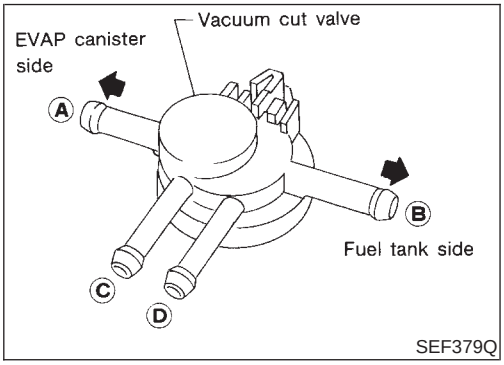
12	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF395V



SEF351Q



SEF379Q

Component Inspection

NAEC0518

VACUUM CUT VALVE BYPASS VALVE

NAEC0518S01

Check air passage continuity.

With CONSULT

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT

Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals	Yes
No supply	No

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

VACUUM CUT VALVE

NAEC0518S02

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

Component Description

NAEC0338

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

NAEC0339

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

CAUTION:

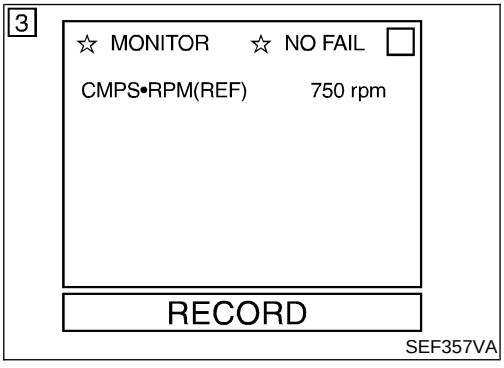
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/G	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	0 - 3.0V

On Board Diagnosis Logic

NAEC0340

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	• An incorrect signal from TCM (Transmission control module)s is sent to ECM.	• Harness or connectors [The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.] • Dead (Weak) battery • TCM (Transmission control module)



DTC Confirmation Procedure

NAEC0341

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

With CONSULT

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-543.

With GST

1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-543.

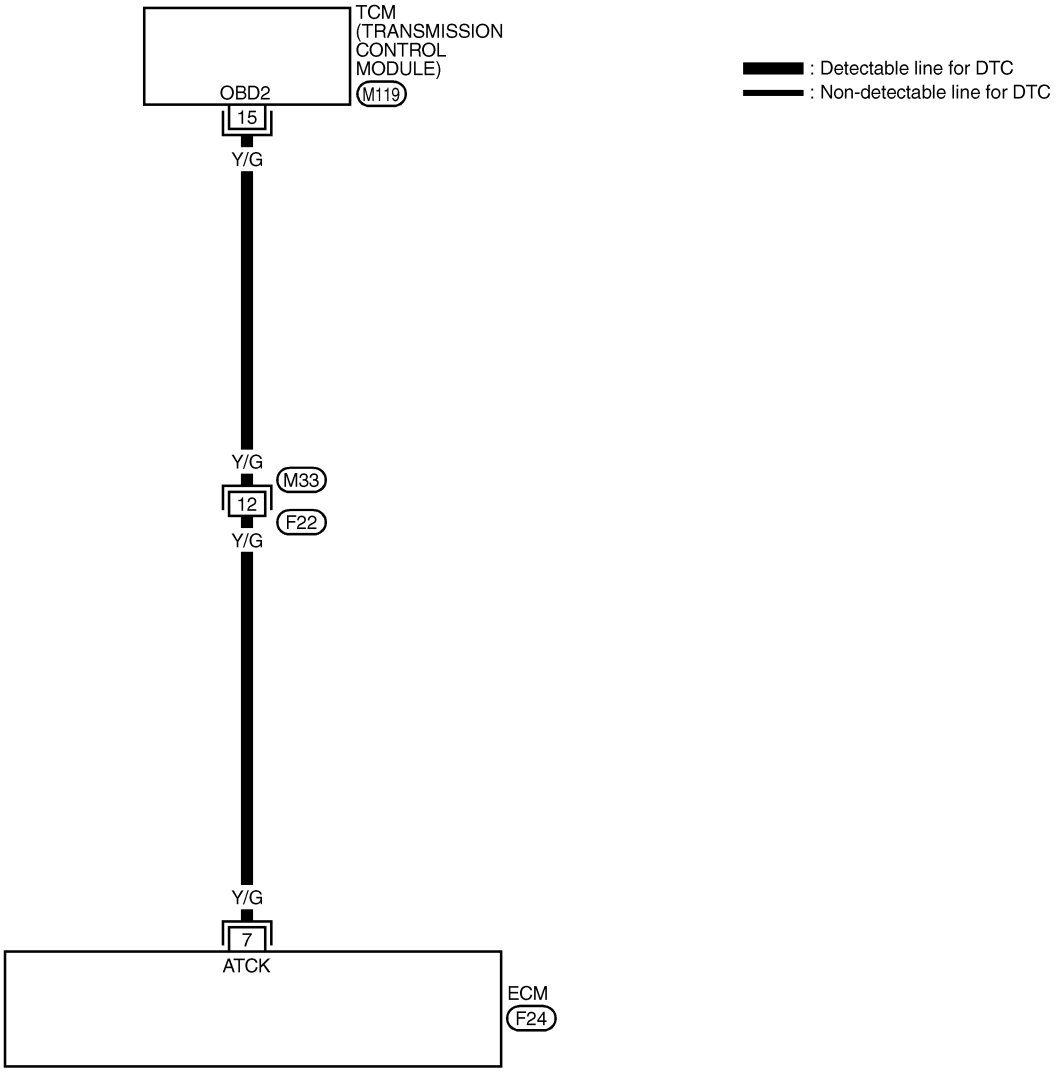
No Tools

1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-543.

Wiring Diagram

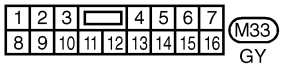
NAEC0342

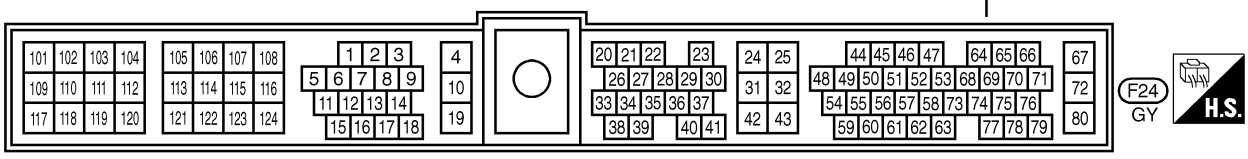
EC-ATDIAG-01



Refer to last page (Foldout page).

M119





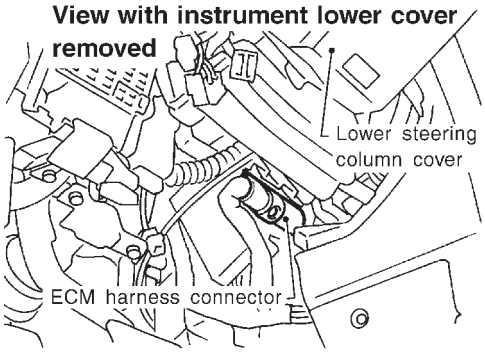
MEC677C

Diagnostic Procedure

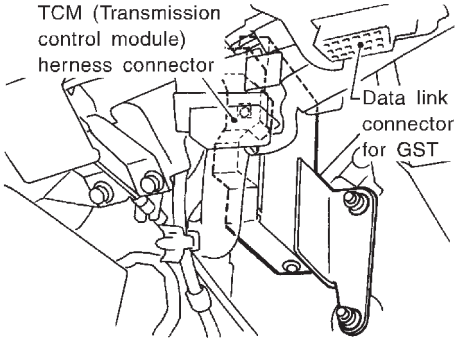
NAEC0343

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

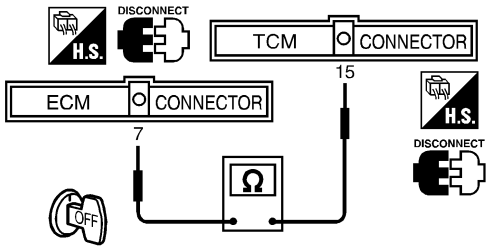


SEF981R



SEF017SA

3. Check harness continuity between ECM terminal 7 and TCM (Transmission control module) terminal 15.



SEF854W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

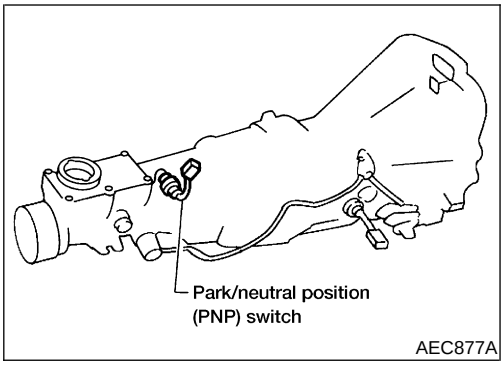
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M33, F22
- Harness for open or short between ECM and TCM (Transmission control module)

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

Diagnostic Procedure (Cont'd)

3	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



Component Description

NAEC0272

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT Reference Value in Data Monitor Mode

NAEC0273

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

ECM Terminals and Reference Value

NAEC0274

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch “ON”]** • Gear position is “N” or “P” (A/T models) • Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch “ON”] • Except the above gear position	BATTERY VOLTAGE (A/T) (11 - 14V) Approximately 5V (M/T)

On Board Diagnosis Logic

NAEC0275

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706 1003	• The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

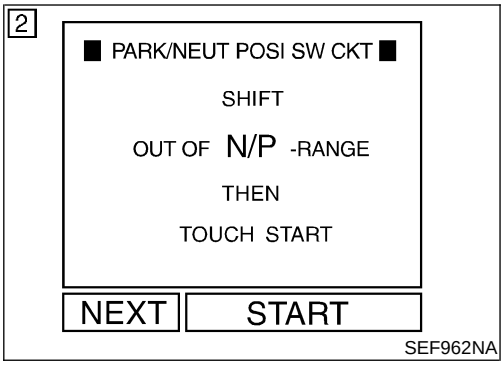
DTC Confirmation Procedure

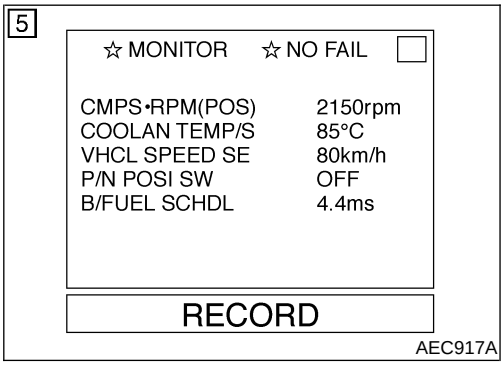
NAEC0276

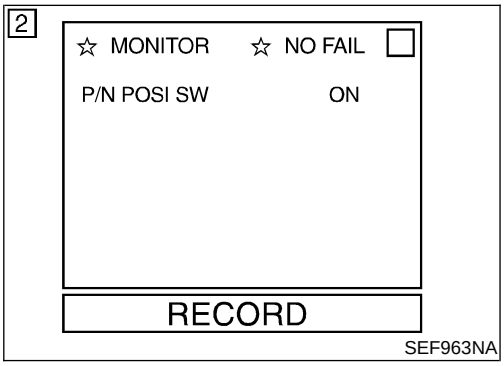
CAUTION:
Always drive vehicle at a safe speed.

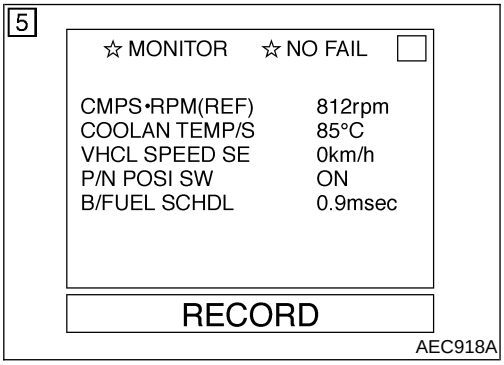
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)









With CONSULT

1) Turn ignition switch "ON".
2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.
   If NG, go to "Diagnostic Procedure", EC-549.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

CMPS·RPM (REF)	1,600 - 2,600 rpm (A/T models) 1,700 - 2,700 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.9 - 5.5 msec (M/T models)
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

6) If 1st DTC is detected, go to "Diagnostic Procedure", EC-549 and 551.

With CONSULT

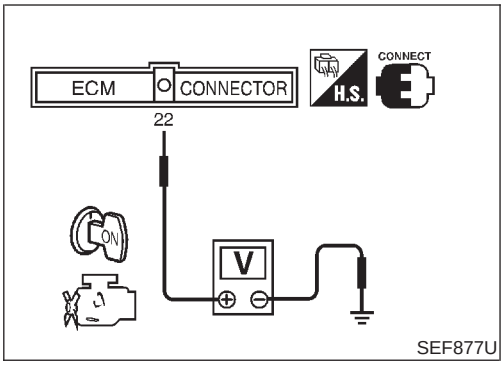
1) Turn ignition switch "ON".
2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

   If NG, go to "Diagnostic Procedure", EC-549 or 551.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

CMPS·RPM (REF)	1,600 - 2,600 rpm (A/T models) 1,700 - 2,700 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.7 - 6.5 msec (A/T models) 1.9 - 5.5 msec (M/T models)
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

6) If 1st DTC is detected, go to "Diagnostic Procedure", EC-549 and 551.



Overall Function Check

NAEC0519

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT

1) Turn ignition switch “ON”.
2) Check voltage between ECM terminal 22 and body ground under the following conditions.

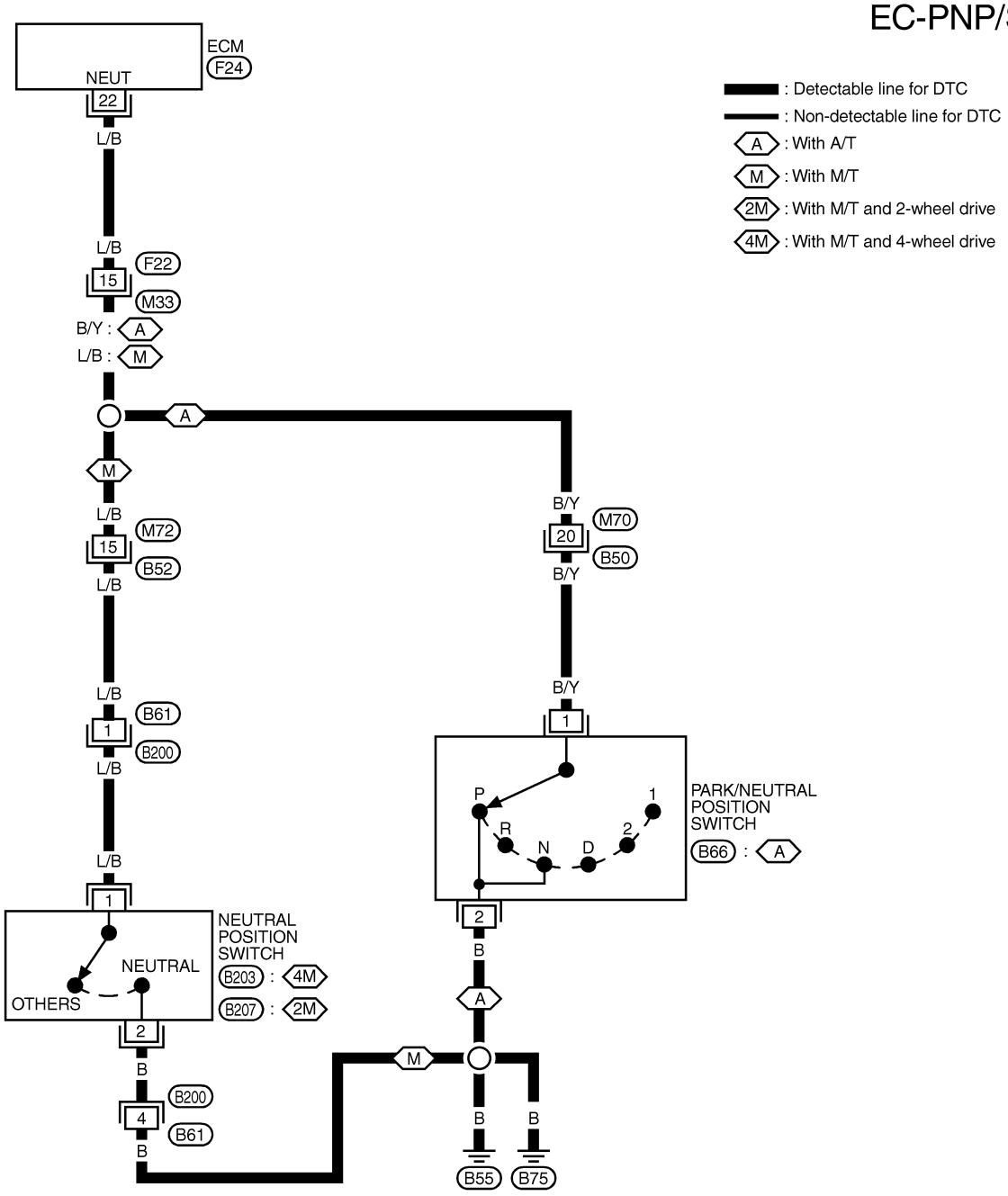
Condition (Gear position)	Voltage V (Known good data)
“P” (A/T only) and “N” position	Approx. 0
Except the above position	BATTERY VOLTAGE (11 - 14V) (A/T) Approx. 5 (M/T)

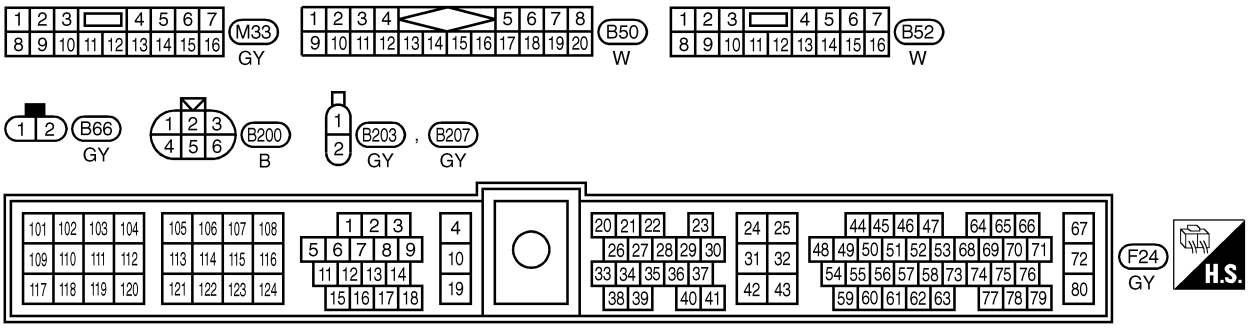
3) If NG, go to “Diagnostic Procedure”, EC-549.

Wiring Diagram

NAEC0277

EC-PNP/SW-01





MEC678C

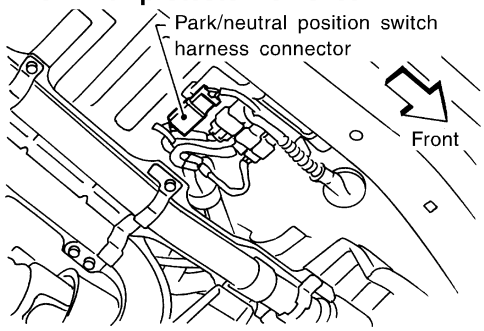
Diagnostic Procedure For A/T Models

NAEC0278

1	CHECK GROUND CIRCUIT

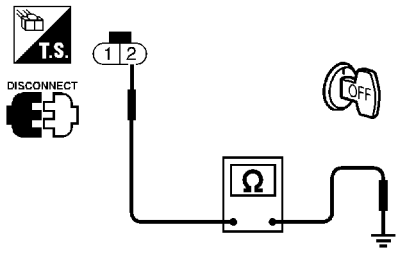
1. Turn ignition switch “OFF”.
2. Disconnect park/neutral position switch harness connector.

View with protector removed



SEF010SA

3. Check harness continuity between terminal 2 and body ground.



SEF762U

Continuity should exist.

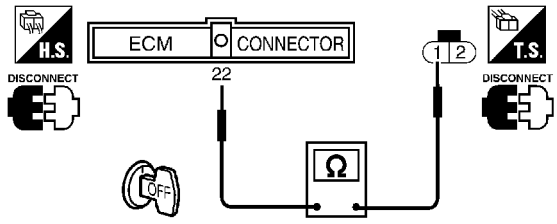
4. Also check harness for short to ground and short to power.

OK or NG

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

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and switch terminal 1.



SEF763U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F22, M33 ● Harness connectors M70, B50 ● Harness for open or short between ECM and park/neutral position (PNP) switch	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH
Refer to AT-104, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH".	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace park/neutral position (PNP) switch.

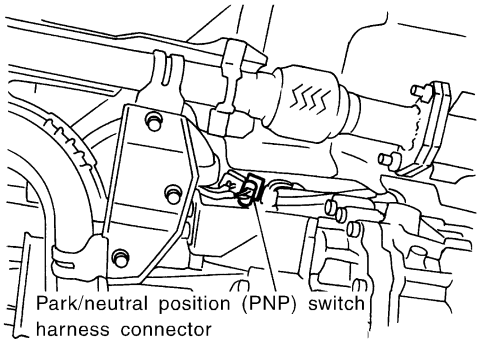
5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**

Diagnostic Procedure For M/T Models

=NAEC0520

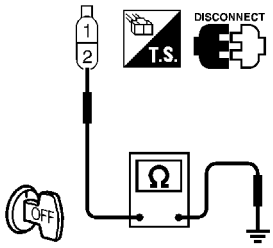
1	CHECK GROUND CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect park/neutral position (PNP) switch harness connector.



SEF011SA

3. Check harness continuity between terminal 2 and body ground.



SEF766U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

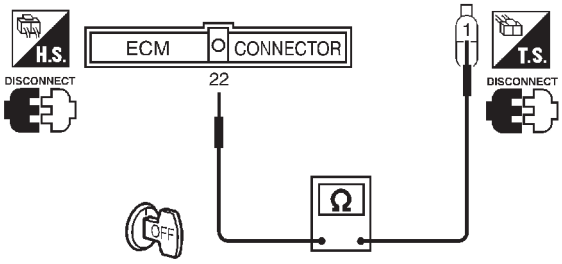
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B200, B61
- Harness for open or short between park/neutral position (PNP) switch and body ground

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

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and terminal 1.



SEF767U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33
- Harness connectors M72, B52
- Harness connectors B61, B200
- Harness for open or short between ECM and park/neutral position (PNP) switch

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

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to MT-6, "Position Switch Check", "ON-VEHICLE SERVICE".

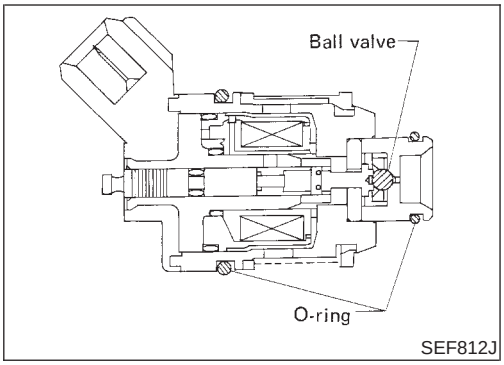
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



Component Description

NAEC0345

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT Reference Value in Data Monitor Mode

NAEC0525

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec

ECM Terminals and Reference Value

NAEC0346

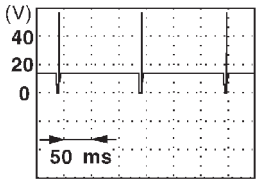
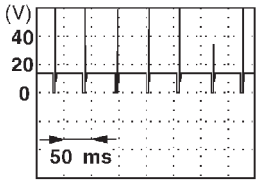
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	L/B	ECCS relay (Self-shut-off)	**[Engine is running]** **[Ignition switch “OFF”]** ● For a few seconds after turning ignition switch “OFF”	0 - 1.5V
			[Ignition switch “OFF”] ● A few seconds passed after turning ignition switch “OFF”	BATTERY VOLTAGE (11 - 14V)

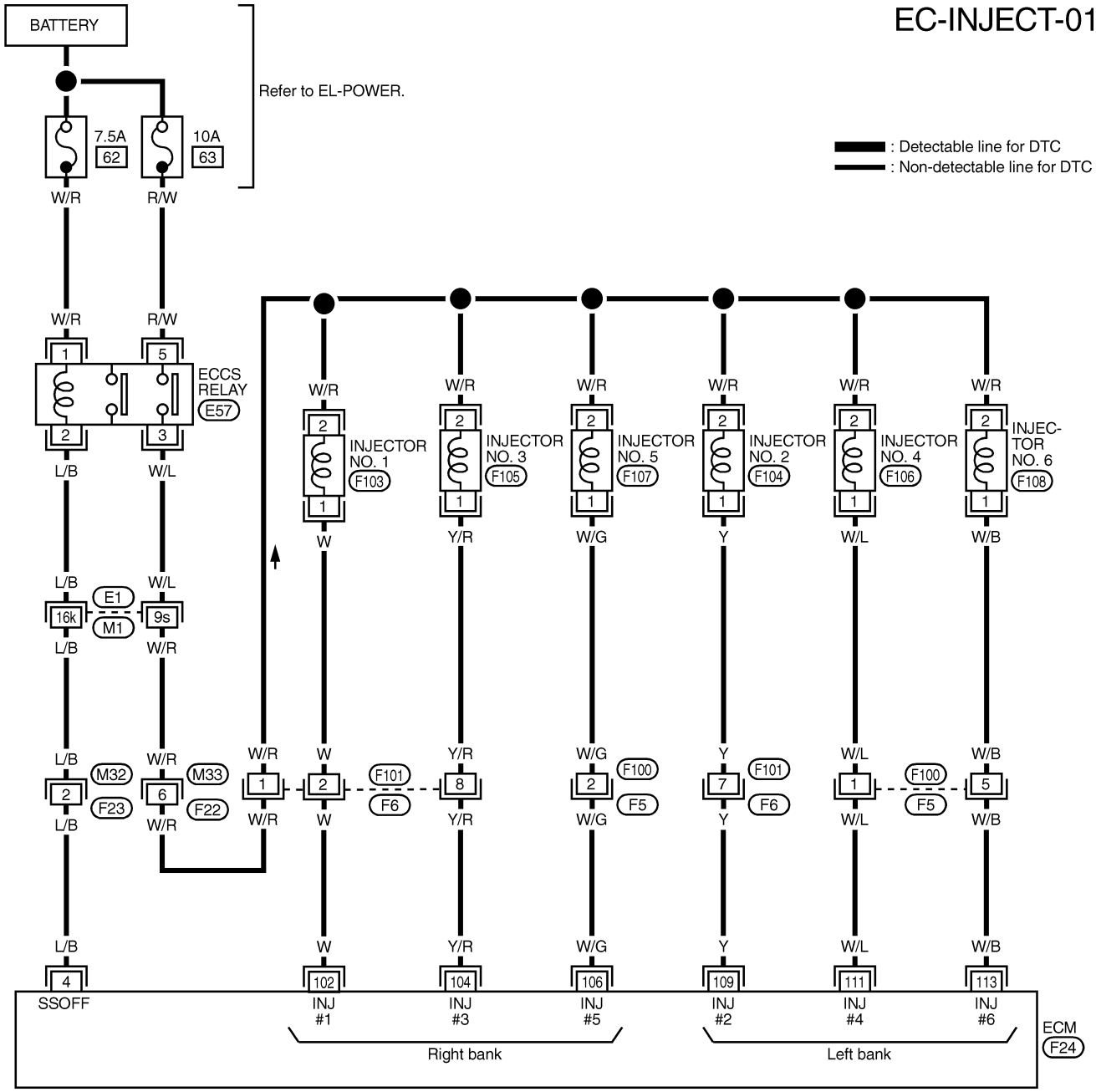
ECM Terminals and Reference Value (Cont'd)

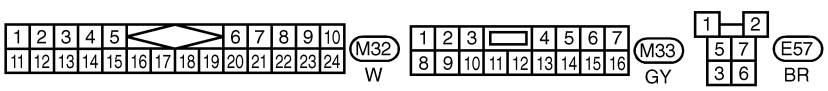
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W Y/R W/G Y W/L W/B	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V

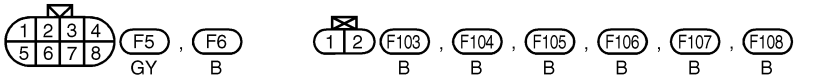
Wiring Diagram

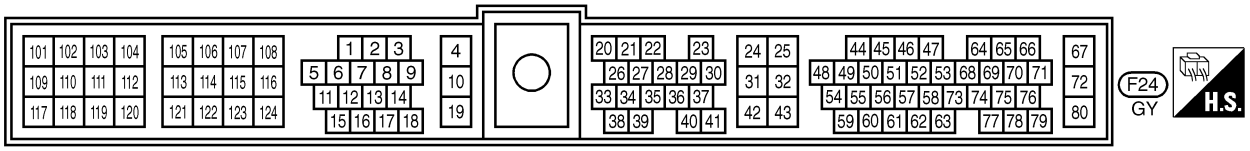
NAEC0344

EC-INJECT-01









Refer to last page (Foldout page).
M1 , E1

MEC706C

Diagnostic Procedure

=NAEC0347

1	INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

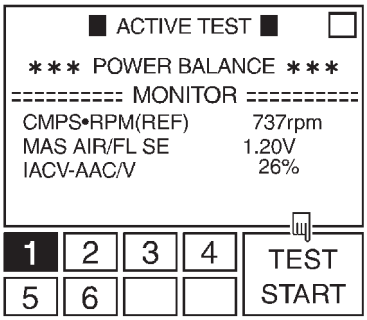
Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 9.

2	CHECK OVERALL FUNCTION

With CONSULT

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT.

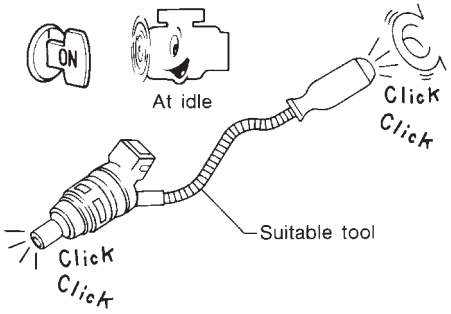


SEF389V

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

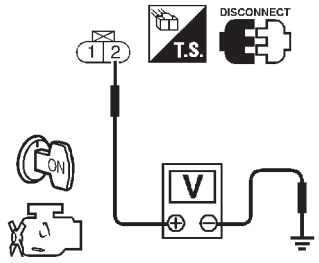
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

3	CHECK POWER SUPPLY-I

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF731U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

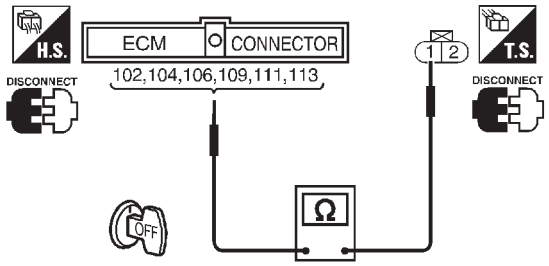
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F6, M101
- Harness for open or short between injector and harness connector F101

	▶	Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 1 and ECM terminals 102, 104, 106, 109, 111, 113.



SEF732U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F100, F5
- Harness connectors F101, F6
- Harness for open or short between ECM and injector

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

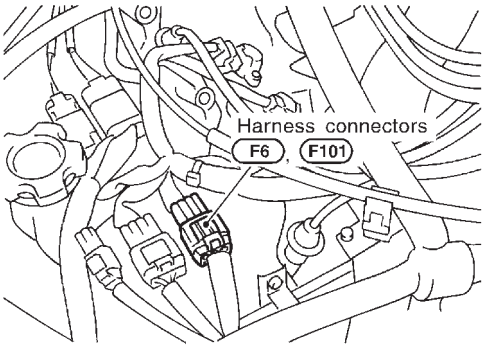
Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR	
Refer to "Component Inspection" EC-561.		
	OK or NG	
OK	▶	GO TO 8.
NG	▶	Replace injector.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.		
	▶	**INSPECTION END**

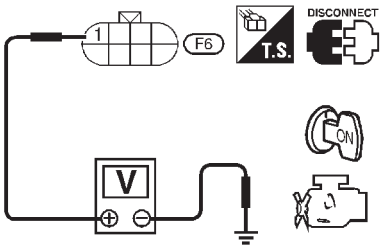
9	CHECK POWER SUPPLY-II	

1. Turn ignition switch "OFF".
2. Disconnect harness connectors F6 and F101.



SEF768U

3. Turn ignition switch "ON".
4. Check voltage between harness connector F6 terminal 1 and ground with CONSULT or tester.



SEF769U

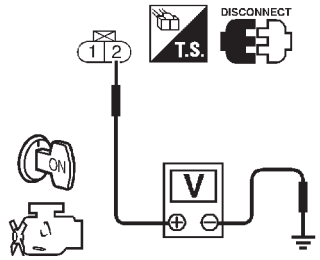
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 11.

10	CHECK POWER SUPPLY-III

1. Turn ignition switch "OFF".
2. Reconnect harness connectors F6 and F101.
3. Disconnect injector harness connector.
4. Turn ignition switch "ON".
5. Check voltage between terminal 2 and ground with CONSULT or tester.



SEF731U

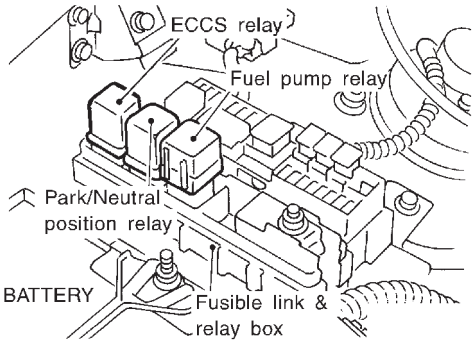
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

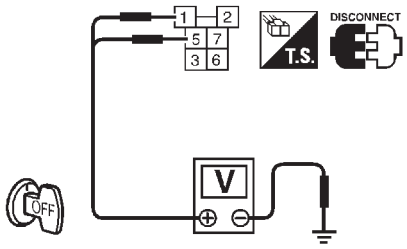
11	CHECK POWER SUPPLY-IV

1. Turn ignition switch "OFF".
2. Disconnect ECCS relay.



SEF681U

3. Check voltage between terminals 1, 5 and ground with CONSULT or tester.



SEF770U

Voltage: Battery voltage

OK or NG

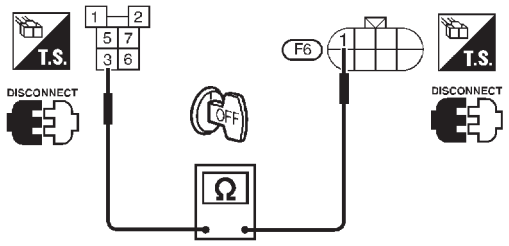
OK	▶	GO TO 13.
NG	▶	GO TO 12.

Diagnostic Procedure (Cont'd)

12	DETECT MALFUNCTIONING PART
Check the following: ● 7.5A fuse ● 10A fuse ● Harness for open or short between ECCS relay and battery	
▶	Repair harness or connectors.

13	CHECK POWER SUPPLY-V

1. Check harness continuity between relay terminal 3 and harness connector F6 terminal 1.



SEF771U

Continuity should exist.

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

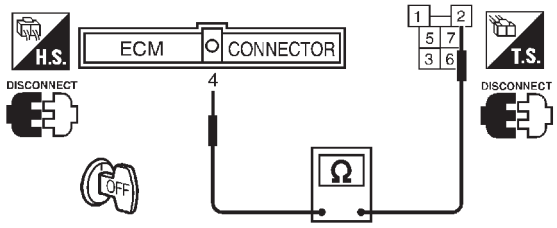
OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open or short between ECCS relay and harness connector F6	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and relay terminal 2.



SEF677U

Continuity should exist.

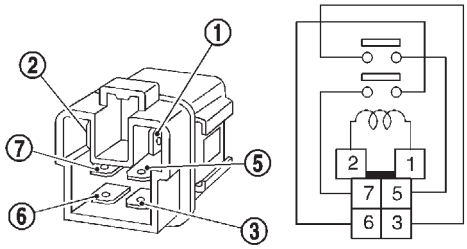
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M32, F23 ● Harness for open or short between ECM and ECCS relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

17	CHECK ECCS RELAY
1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5, 6 and 7.	

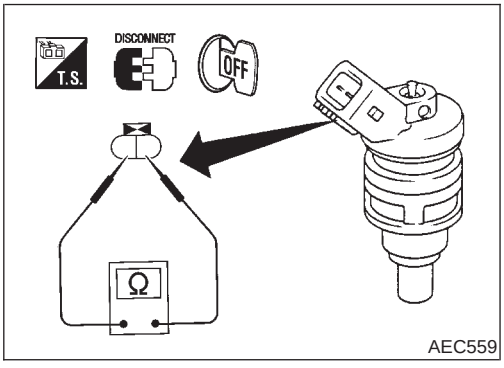


SEF745U

12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

OK	▶	Go to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-137.
NG	▶	Replace ECCS relay.



AEC559

Component Inspection

NAEC0348

INJECTOR

NAEC0348S01

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω [at 25°C (77°F)]
   If NG, replace injector.

CONSULT Reference Value in Data Monitor Mode

NAEC0350

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NAEC0351

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

CAUTION:

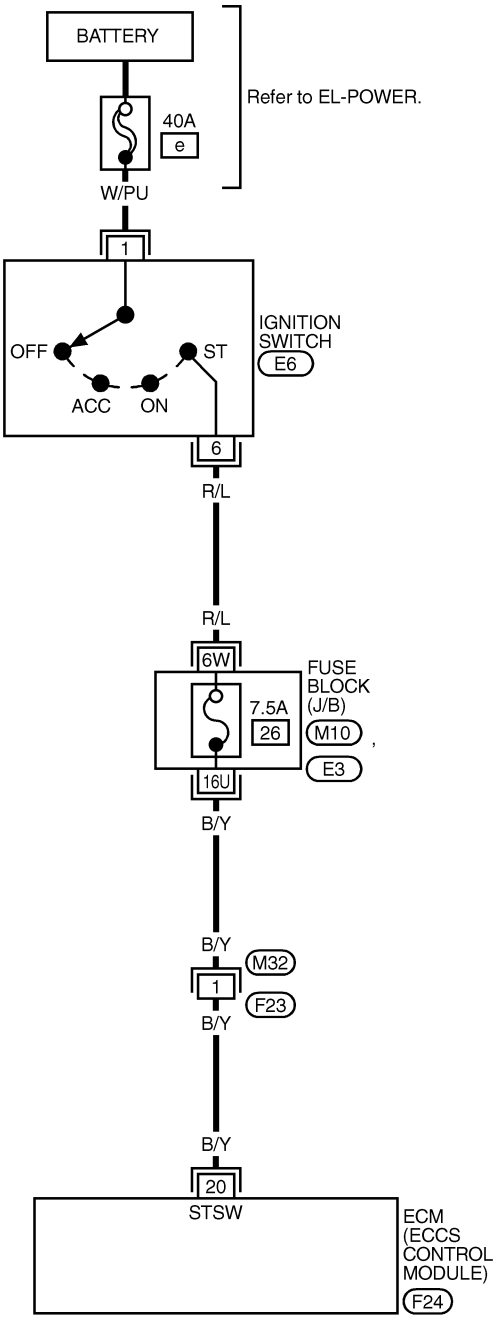
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

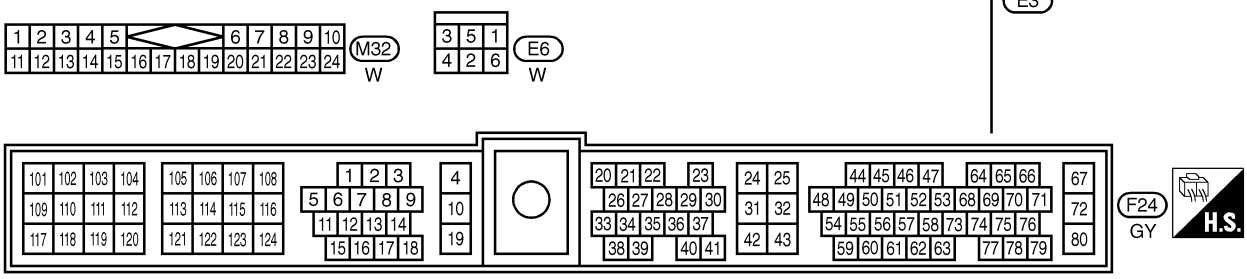
NAEC0349

EC-S/SIG-01



: Detectable line for DTC
: Non-detectable line for DTC

Refer to last page (Foldout page).
M10
E3



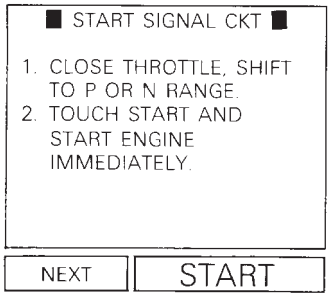
MEC682C

Diagnostic Procedure

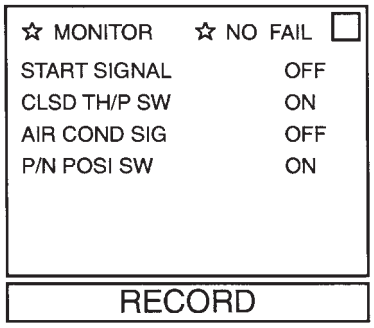
NAEC0352

1	INSPECTION START	
Do you have CONSULT?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION	
With CONSULT 1. Turn ignition switch “ON”. 2. Perform “START SIGNAL CKT” in “FUNCTION TEST” mode with CONSULT.		
With CONSULT 1. Turn ignition switch “ON”. 2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 4.



SEF191L



SEF111P

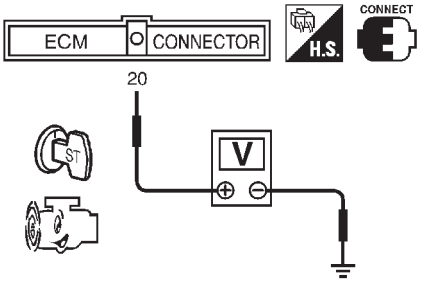
Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

MTBL0147

3	CHECK OVERALL FUNCTION

Without CONSULT

1. Turn ignition switch to "START".
2. Check voltage between ECM terminal 20 and ground.



SEF733U

Condition	Voltage
Ignition switch "START"	Battery voltage
Other positions	Approximately 0V

MTBL0148

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK STARTING SYSTEM

Turn ignition switch "OFF", then turn it to "START".
Does starter motor operate?

Yes or No

Yes	▶	GO TO 5.
No	▶	Refer to EL section "STARTING SYSTEM".

5	CHECK FUSE

1. Disconnect 7.5A fuse.
2. Check if 7.5A fuse is OK.

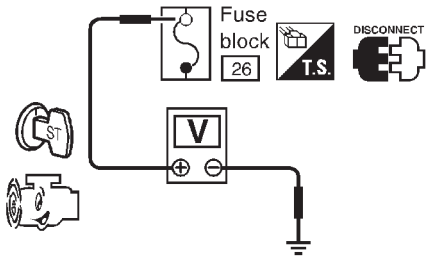
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace 7.5A fuse.

Diagnostic Procedure (Cont'd)

6	CHECK INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch to "START".
2. Check voltage between fuse block and ground with CONSULT or tester.



SEF734U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

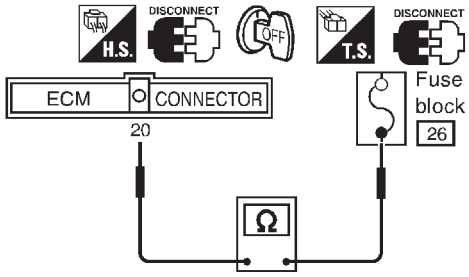
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E3
- Fuse block (J/B)
- Harness for open or short between fuse block and ignition switch

	▶	Repair harness or connectors.

8	CHECK INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 20 and fuse block.



SEF735U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Harness connectors M10
- Fuse block (J/B)
- Harness for open or short between ECM and fuse block

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

Diagnostic Procedure (Cont'd)

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**

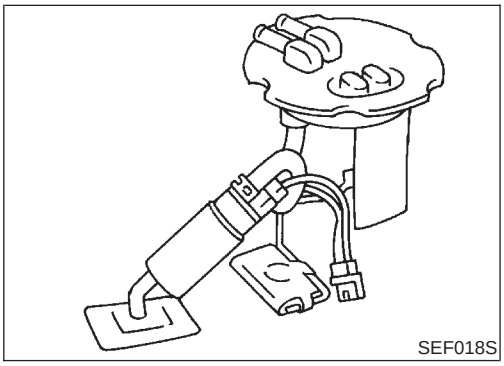
System Description

NAEC0353

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops


SEF018S

Component Description

NAEC0524

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT Reference Value in Data Monitor Mode

NAEC0354

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 5 seconds.) ● Engine running and cranking	ON
	Except as shown above	OFF

ECM Terminals and Reference Value

=NAEC0355

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

CAUTION:

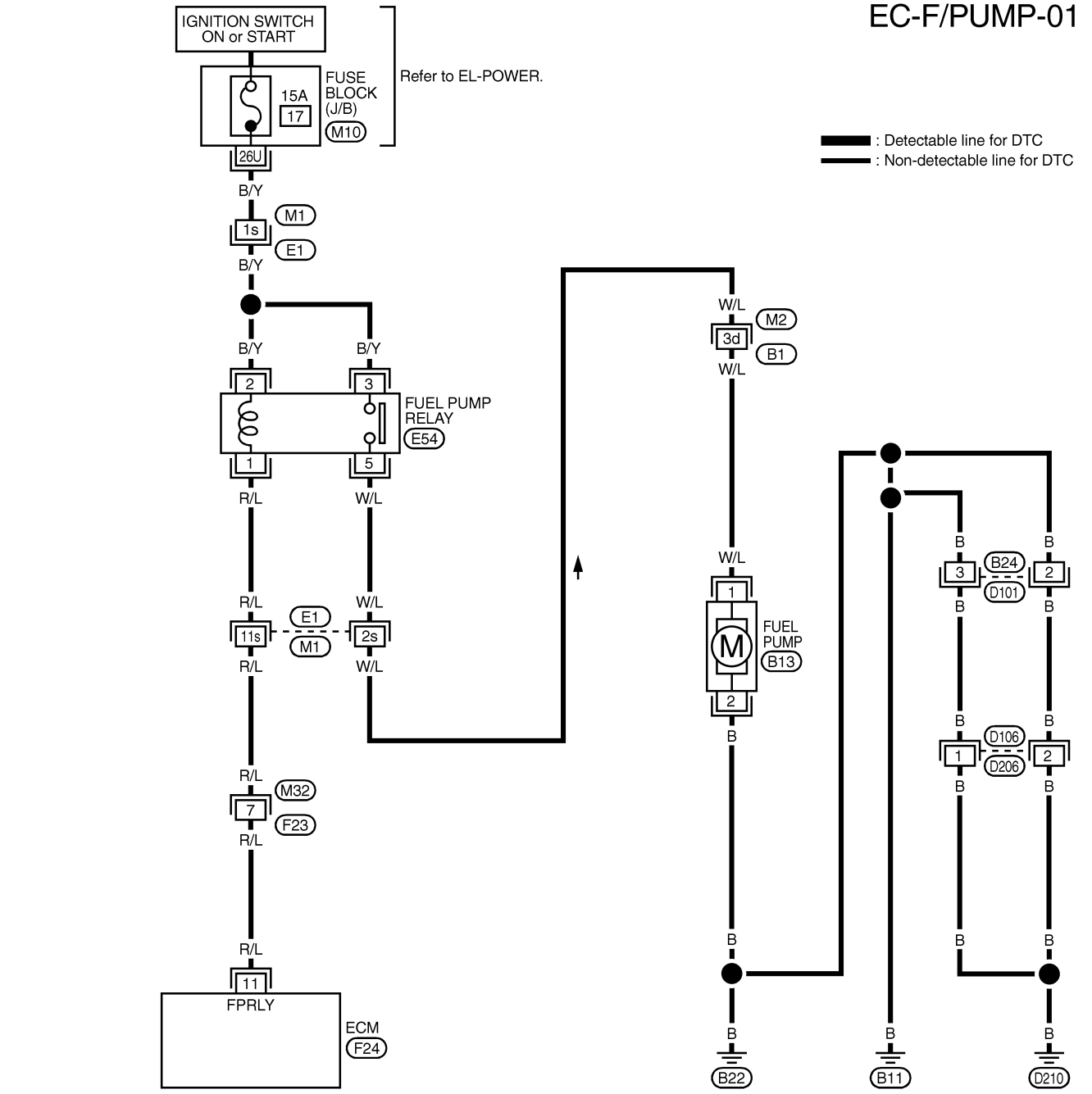
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

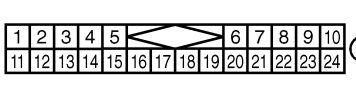
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	R/L	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

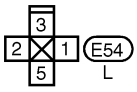
Wiring Diagram

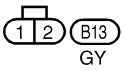
NAEC0356

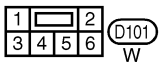
EC-F/PUMP-01

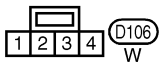










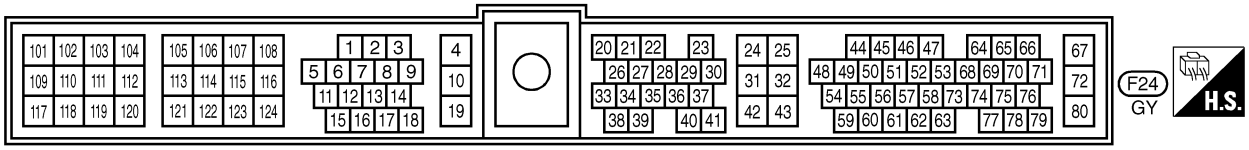


Refer to last page (Foldout page).

M1 , E1

M2 , B1

M10



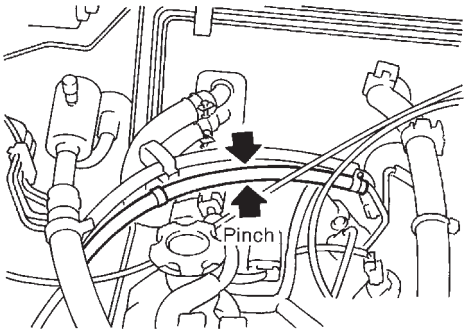
MEC679C

Diagnostic Procedure

NAEC0357

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with fingers.



SEF019S

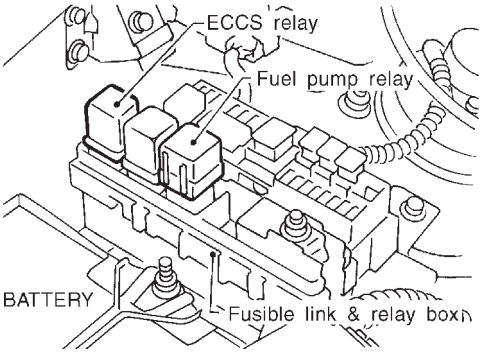
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

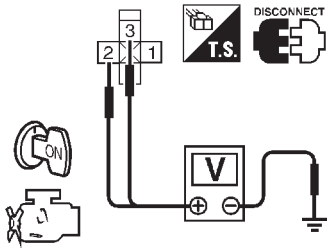
2	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay.



SEF020S

3. Turn ignition switch “ON”.
4. Check voltage between terminals 2, 3 and ground with CONSULT or tester.



SEF736U

Voltage: Battery voltage

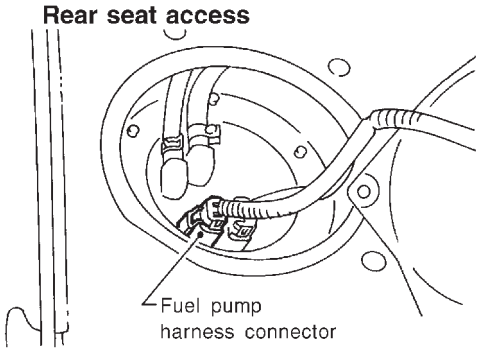
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

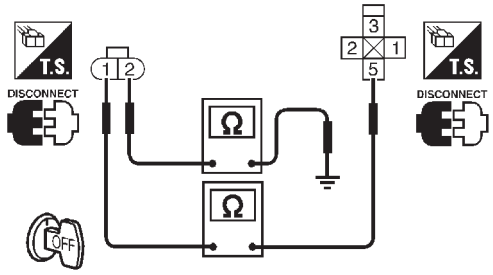
4	CHECK POWER AND GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.



SEF021S

3. Check harness continuity between terminal 2 and body ground, terminal 1 and fuel pump relay connector terminal 5.



SEF737U

Continuity should exist.

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

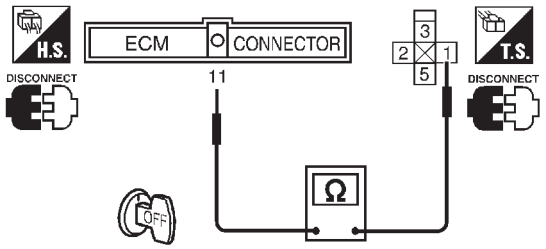
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M2, B1 ● Harness connectors E1, M1 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 11 and fuel pump relay connector terminal 1.



SEF738U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

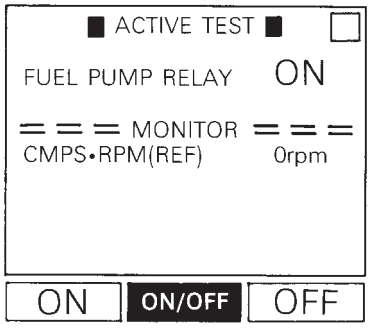
Check the following.
- Harness connectors F23, M32
- Harness connectors M1, E1
- Harness for open or short between ECM and fuel pump relay

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

8	CHECK FUEL PUMP RELAY

With CONSULT

1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.



MEF309F

Without CONSULT

Refer to "Component Inspection", EC-574.

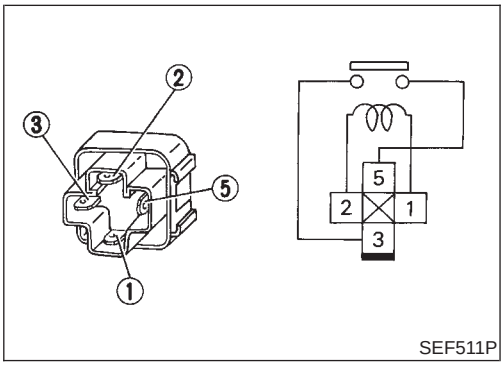
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

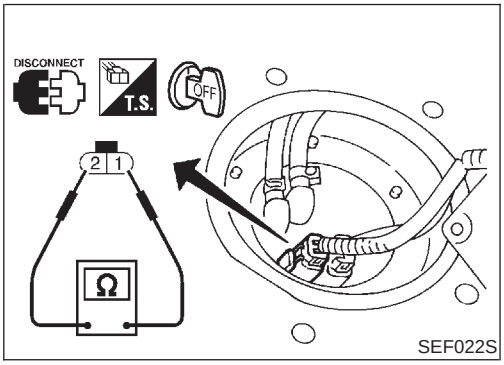
Diagnostic Procedure (Cont'd)

9	CHECK FUEL PUMP	
Refer to "Component Inspection", EC-574.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.	
▶	**INSPECTION END**



SEF511P



SEF022S

Component Inspection

NAEC0358

FUEL PUMP RELAY

NAEC0358S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

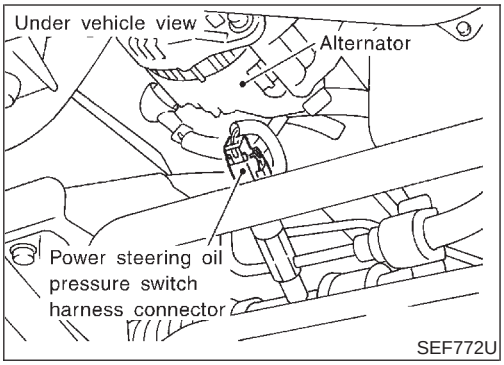
FUEL PUMP

NAEC0358S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace fuel pump.



Component Description

NAEC0360

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT Reference Value in Data Monitor Mode

NAEC0361

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NAEC0362

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

CAUTION:

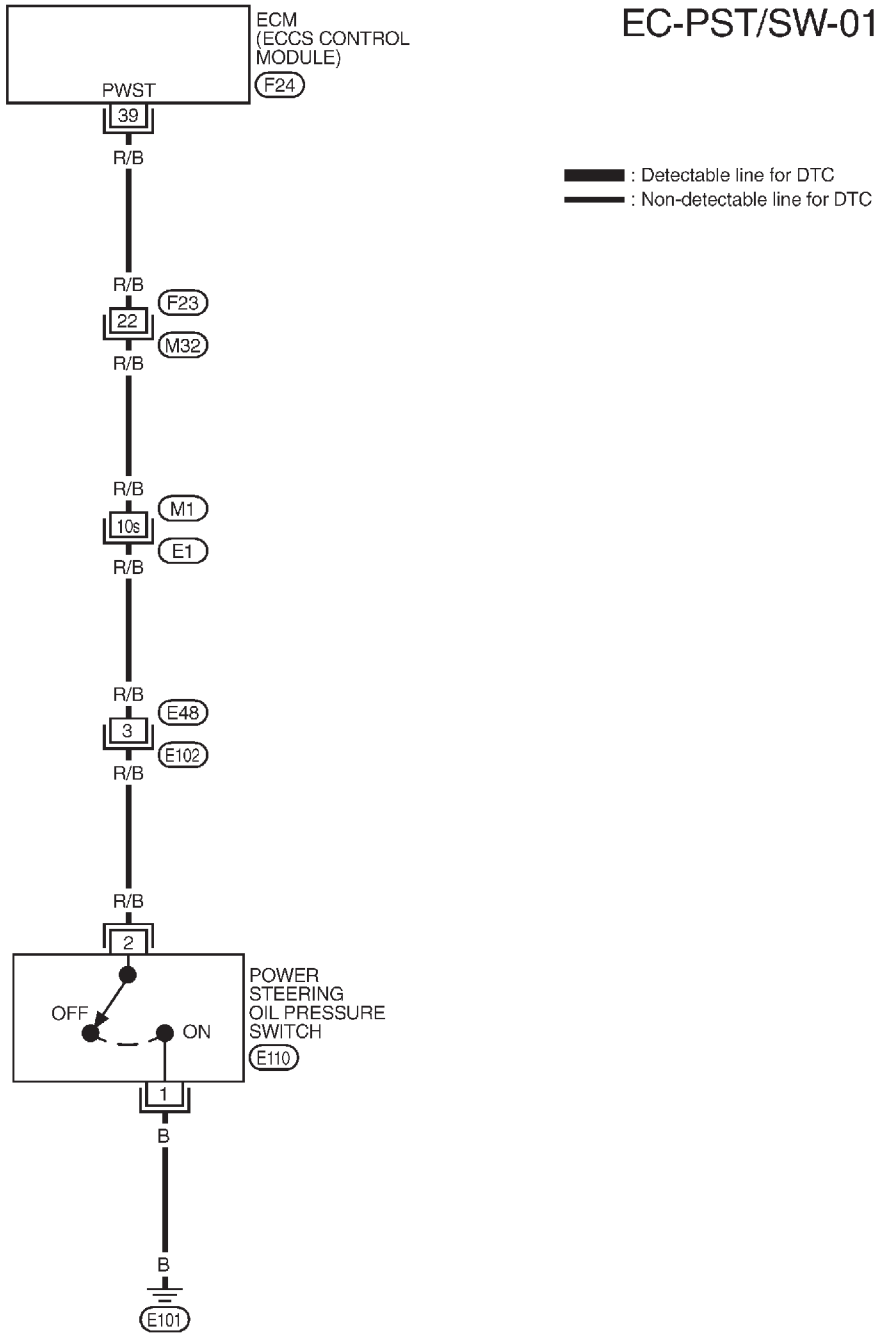
Do not use ECM ground terminals when measuring input/output voltage. Doing so, may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	R/B	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being fully turned	0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

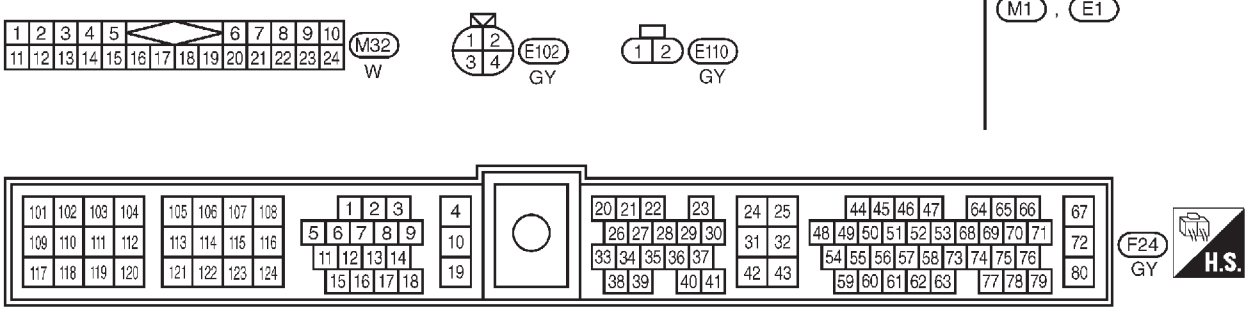
Wiring Diagram

NAEC0359

EC-PST/SW-01



Refer to last page (Foldout page).
M1 , E1



MEC084C

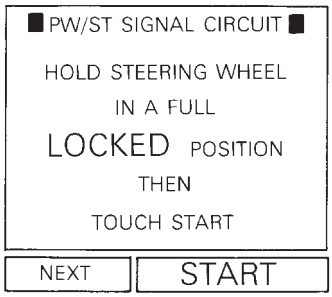
Diagnostic Procedure

=NAEC0363

1	INSPECTION START
Do you have CONSULT?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

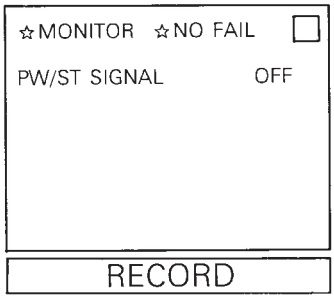
2	CHECK OVERALL FUNCTION

With CONSULT
1. Turn ignition switch “ON”.
2. Perform “PW/ST SIGNAL CIRCUIT” in “FUNCTION TEST” mode with CONSULT.



MEF023E

With CONSULT
1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT.



SEF591I

Condition	“PW/ST SIGNAL”
Steering is neutral position	OFF
Steering is turned to full position	ON

MTBL0144

OK or NG

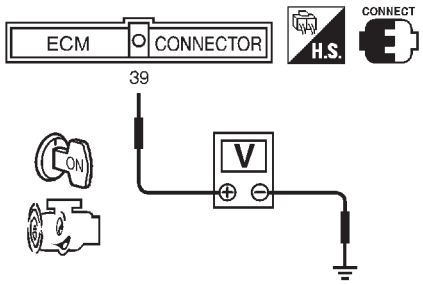
OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

Diagnostic Procedure (Cont'd)

3	CHECK OVERALL FUNCTION

Without CONSULT

1. Start engine.
2. Check voltage between ECM terminal 39 and ground.



SEF739U

Condition	Voltage
Steering is neutral position	Approximately 5V
Steering is turned to full position	Approximately 0V

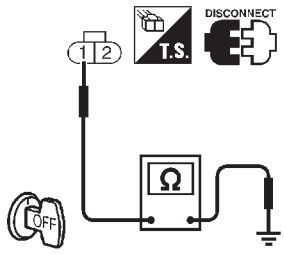
MTBL0145

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal 1 and engine ground.



SEF740U

Continuity should exist.

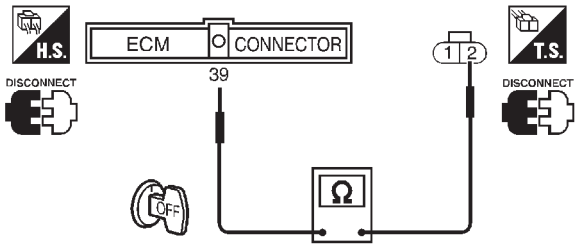
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and terminal 2.



SEF741U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F23, M32
- Harness connectors M1, E1
- Harness connectors E48, E102
- Harness for open or short between ECM and power steering oil pressure switch

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

7	CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to "Component Inspection", EC-579.

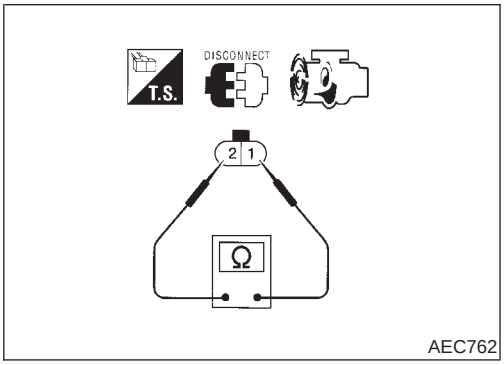
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace power steering oil pressure switch.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



AEC762

Component Inspection

NAEC0364

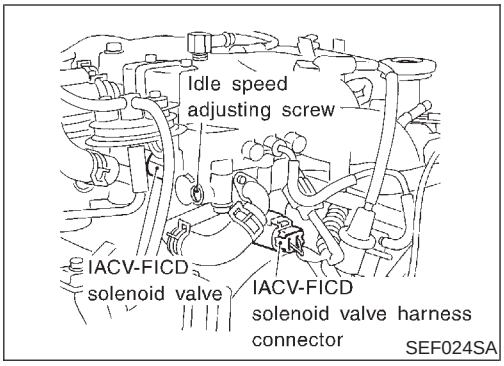
POWER STEERING OIL PRESSURE SWITCH

NAEC0364S01

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals 1 and 2.

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

If NG, replace power steering oil pressure switch.



Component Description

NAEC0366

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load. For more information, refer to HA-19, “DESCRIPTION”.

ECM Terminals and Reference Value

NAEC0367

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

CAUTION:

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

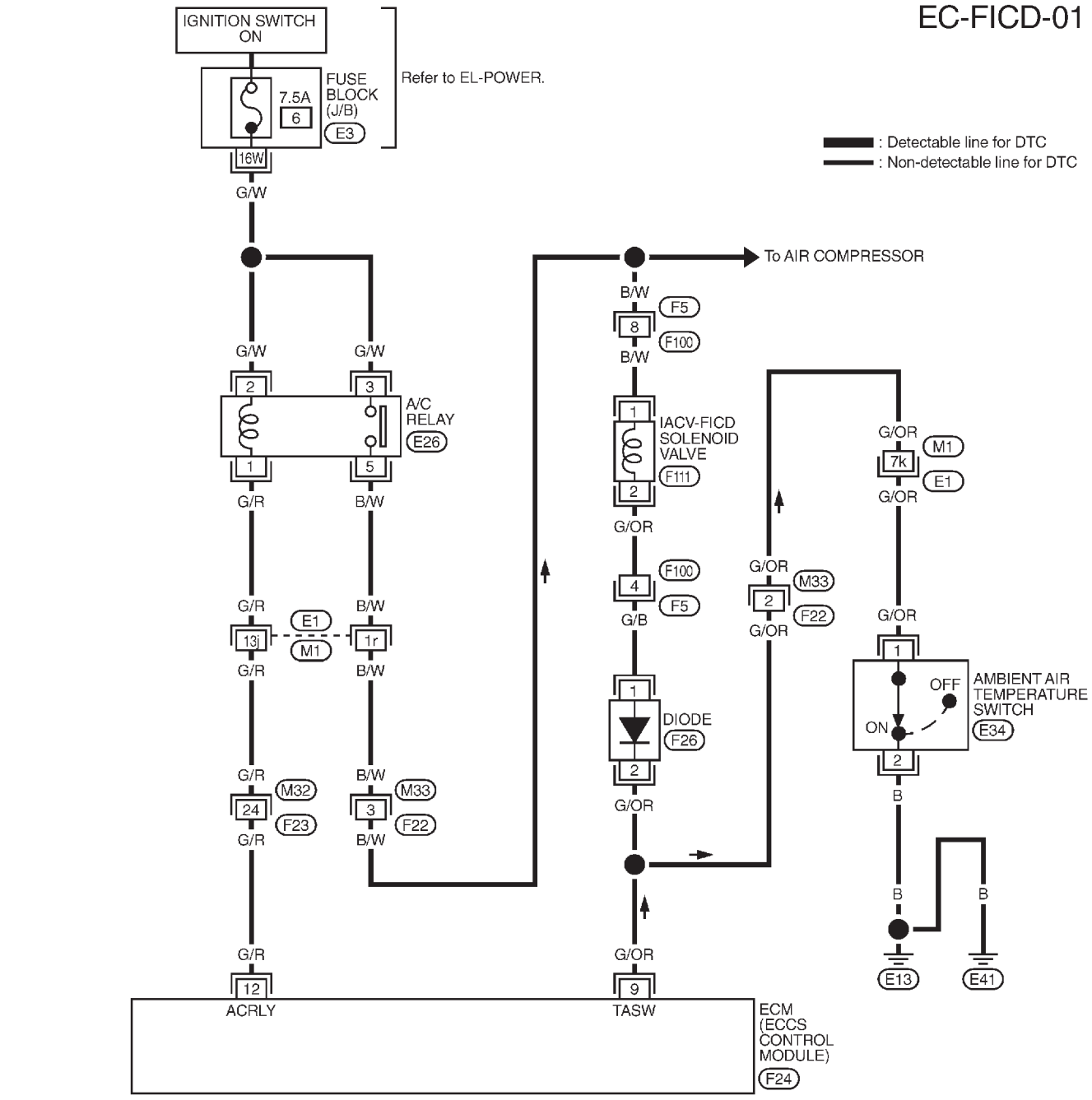
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	G/OR	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 23.5°C (74°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 23.5°C (74°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 23.5°C (74°F) ● Air conditioner is not operating	Approximately 5V
12	G/R	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower fan switch are “ON”*	0 - 1V
			[Engine is running] ● A/C switch is “OFF”	BATTERY VOLTAGE (11 - 14V)
21	B/W	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower fan switch are “ON” (Compressor operates)*	Approximately 0V
			[Engine is running] ● Air conditioner switch is “OFF”	Approximately 5V

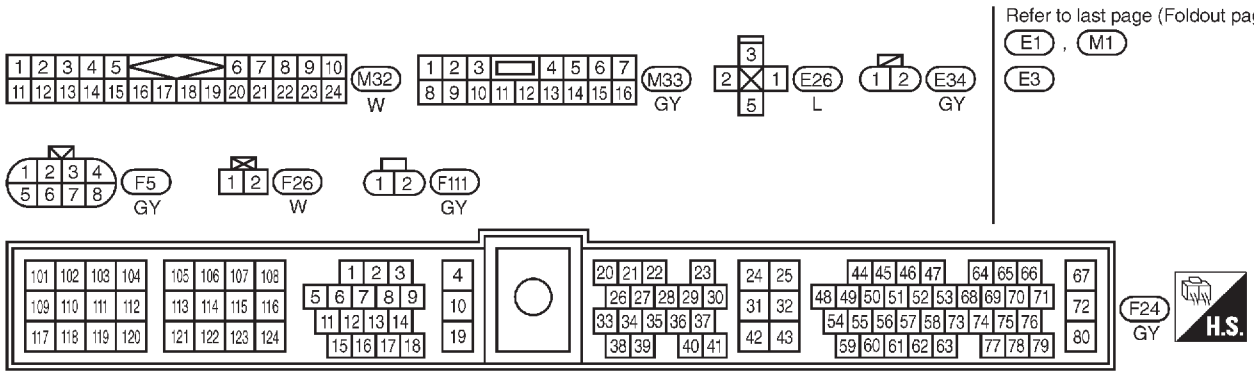
*: Any mode except “OFF”, ambient air temperature is above 23.5°C (74°F).

Wiring Diagram

NAEC0365

EC-FICD-01





Refer to last page (Foldout page).
E1 , M1
E3

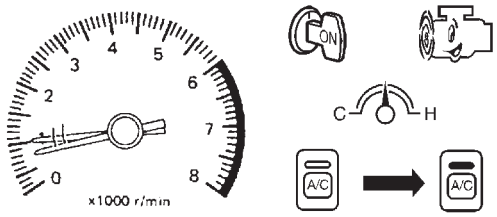
MEC085C

Diagnostic Procedure

=NAEC0368

1	CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   750±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch "ON".
4. Recheck idle speed.



SEF742U

850 rpm or more (in "N" position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK AIR CONDITIONER FUNCTION

Check if air conditioner compressor functions normally.

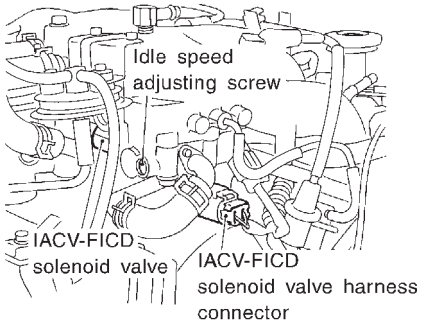
OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to HA-80, "TROUBLE DIAGNOSES".

Diagnostic Procedure (Cont'd)

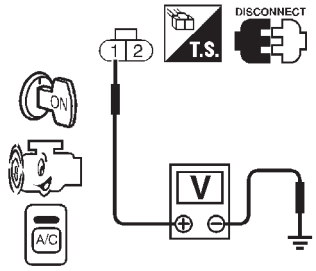
3	CHECK POWER SUPPLY

1. Turn air conditioner switch and blower fan switch "OFF".
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.



SEF024SA

4. Start engine, then turn air conditioner switch and blower fan switch "ON".
5. Check voltage between terminal 1 and ground with CONSULT or tester.



SEF743U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

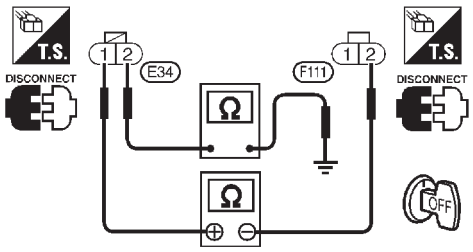
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F5, F100
- Harness for open or short between IACV-FICD solenoid valve and harness connector F22

	▶	Repair harness or connectors.

5	CHECK GROUND CIRCUIT

1. Stop engine.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between switch terminal 2 and body ground, switch terminal 1 and solenoid valve terminal 2.



SEF744U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F100, F5
- Harness connectors F22, M33
- Harness connectors M1, E1
- Diode F26
- Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch
- Harness for open or short between ambient air temperature switch and ground

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

7	CHECK AMBIENT AIR TEMPERATURE SWITCH

Refer to HA-20, "Ambient air temperature switch operation".

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace Ambient air temperature switch.

8	CHECK IACV-FICD SOLENOID VALVE

Refer to "Component Inspection", EC-586.

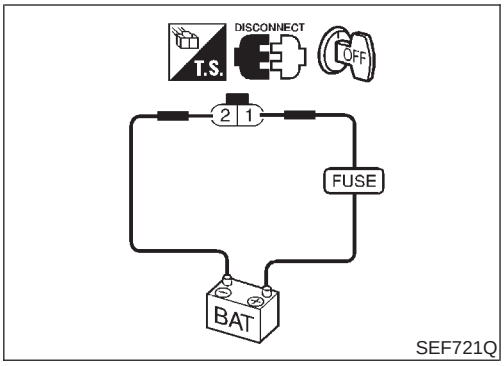
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace IACV-FICD solenoid valve.

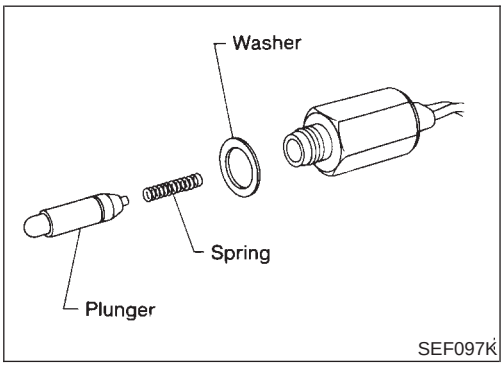
9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-136.

	▶	**INSPECTION END**



SEF721Q



SEF097K

Component Inspection

NAEC0369

IACV-FICD SOLENOID VALVE

NAEC0369S01

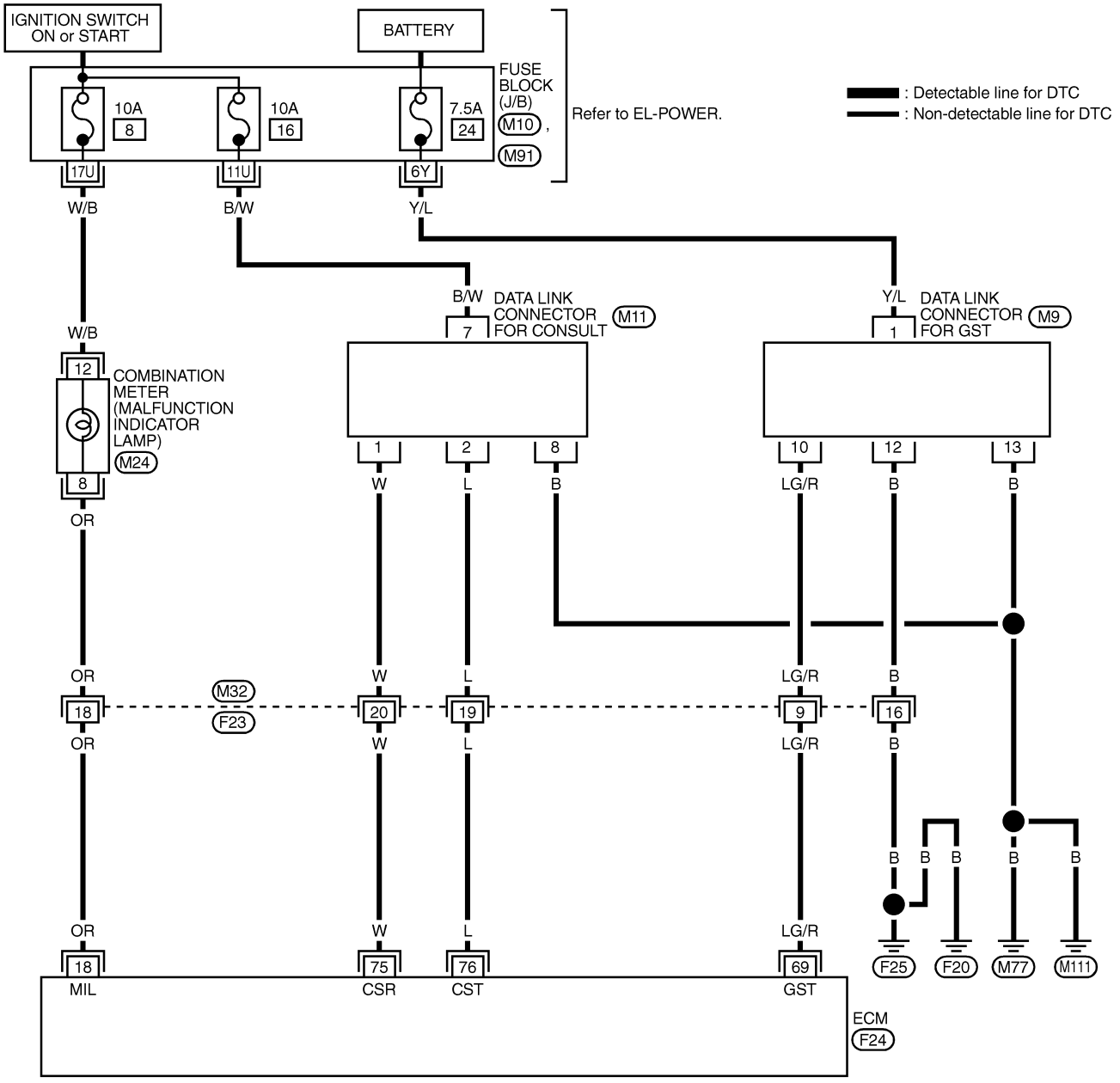
Disconnect IACV-FICD solenoid valve harness connector.

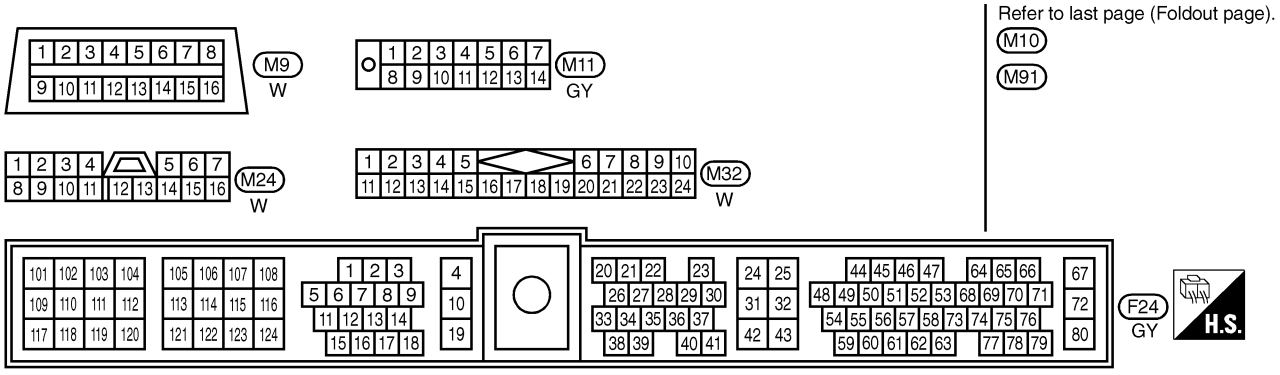
- Check for clicking sound when applying 12V direct current to terminals.
- Check plunger for seizing or sticking.
- Check for broken spring.

Wiring Diagram

NAEC0370

EC-MIL/DL-01





Refer to last page (Foldout page).
M10
M91

MEC680C

Fuel Pressure Regulator

NAEC0371

Fuel pressure at idling kPa (kg/cm^2, psi)		
	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NAEC0372

Base idle speed*1	No-load*4 (in “P” or N” position)	700±50 rpm
Target idle speed*2	No-load*4 (in “P” or N” position)	750±50 rpm
Air conditioner: ON	In “P” or N” position	850 rpm or more
Ignition timing*3	In “P” or N” position	15°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NAEC0373

Primary voltage	12 V
Primary resistance [at 20°C (68°F)]	Approximately 1.0 Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NAEC0374

Supply voltage	Battery voltage (11 - 14) V
Output voltage at idle	1.0 - 1.7* V
Mass air flow (Using CONSULT or GST)	3.3 - 4.8 g·m/sec at idle* 12.0 - 14.9 g·m/sec at 2,500 rpm*

*: Engine is warmed up to nomal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NAEC0375

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

EGR Temperature Sensor

NAEC0376

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

Front Heated Oxygen Sensor Heater

NAEC0377

Resistance [at 25°C (77°F)]	2.3 - 4.3 Ω

Fuel Pump

NAEC0378

Resistance [at 25°C (77°F)]	0.2 - 5.0 Ω

IACV-AAC Valve

NAEC0379

Resistance [at 20°C (68°F)]	Approximately 10.0 Ω

Injector

NAEC0380

Resistance [at 25°C (77°F)]	10 - 14 Ω

Resistor

NAEC0381

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ

Throttle Position Sensor

NAEC0382

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NAEC0383

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

NAEC0384

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Rear Heated Oxygen Sensor Heater

NAEC0385

Resistance [at 25°C (77°F)]	2.3 - 4.3 Ω

Crankshaft Position Sensor (OBD)

NAEC0386

Resistance [at 20°C (68°F)]	166.5 - 203.5 Ω

Fuel Tank Temperature Sensor

NAEC0521

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

NOTES