

ENGINE CONTROL SYSTEM

SECTION EC

GI
MA
EM
LC

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When you read wiring diagrams:

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

When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”.

GI
 MA
 EM
 LG
 EC
 FE
 AT
 PD
 FA
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 EL
 IDX

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*6		Reference page	Items (CONSULT-II screen terms)	DTC*6		Reference page
	CONSULT-II GST*2	ECM*1			CONSULT-II GST*2	ECM*1	
*COOLAN T SEN/CIRC	P0125	0908	EC-161	FPCM/CIRCUIT	P1220	1305	EC-391
A/T 1ST GR FNCTN	P0731	1103	AT-95	FR O2 SE HEATER-B1	P0135	0901	EC-202
A/T 2ND GR FNCTN	P0732	1104	AT-100	FR O2 SE HEATER-B2	P0155	1001	EC-202
A/T 3RD GR FNCTN	P0733	1105	AT-104	FRONT O2 SENSOR-B1	P0130	0303	EC-166
A/T 4TH GR FNCTN	P0734	1106	AT-108	FRONT O2 SENSOR-B1	P0133	0409	EC-186
A/T COMM LINE	P0600	0504	EC-350	FRONT O2 SENSOR-B1	P0132	0410	EC-180
A/T DIAG COMM LINE	P1605	0804	EC-350	FRONT O2 SENSOR-B1	P0131	0411	EC-174
A/T TCC S/V FNCTN	P0744	1107	AT-118	FRONT O2 SENSOR-B1	P0134	0412	EC-195
ABS-TCS C/U SIGNAL	—	0107	EC-498	FRONT O2 SENSOR-B2	P0153	0413	EC-186
ABSL PRES SEN/CIRC	P0105	0803	EC-132	FRONT O2 SENSOR-B2	P0152	0414	EC-180
AIR TEMP SEN/CIRC	P0110	0401	EC-140	FRONT O2 SENSOR-B2	P0151	0415	EC-174
ATF TEMP SEN/CIRC	P0710	1208	AT-85	FRONT O2 SENSOR-B2	P0150	0503	EC-166
CAM POS SEN/CIR	P0340	0101	EC-273	FRONT O2 SENSOR-B2	P0154	0509	EC-195
CLOSED LOOP-B1	P1148	0307	EC-386	FUEL SYS LEAN/BK1	P0171	0115	EC-243
CLOSED LOOP-B2	P1168	0308	EC-386	FUEL SYS LEAN/BK2	P0174	0210	EC-243
CLOSED TP SW/CIRC	P0510	0203	EC-344	FUEL SYS RICH/BK1	P0172	0114	EC-249
COOLANT T SEN/CIRC	P0115	0103	EC-145	FUEL SYS RICH/BK2	P0175	0209	EC-249
CPS/CIRC (OBD) COG	P1336	0905	EC-405	FUEL TEMP SEN/CIRC	P0180	0402	EC-255
CPS/CIRCUIT (OBD)	P0335	0802	EC-268	IACV/AAC VLV/CIRC	P0505	0205	EC-338
CYL 1 MISFIRE	P0301	0608	EC-260	IGN SIGNAL-PRIMARY	P1320	0201	EC-397
CYL 2 MISFIRE	P0302	0607	EC-260	INT/V TIM CONT-B1	P1110	0805	EC-365
CYL 3 MISFIRE	P0303	0606	EC-260	INT/V TIM CONT-B2	P1135	1301	EC-365
CYL 4 MISFIRE	P0304	0605	EC-260	INTK TIM S/CIRC-B1	P1140	1303	EC-380
CYL 5 MISFIRE	P0305	0604	EC-260	INTK TIM S/CIRC-B2	P1145	1304	EC-380
CYL 6 MISFIRE	P0306	0603	EC-260	KNOCK SEN/CIRC-B1	P0325	0304	EC-265
CYL 7 MISFIRE	P0307	0602	EC-260	KNOCK SEN/CIRC-B2	P0330	0212	EC-265
CYL 8 MISFIRE	P0308	0601	EC-260	L/PRESS SOL/CIRC	P0745	1205	AT-125
ECM	P0605	0301	EC-353	MAF SEN/CIRCUIT*3	P0100	0102	EC-124
ECM-ABSTCS COMM NG	—	0404	EC-498	MAP/BAR SW SOL/CIR	P1105	1302	EC-356
EGR SYSTEM	P0400	0302	EC-279	MULTI CYL MISFIRE	P0300	0701	EC-260
EGR SYSTEM	P1402	0514	EC-421	NATS MALFUNCTION	—	—	EC-69
EGR TEMP SEN/CIRC	P1401	0305	EC-415	NO SELF DIAGNOSTIC FAILURE INDICATED	P0000	0505	—
EGRC SOLENOID/V	P1400	1005	EC-410	NO SELF DIAGNOSTIC FAILURE INDICATED	No DTC	Flashing*5	EC-65
EGRC-BPT VALVE	P0402	0306	EC-288	O/R CLTCH SOL/CIRC	P1760	1203	AT-143
ENGINE SPEED SIG	P0725	1207	AT-92	OVER HEAT	—	0208	EC-501
EVAP PURG FLOW/MON	P1447	0111	EC-455	P-N POS SW/CIRCUIT	P1706	1003	EC-492
EVAP SMALL LEAK	P1440	0213	EC-430	PNP SW/CIRC	P0705	1101	AT-81
EVAP SMALL LEAK	P0440	0705	EC-296	PURG CONT/V & S/V	P1493	0312	EC-485
EVAP SYS PRES SEN	P0450	0704	EC-318	PURG CONT/V S/V	P1492	0807	EC-479
EVAP GROSS LEAK	P0455	0715	EC-324				

DIAGNOSTIC TROUBLE CODE INDEX

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

Items (CONSULT-II screen terms)	DTC*6		Reference page
	CONSULT-II GST*2	ECM*1	
PURG VOLUME CONT/V	P1444	0214	EC-442
PURG VOLUME CONT/V	P0443	1008	EC-307
REAR O2 SENSOR-B1	P0137	0511	EC-208
REAR O2 SENSOR-B1	P0140	0512	EC-231
REAR O2 SENSOR-B1	P0139	0707	EC-224
REAR O2 SENSOR-B1	P0138	0510	EC-216
REAR O2 SENSOR-B2	P0158	0313	EC-216
REAR O2 SENSOR-B2	P0157	0314	EC-208
REAR O2 SENSOR-B2	P0160	0315	EC-231
REAR O2 SENSOR-B2	P0159	0708	EC-224
RR O2 SE HEATER-B1	P0141	0902	EC-237
RR O2 SE HEATER-B2	P0161	1002	EC-237
SFT SOL A/CIRC*3	P0750	1108	AT-129
SFT SOL B/CIRC*3	P0755	1201	AT-133
TACM SW SIGNALS	P1210	0106	EC-388
TANDEM TP SEN/CIRC	P1125	0110	EC-379
TCC SOLENOID/CIRC	P0740	1204	AT-114
THRTL POS SEN/ CIRC*3	P0120	0403	EC-150
TP SEN/CIRC A/T*3	P1705	1206	AT-137
TP SEN2/CIRCUIT	P1120	0406	EC-373
TW CATALYST SYS-B1	P0420	0702	EC-293
TW CATALYST SYS-B2	P0430	0703	EC-293
Unable to access ECM	—	—	EC-98
VC CUT/V BYPASS/V	P1491	0311	EC-473
VC/V BYPASS/V	P1490	0801	EC-468
VEH SPD SEN/CIR AT*4	P0720	1102	AT-89
VEH SPEED SEN/ CIRC*4	P0500	0104	EC-333
VENT CONTROL VALVE	P1446	0215	EC-450
VENT CONTROL VALVE	P1448	0309	EC-462
VENT CONTROL VALVE	P0446	0903	EC-313

GI

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IDX

*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 Y33 models, "-B1" indicates left bank and "-B2" indicates right bank.

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CONSULT-II GST*2	ECM*1			CONSULT-II GST*2	ECM*1		
—	—	Unable to access ECM	EC-98	P0180	0402	FUEL TEMP SEN/CIRC	EC-255
—	0107	ABS-TCS C/U SIGNAL	EC-498	P0300	0701	MULTI CYL MISFIRE	EC-260
—	0208	OVER HEAT	EC-501	P0301	0608	CYL 1 MISFIRE	EC-260
—	0404	ECM-ABSTCS COMM NG	EC-498	P0302	0607	CYL 2 MISFIRE	EC-260
—	—	NATS MALFUNC	EC-69	P0303	0606	CYL 3 MISFIRE	EC-260
No DTC	Flashing*5	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-65	P0304	0605	CYL 4 MISFIRE	EC-260
P0000	0505	NO SELF DIAGNOSTIC FAILURE INDICATED	—	P0305	0604	CYL 5 MISFIRE	EC-260
P0100	0102	MAF SEN/CIRCUIT*3	EC-124	P0306	0603	CYL 6 MISFIRE	EC-260
P0105	0803	ABSL PRES SEN/CIRC	EC-132	P0307	0602	CYL 7 MISFIRE	EC-260
P0110	0401	AIR TEMP SEN/CIRC	EC-140	P0308	0601	CYL 8 MISFIRE	EC-260
P0115	0103	COOLANT T SEN/CIRC	EC-145	P0325	0304	KNOCK SEN/CIRC-B1	EC-265
P0120	0403	THRTL POS SEN/CIRC*3	EC-150	P0330	0212	KNOCK SEN/CIRC-B2	EC-265
P0125	0908	*COOLAN T SEN/CIRC	EC-161	P0335	0802	CPS/CIRCUIT (OBD)	EC-268
P0130	0303	FRONT O2 SENSOR-B1	EC-166	P0340	0101	CAM POS SEN/CIR	EC-273
P0131	0411	FRONT O2 SENSOR-B1	EC-174	P0400	0302	EGR SYSTEM	EC-279
P0132	0410	FRONT O2 SENSOR-B1	EC-180	P0402	0306	EGRC-BPT VALVE	EC-288
P0133	0409	FRONT O2 SENSOR-B1	EC-186	P0420	0702	TW CATALYST SYS-B1	EC-293
P0134	0412	FRONT O2 SENSOR-B1	EC-195	P0430	0703	TW CATALYST SYS-B2	EC-293
P0135	0901	FR O2 SE HEATER-B1	EC-202	P0440	0705	EVAP SMALL LEAK	EC-296
P0137	0511	REAR O2 SENSOR-B1	EC-208	P0443	1008	PURG VOLUME CONT/V	EC-307
P0138	0510	REAR O2 SENSOR-B1	EC-216	P0446	0903	VENT CONTROL VALVE	EC-313
P0139	0707	REAR O2 SENSOR-B1	EC-224	P0450	0704	EVAPO SYS PRES SEN	EC-318
P0140	0512	REAR O2 SENSOR-B1	EC-231	P0455	0715	EVAP GROSS LEAK	EC-324
P0141	0902	RR O2 SE HEATER-B1	EC-237	P0500	0104	VEH SPEED SEN/CIRC*4	EC-333
P0150	0503	FRONT O2 SENSOR-B2	EC-166	P0505	0205	IACV/AAC VLV/CIRC	EC-338
P0151	0415	FRONT O2 SENSOR-B2	EC-174	P0510	0203	CLOSED TP SW/CIRC	EC-344
P0152	0414	FRONT O2 SENSOR-B2	EC-180	P0600	0504	A/T COMM LINE	EC-350
P0153	0413	FRONT O2 SENSOR-B2	EC-186	P0605	0301	ECM	EC-353
P0154	0509	FRONT O2 SENSOR-B2	EC-195	P0705	1101	PNP SW/CIRC	AT-81
P0155	1001	FR O2 SE HEATER-B2	EC-202	P0710	1208	ATF TEMP SEN/CIRC	AT-85
P0157	0314	REAR O2 SENSOR-B2	EC-208	P0720	1102	VEH SPD SEN/CIR AT*4	AT-89
P0158	0313	REAR O2 SENSOR-B2	EC-216	P0725	1207	ENGINE SPEED SIG	AT-92
P0159	0708	REAR O2 SENSOR-B2	EC-224	P0731	1103	A/T 1ST GR FNCTN	AT-95
P0160	0315	REAR O2 SENSOR-B2	EC-231	P0732	1104	A/T 2ND GR FNCTN	AT-100
P0161	1002	RR O2 SE HEATER-B2	EC-237	P0733	1105	A/T 3RD GR FNCTN	AT-104
P0171	0115	FUEL SYS LEAN/BK1	EC-243	P0734	1106	A/T 4TH GR FNCTN	AT-108
P0172	0114	FUEL SYS RICH/BK1	EC-249	P0740	1204	TCC SOLENOID/CIRC	AT-114
P0174	0210	FUEL SYS LEAN/BK2	EC-243	P0744	1107	A/T TCC S/V FNCTN	AT-118
P0175	0209	FUEL SYS RICH/BK2	EC-249	P0745	1205	L/PRESS SOL/CIRC	AT-125
				P0750	1108	SFT SOL A/CIRC*3	AT-129
				P0755	1201	SFT SOL B/CIRC*3	AT-133

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CONSULT-II GST*2	ECM*1		
P1105	1302	MAP/BAR SW SOL/CIR	EC-356
P1110	0805	INT/V TIM CONT-B1	EC-365
P1120	0406	TP SEN2/CIRCUIT	EC-373
P1125	0110	TANDEM TP SEN/CIRC	EC-379
P1135	1301	INT/V TIM CONT-B2	EC-365
P1140	1303	INTK TIM S/CIRC-B1	EC-380
P1145	1304	INTK TIM S/CIRC-B2	EC-380
P1148	0307	CLOSED LOOP-B1	EC-386
P1168	0308	CLOSED LOOP-B2	EC-386
P1210	0106	TACM SW SIGNALS	EC-388
P1220	1305	FPCM/CIRCUIT	EC-391
P1320	0201	IGN SIGNAL-PRIMARY	EC-397
P1336	0905	CPS/CIRC (OBD) COG	EC-405
P1400	1005	EGRC SOLENOID/V	EC-410
P1401	0305	EGR TEMP SEN/CIRC	EC-415
P1402	0514	EGR SYSTEM	EC-421
P1440	0213	EVAP SMALL LEAK	EC-430
P1444	0214	PURG VOLUME CONT/V	EC-442
P1446	0215	VENT CONTROL VALVE	EC-450
P1447	0111	EVAP PURG FLOW/ MON	EC-455
P1448	0309	VENT CONTROL VALVE	EC-462
P1490	0801	VC/V BYPASS/V	EC-468
P1491	0311	VC CUT/V BYPASS/V	EC-473
P1492	0807	PURG CONT/V S/V	EC-479
P1493	0312	PURG CONT/V & S/V	EC-485
P1605	0804	A/T DIAG COMM LINE	EC-350
P1705	1206	TP SEN/CIRC A/T*3	AT-137
P1706	1003	P-N POS SW/CIRCUIT	EC-492
P1760	1203	O/R CLTCH SOL/CIRC	AT-143

*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 Y33 models, "-B1" indicates left bank and "-B2" indicates right bank.

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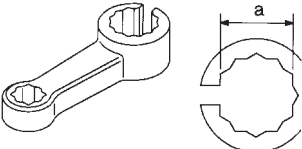
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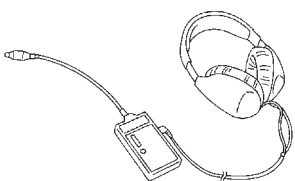
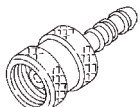
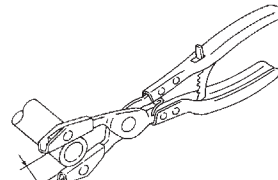
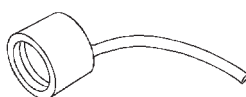
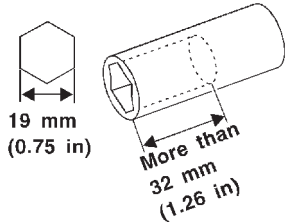
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Special Service Tool

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

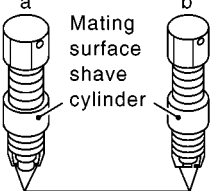
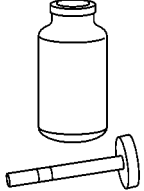
Tool number (Kent-Moore No.) Tool name	Description	
(J38365-A) Heated oxygen sensor wrench		Loosening or tightening heated oxygen sensor 3/8 drive a: 22 mm (0.87 in)
NT636		

Commercial Service Tools

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)		Locating the EVAP leak
NT703		
EVAP service port adapter (J41413-OBD)		Applying positive pressure through EVAP service port
NT704		
Hose clipper		Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [(EVAP small leak positive pressure)].
NT720	Approx. 20 mm (0.79 in)	
Fuel filler cap adapter		Checking fuel tank vacuum relief valve opening pressure
NT653		
Socket wrench		Removing and installing engine coolant temperature sensor
NT705		

PRECAUTIONS AND PREPARATION

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below.</p> <p>a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor</p> <p>b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor</p> </div> </div> <p>NT778</p>
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	<div style="text-align: center;">  </div> <p>Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.</p> <p>NT779</p>

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

The Supplemental Restraint System “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental 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 INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses (except “SEAT BELT PRE-TENSIONER” connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).

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

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 the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure to connect the connector without water, grease, dirt, bent terminals, etc. in it.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to EL section, “Description”, “HARNESS CONNECTOR”.
- Be sure to route and clamp 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 the work. The misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or the fuel injection system, etc.
- Be sure to erase the unnecessary (already fixed) malfunction information in the ECM and TCM (Transmission Control Module) before returning the vehicle to the customer.

Engine Fuel & Emission Control System

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 now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

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

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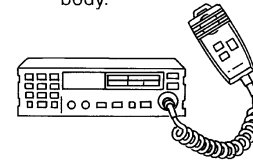
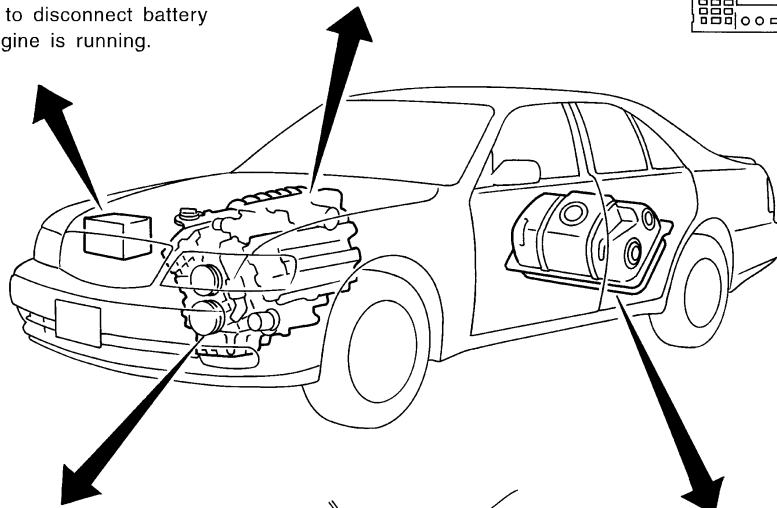
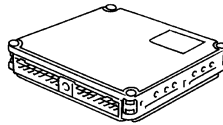
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BATTERY

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



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).

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.

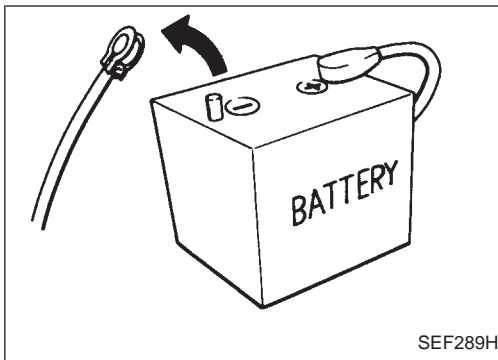
FUEL PUMP

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

ECM HARNESS HANDLING

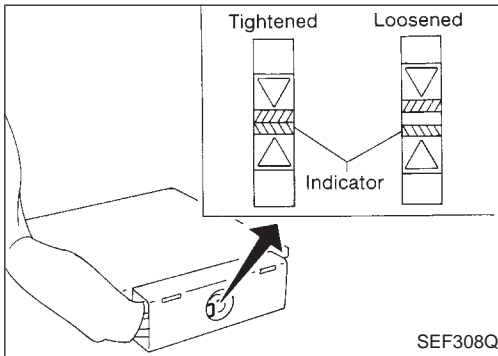
- Securely connect ECM harness connectors. Poor connection can cause extremely high (surge) voltage in coil and condenser, resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) from adjacent harness, to prevent ECM system malfunctions due to receiving external noise, degraded operation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





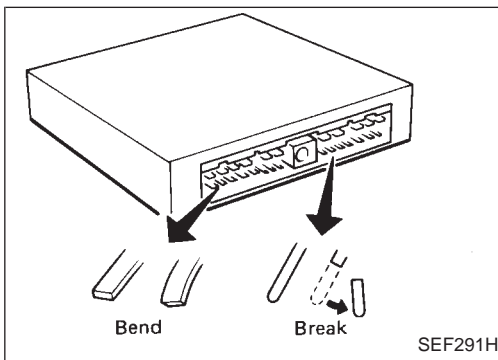
Precautions

- 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.



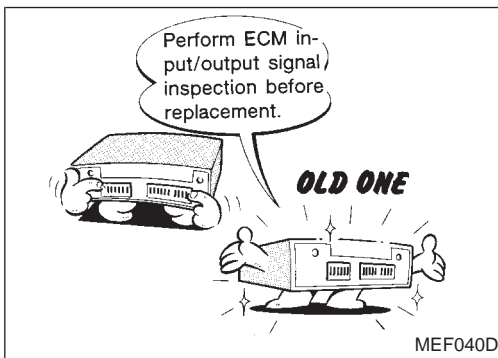
- When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears.

: 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)



- 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.



- Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-107.)



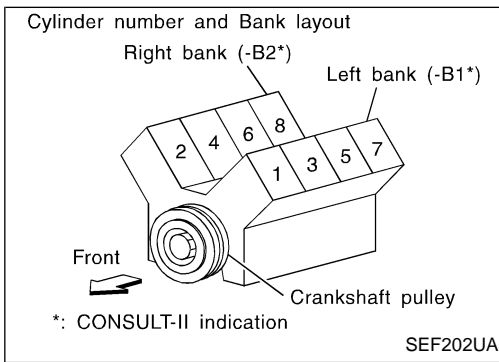
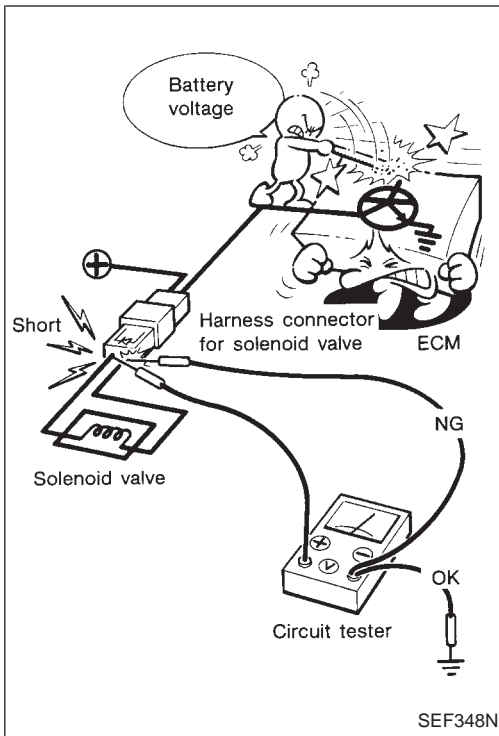
- After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".

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.

PRECAUTIONS AND PREPARATION

Precautions (Cont'd)

- When measuring ECM signals with a circuit tester, never bring the two tester probes into contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- Regarding model Y33, “-B1” indicates the left bank and “-B2” indicates the right bank as shown in the figure.

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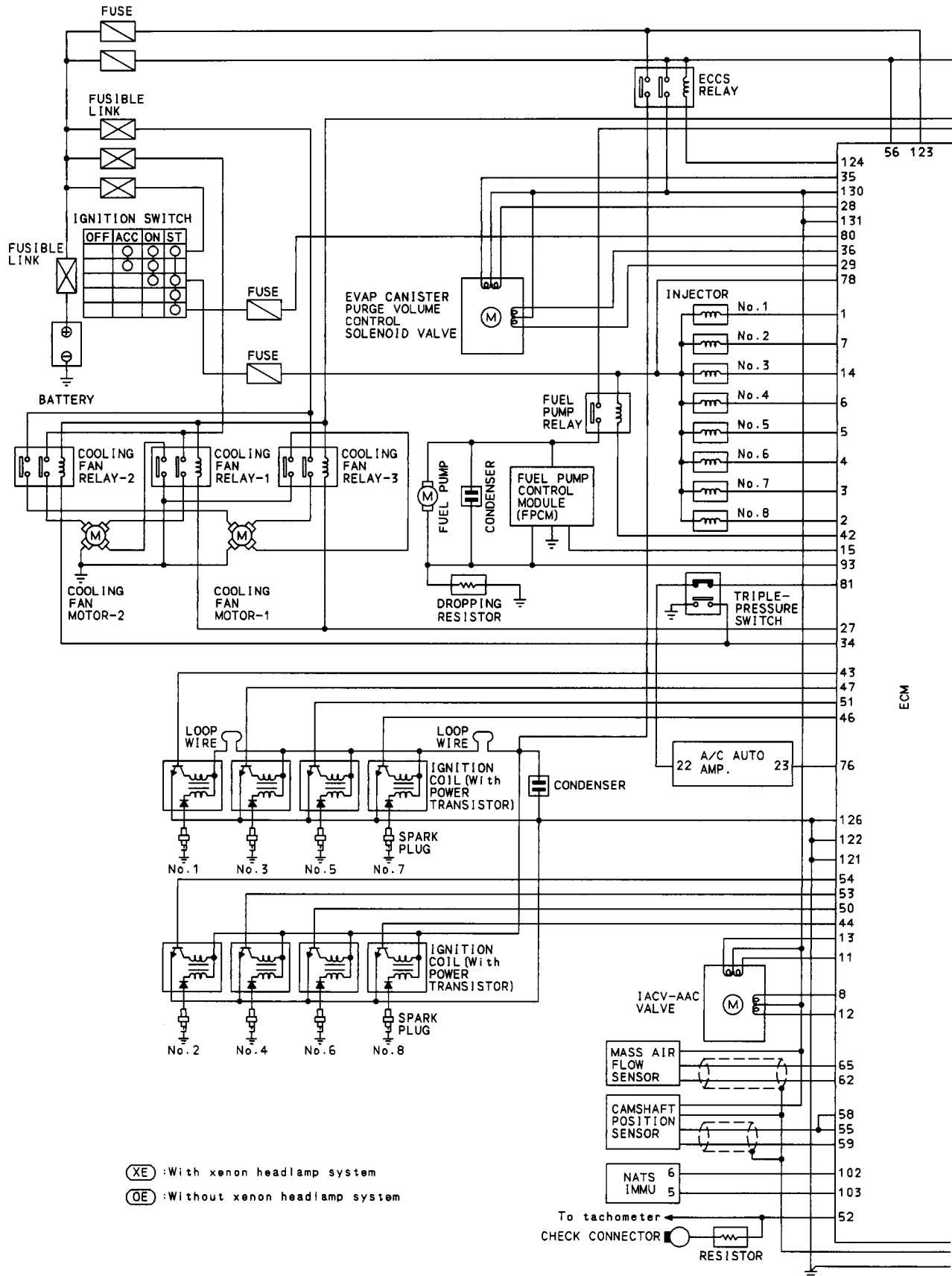
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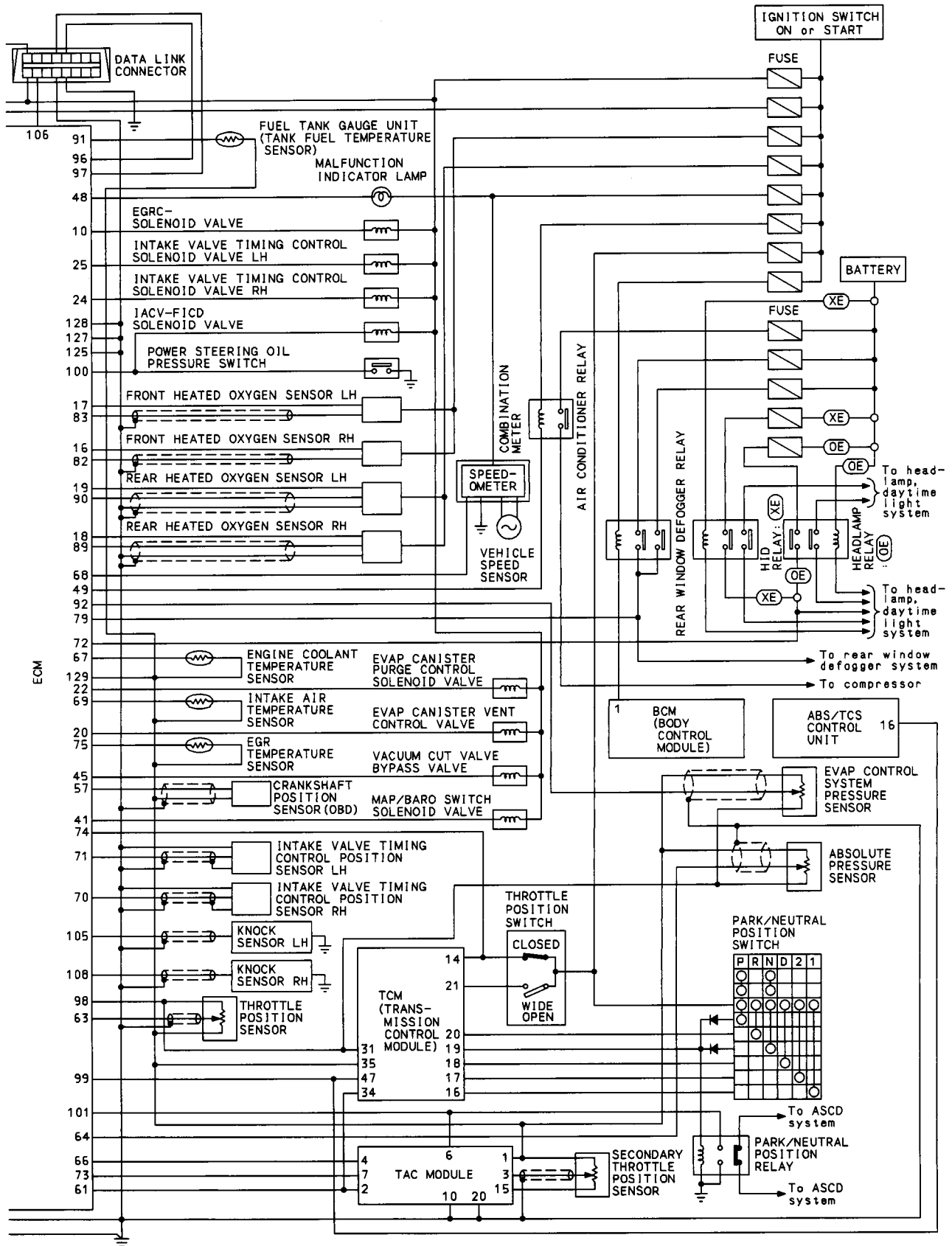
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Circuit Diagram

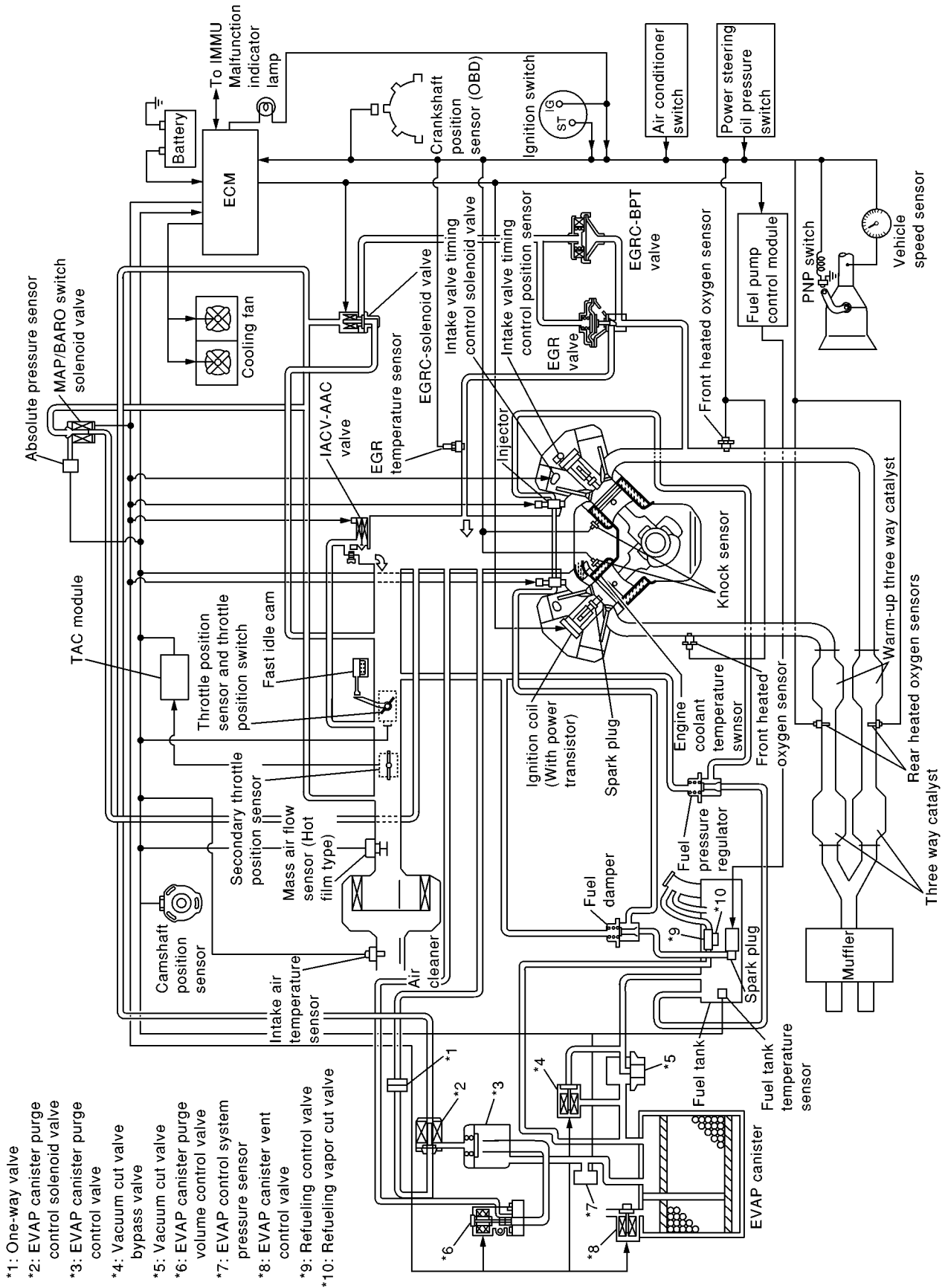


ENGINE AND EMISSION CONTROL OVERALL SYSTEM Circuit Diagram (Cont'd)

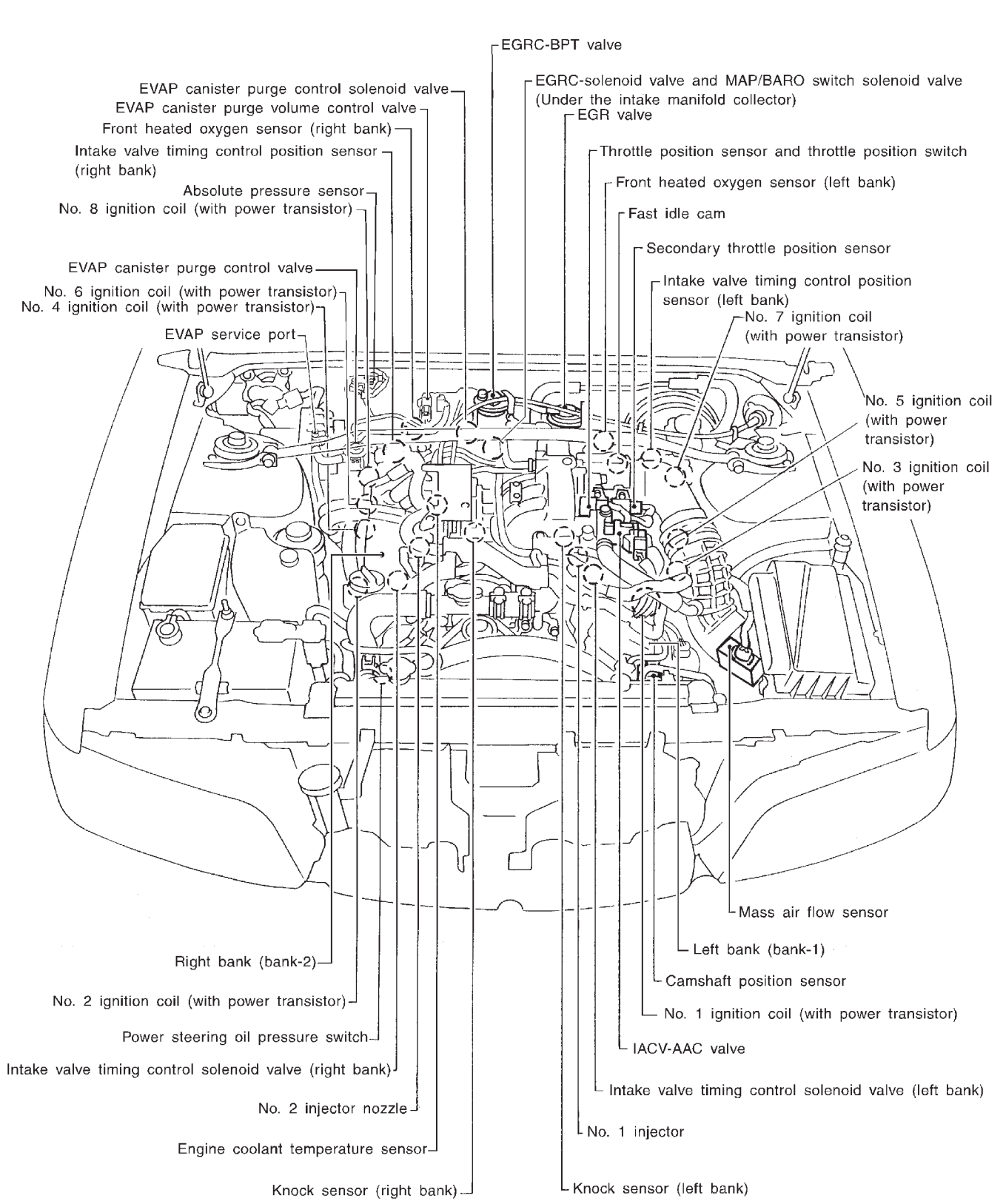


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System Diagram



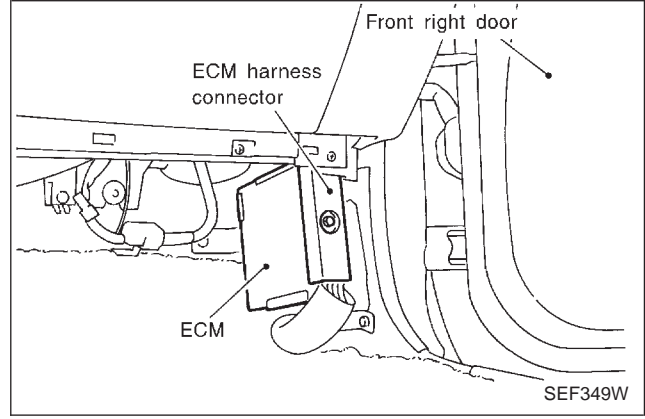
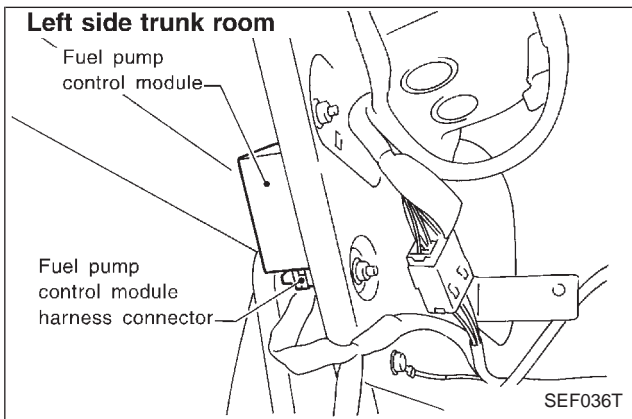
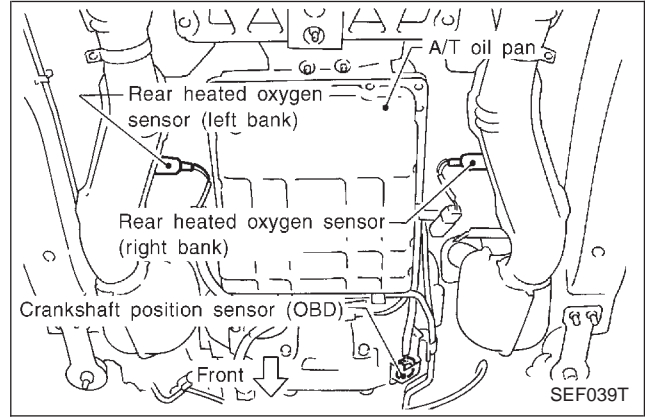
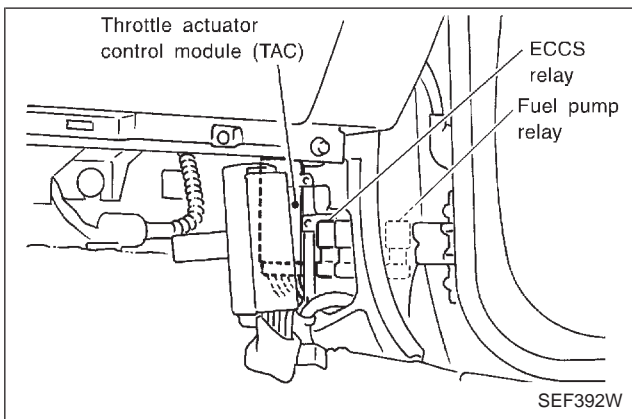
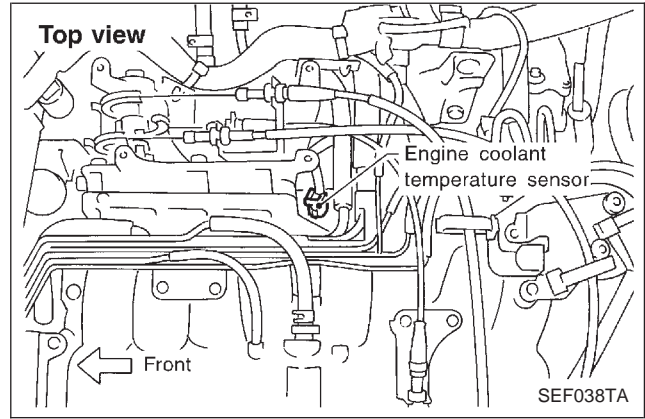
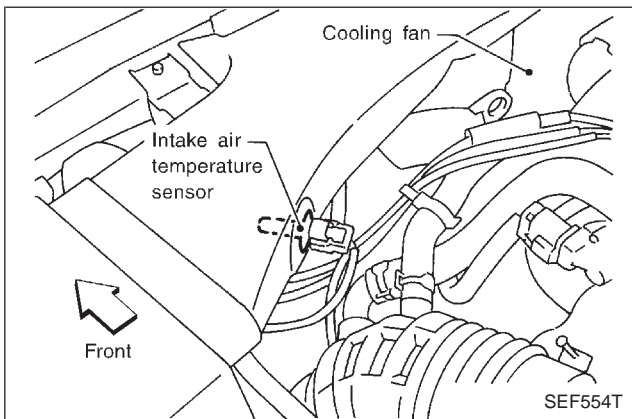
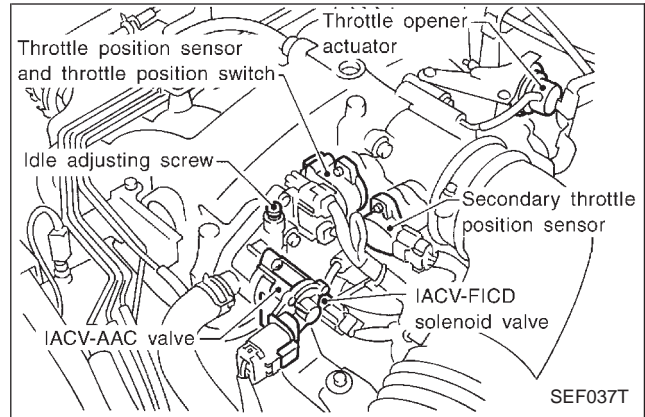
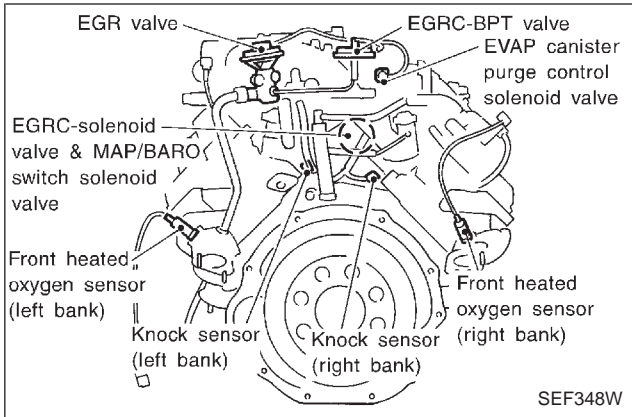
Engine Control Component Parts Location



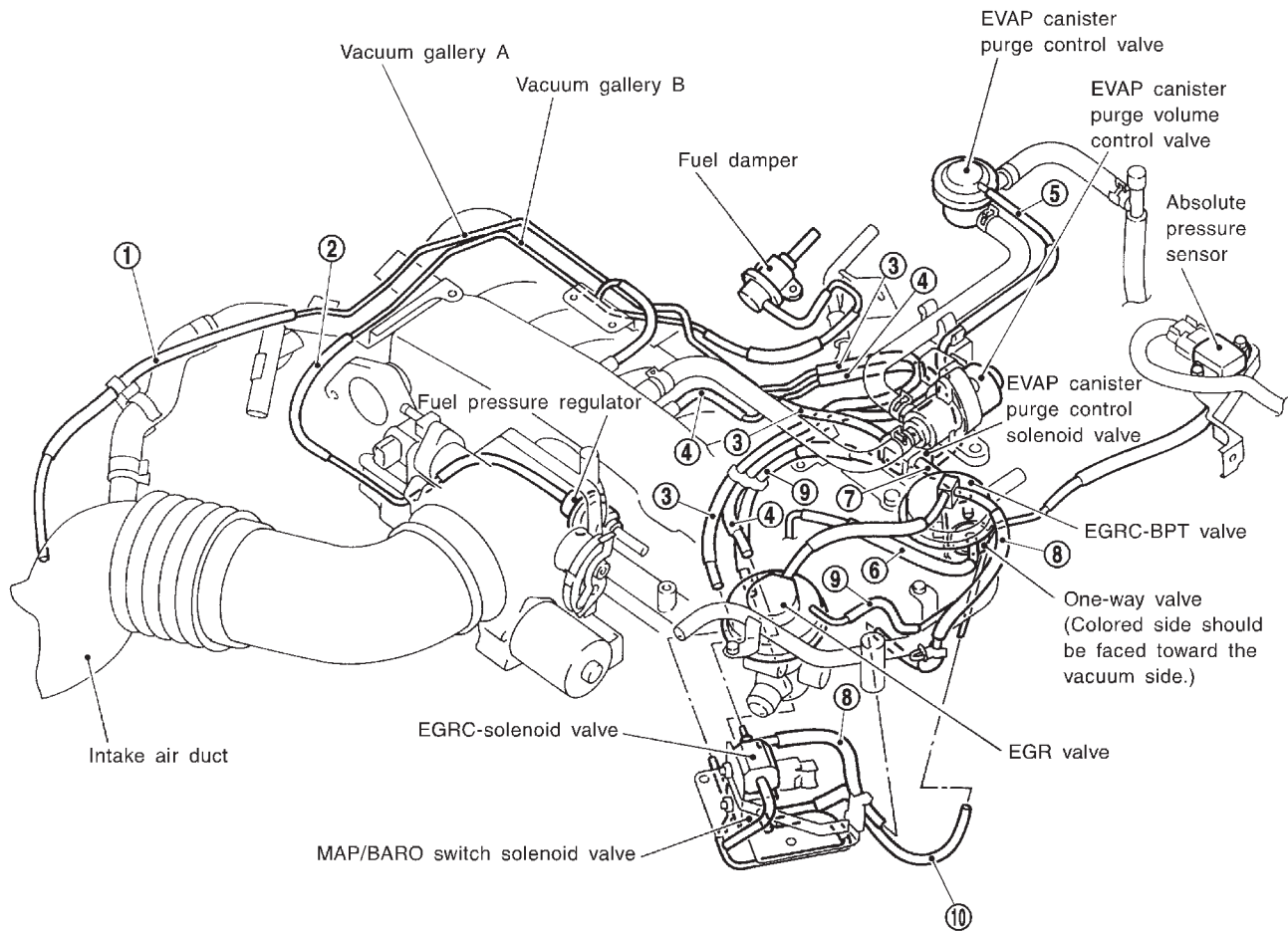
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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Engine Control Component Parts Location (Cont'd)



Vacuum Hose Drawing



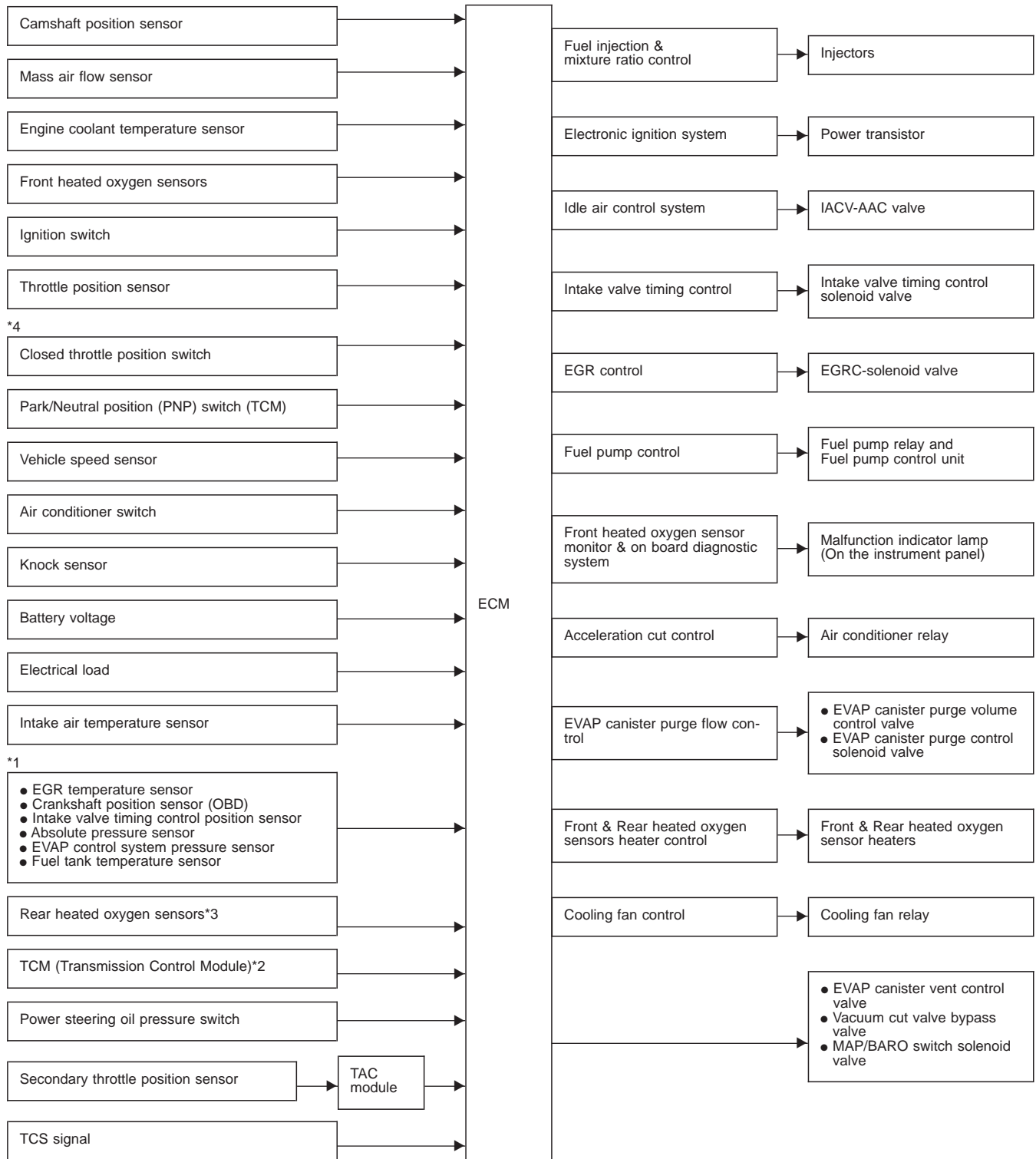
- ① Intake air duct to vacuum gallery A
- ② Fuel pressure regulator to vacuum gallery B
- ③ Vacuum gallery A to EGRC-solenoid valve, MAP/BARO switch solenoid valve and EVAP canister purge control solenoid valve
- ④ Intake manifold collector to EGRC-solenoid valve
- ⑤ EVAP canister purge control valve to EVAP canister purge control solenoid valve
- ⑥ Intake manifold collector to One-way valve
- ⑦ One-way valve to EVAP canister purge control solenoid valve
- ⑧ EGRC-BPT valve to EGRC-solenoid valve
- ⑨ Intake manifold collector to MAP/BARO switch solenoid valve
- ⑩ Absolute pressure sensor to MAP/BARO switch solenoid valve

Refer to “System Diagram”, EC-16, for vacuum control system.

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

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System Chart



*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

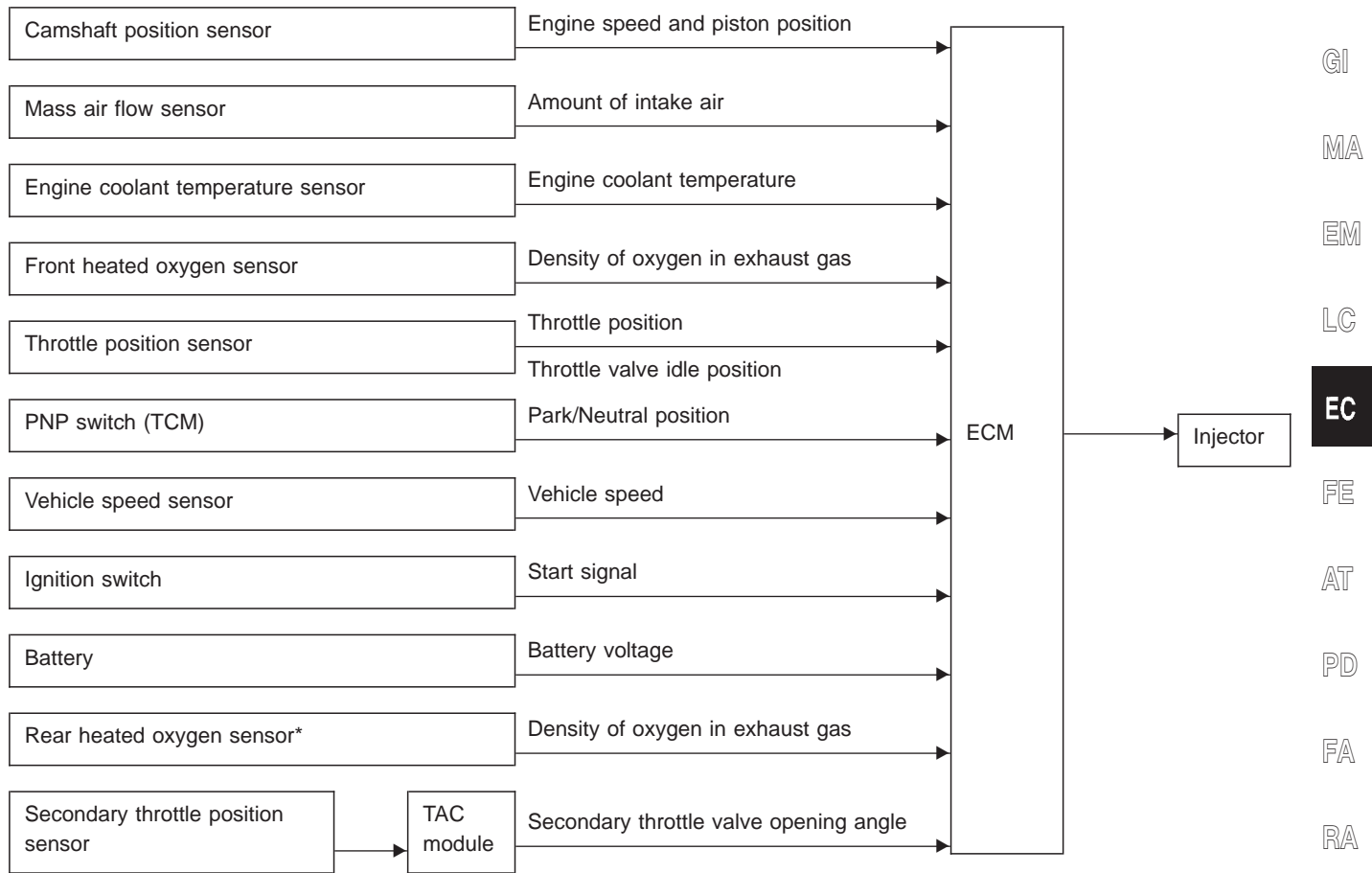
*2: The DTC related to A/T and gear position will be sent to ECM.

*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

INPUT/OUTPUT SIGNAL LINE



*: Under normal conditions, this sensor is not used to control the engine system.

BASIC MULTIPOINT FUEL INJECTION SYSTEM

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

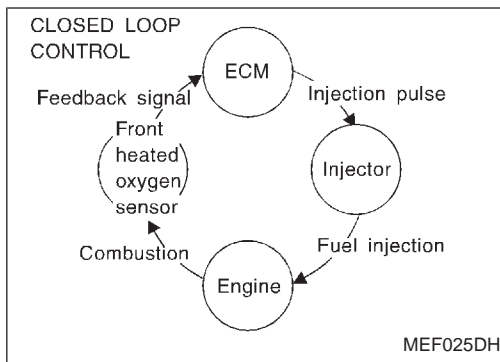
The amount of fuel injected is compensated for to improve engine performance. This will be made under various operating conditions as listed below.

<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 speed operation
- Extremely high engine coolant temperature
- During TCS operation
- During high engine speed operation



Multiport Fuel Injection (MFI) System (Cont'd)

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The 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 is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about front heated oxygen sensor, refer to pages EC-166. 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 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

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

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 film) and characteristic changes during operation (i.e. injector clogging) directly affect mixture ratio.

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

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long-term fuel trim.

"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from 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.

Multiport Fuel Injection (MFI) System (Cont'd)

FUEL INJECTION SYSTEM

Two types of systems are used.

Sequential multiport fuel injection system

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

Simultaneous multiport fuel injection system

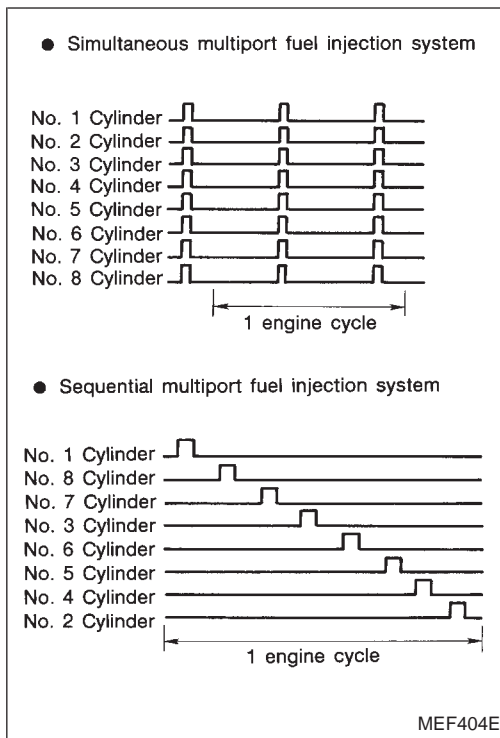
Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

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 mode (CPU) or crankshaft position sensor (REF) is operating.

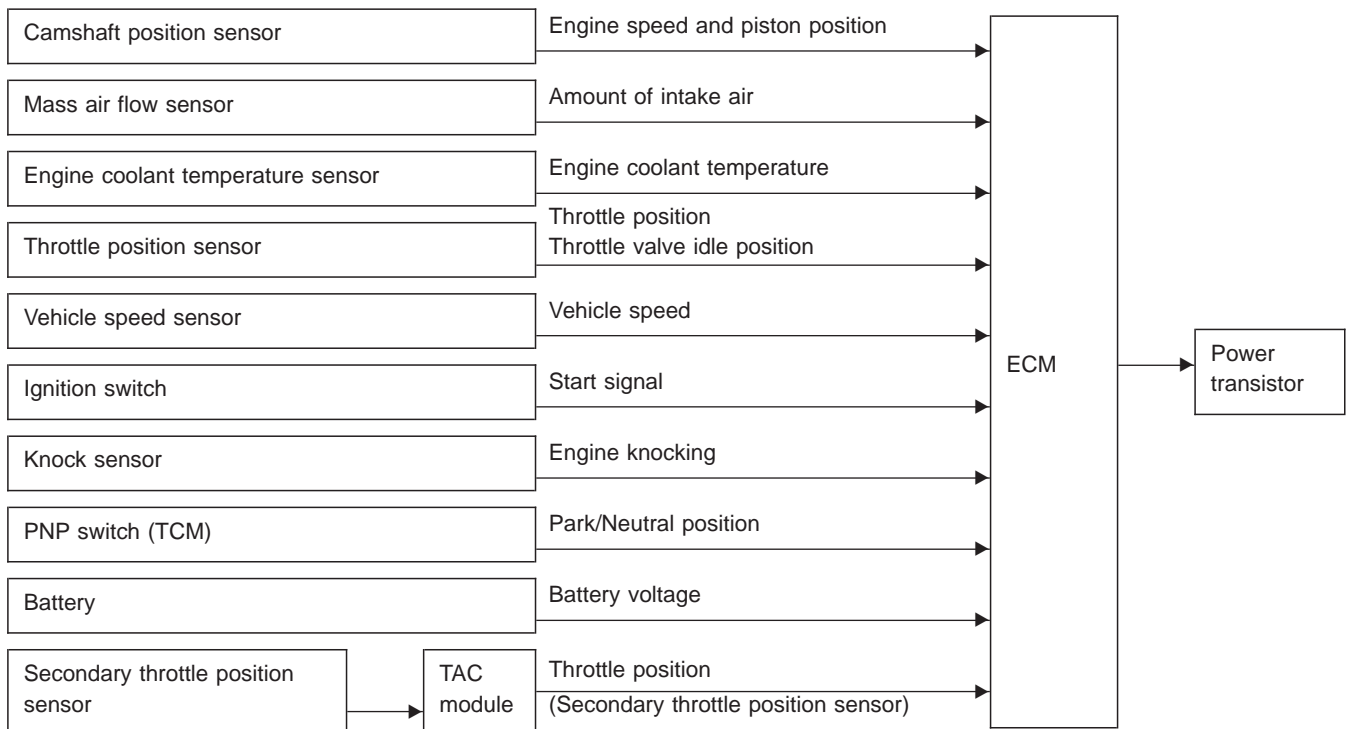
FUEL SHUT-OFF

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



Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE



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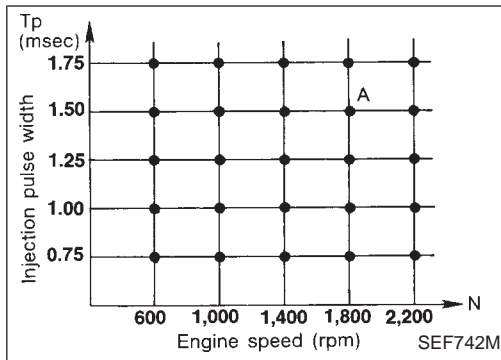
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Electronic Ignition (EI) System (Cont'd)

SYSTEM DESCRIPTION

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

The ignition timing data is stored in the ECM. This data forms the map shown below.

The ECM detects information such as the injection pulse width and camshaft position sensor signal. Responding to 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.

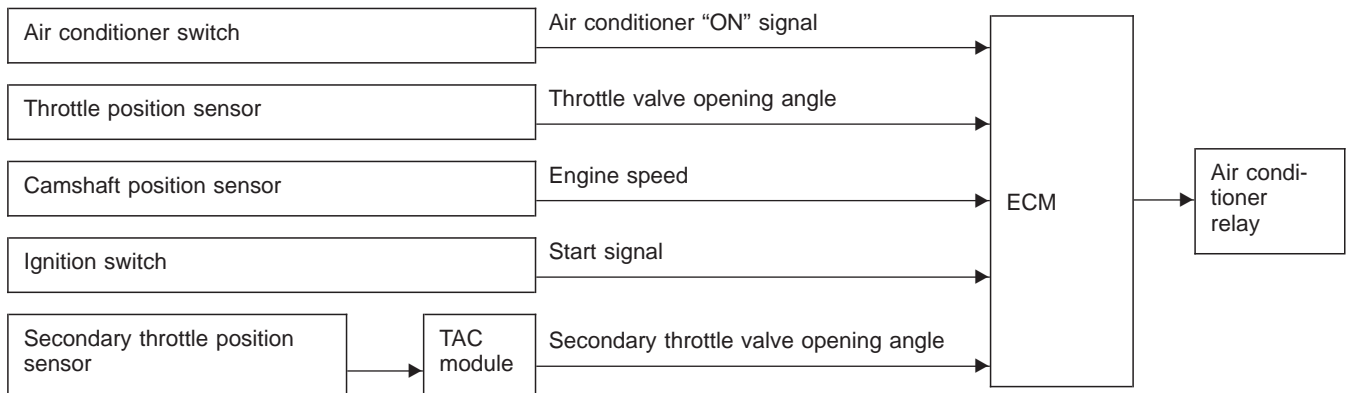
- 1 At starting
- 2 During warm-up
- 3 At idle
- 4 Hot engine operation
- 5 At acceleration

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

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

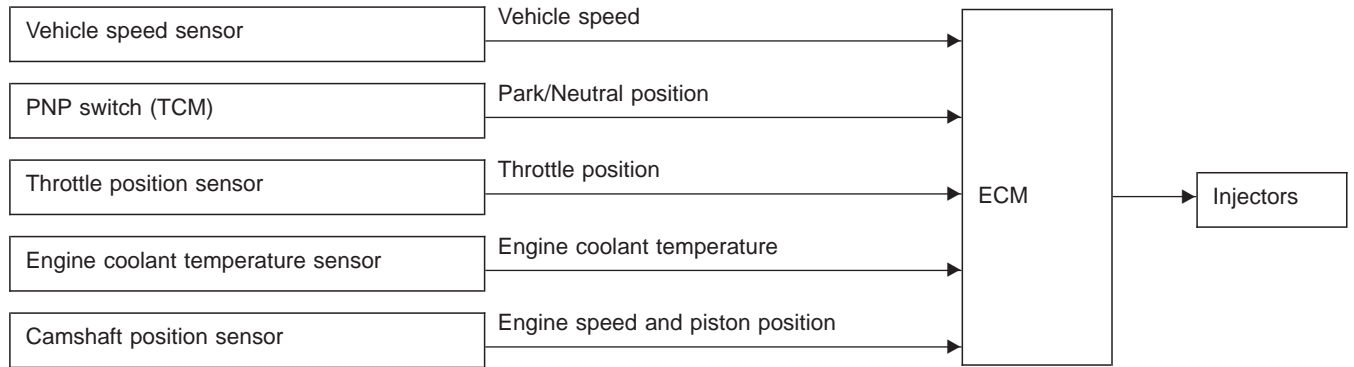
This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- After a few seconds when the TCS has started operating.

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

INPUT/OUTPUT SIGNAL LINE



- GI
- MA
- EM
- LC
- EC**
- FE
- AT
- PD
- FA
- RA
- BR
- ST
- RS
- BT
- HA
- EL
- IDX

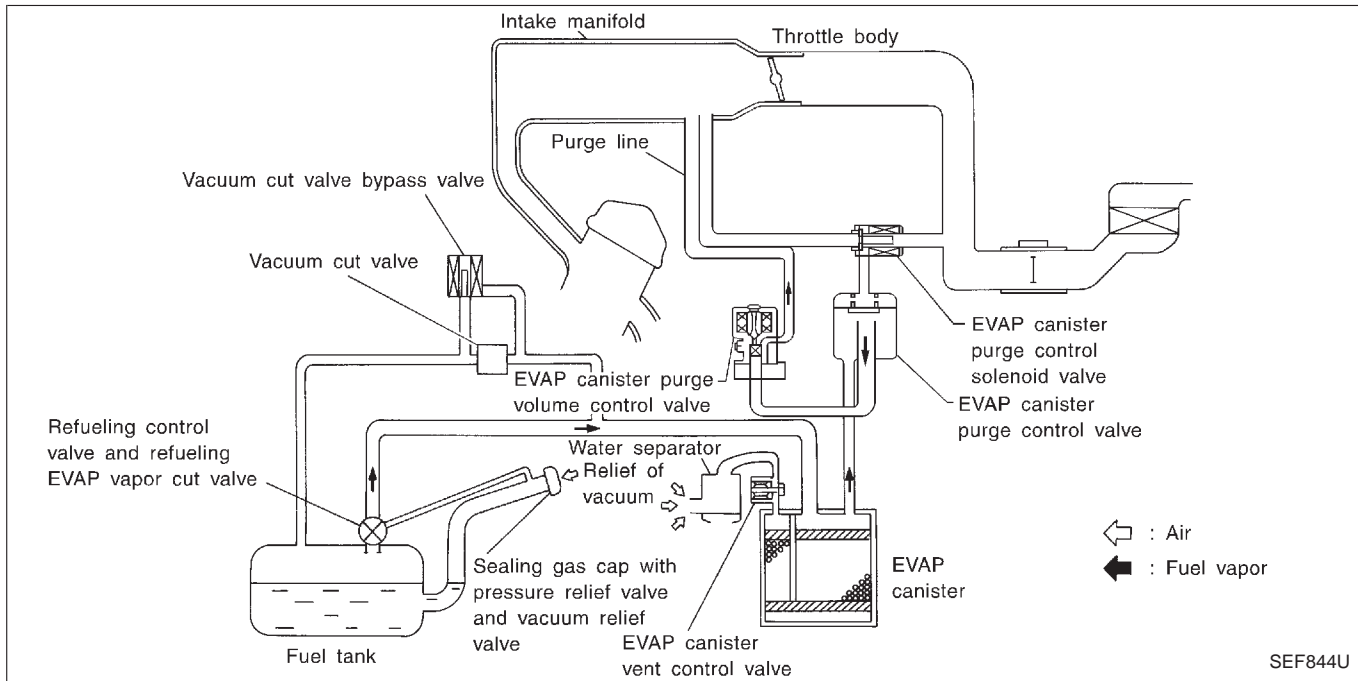
If the engine speed is above 1,400 rpm with no load (for example, in neutral and engine speed over 1,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will operate until the engine speed reaches 1,000 rpm, then fuel cut is cancelled.

NOTE:

This function is different than deceleration control listed under multiport fuel injection on EC-21.

Description

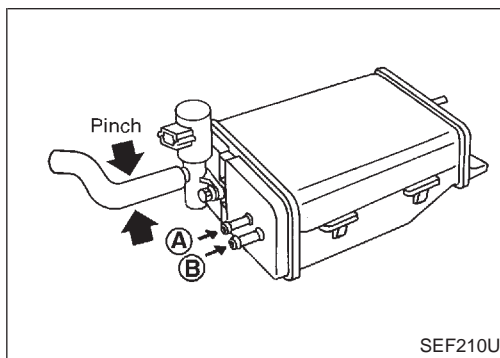


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

The vapor in the EVAP canister is purged by the air flowing through the EVAP canister purge volume control valve which is controlled by engine control module. When the engine operates, the flow rate of vapor controlled by the EVAP canister purge volume control valve is proportionally regulated as the air flow increases.

The EVAP canister purge control valve shuts off the vapor purge line during decelerating and idling; under normal operating conditions the valve is usually open.



Inspection

EVAP CANISTER

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).

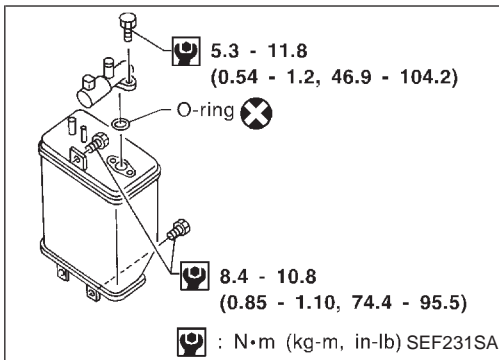
EVAPORATIVE EMISSION SYSTEM

Inspection (Cont'd)

TIGHTENING TORQUE

Tighten EVAP canister as shown in the figure.

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



FUEL TANK VACUUM RELIEF VALVE

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

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

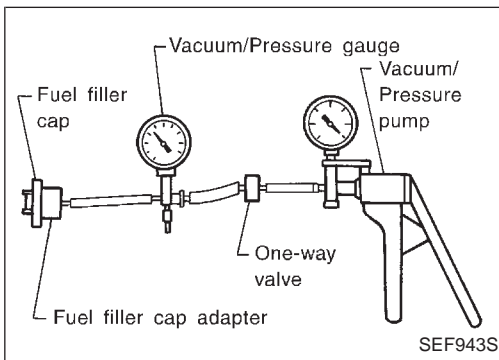
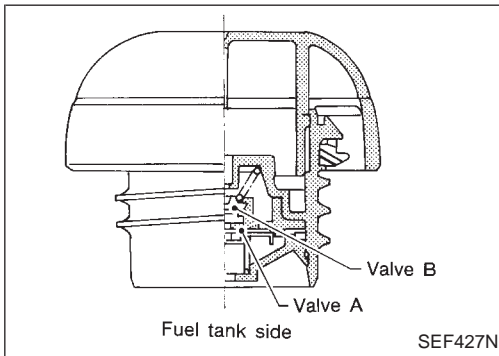
Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -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.



EGRC-SOLENOID VALVE

Refer to EC-410.

EVAP CANISTER PURGE CONTROL VALVE

Refer to EC-486.

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-473.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VOLUME CONTROL VALVE

Refer to EC-442.

EVAPORATIVE EMISSION (EVAP) CANISTER PURGE CONTROL SOLENOID VALVE

Refer to EC-486.

FUEL TANK TEMPERATURE SENSOR

Refer to EC-255.

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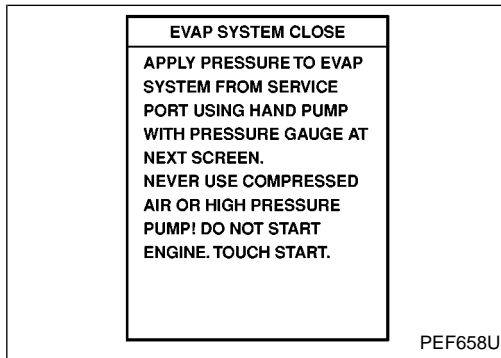
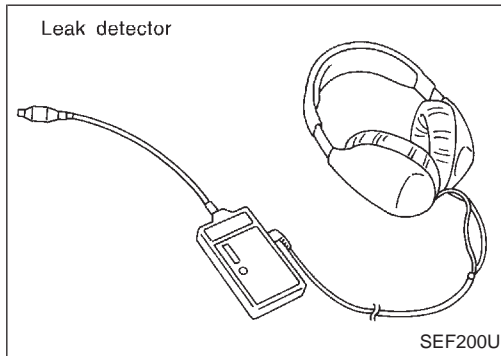
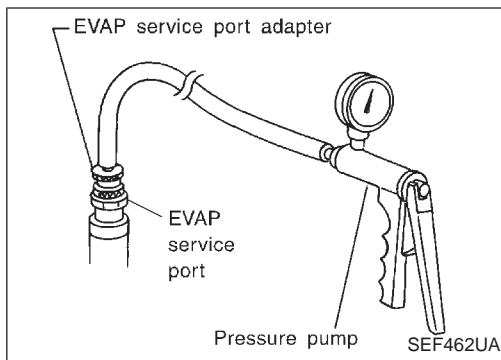
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EVAPORATIVE EMISSION SYSTEM

Inspection (Cont'd)

EVAP SERVICE PORT

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.



HOW TO DETECT FUEL VAPOR LEAKAGE

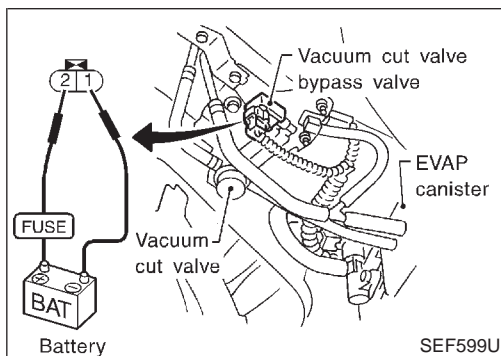
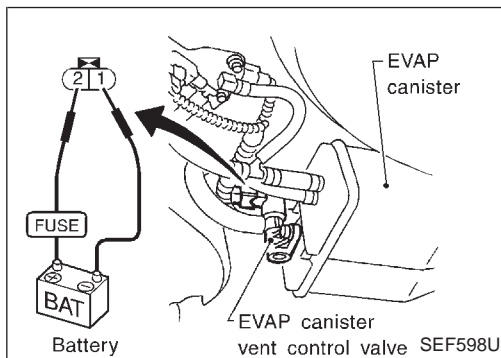
CAUTION:

- Never use compressed air or a high pressure pump.
- Do not start engine.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Improper installation of adapter to the service port may cause a leak.

1. Attach the EVAP service port adapter securely to the EVAP SERVICE port.
2. Also attach the pressure pump and hose.
3. Turn ignition switch "ON".
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
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 adapter and hose with pressure pump.
8. Locate the leak using a leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.



OR

1. Attach the adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2. 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.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 - 2.76 kPa (0.014 - 0.028 kg/cm², 0.2 - 0.4 psi).
4. Remove adapter and hose with pressure pump.
5. Locate the leak using a leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

Evaporative Emission Line Drawing

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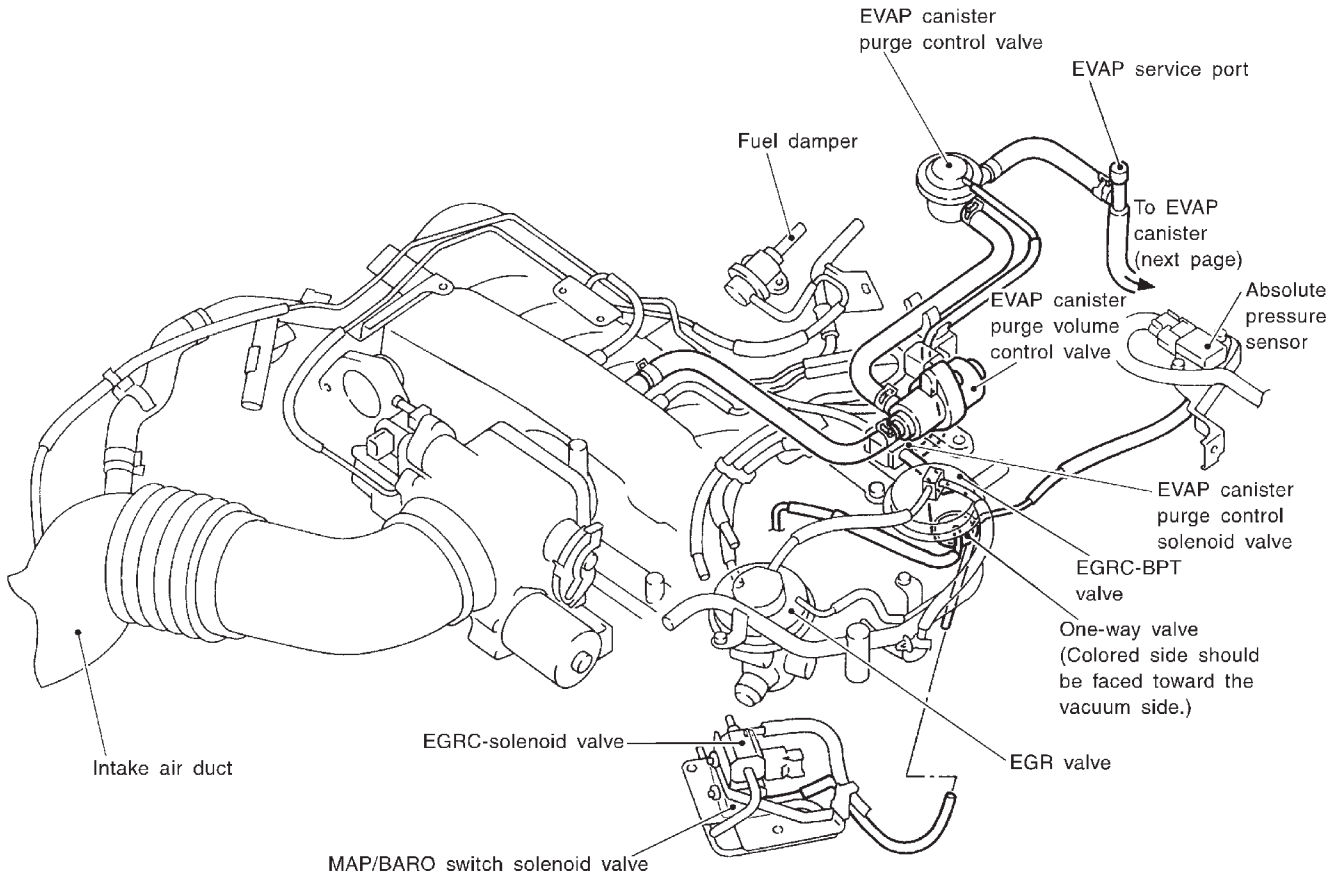
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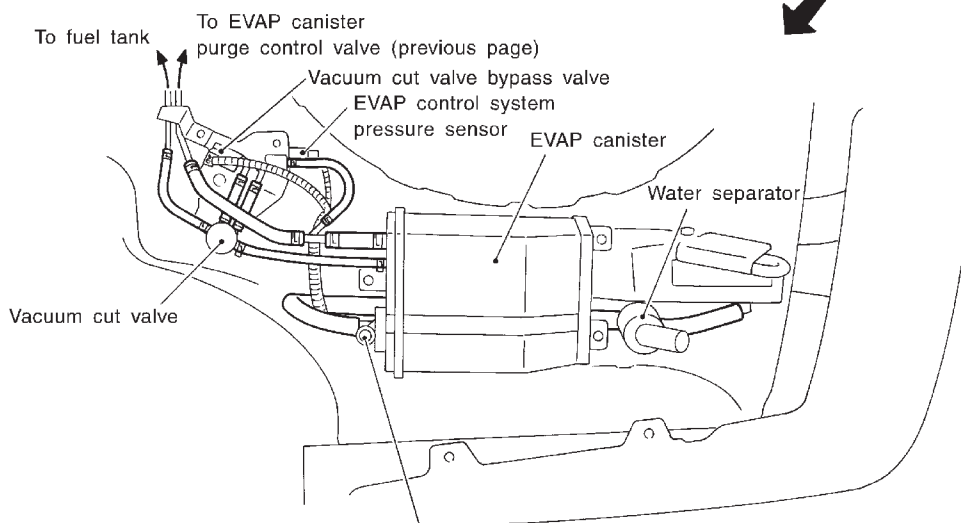
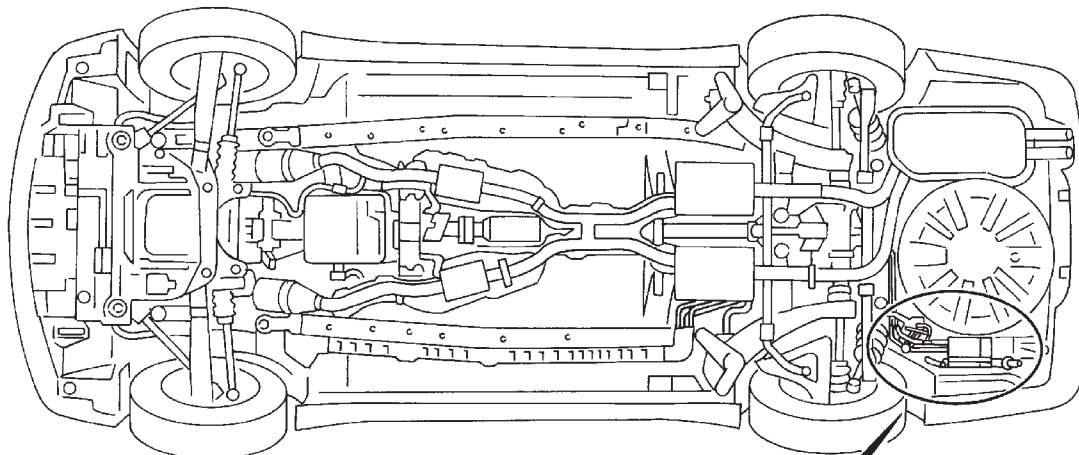
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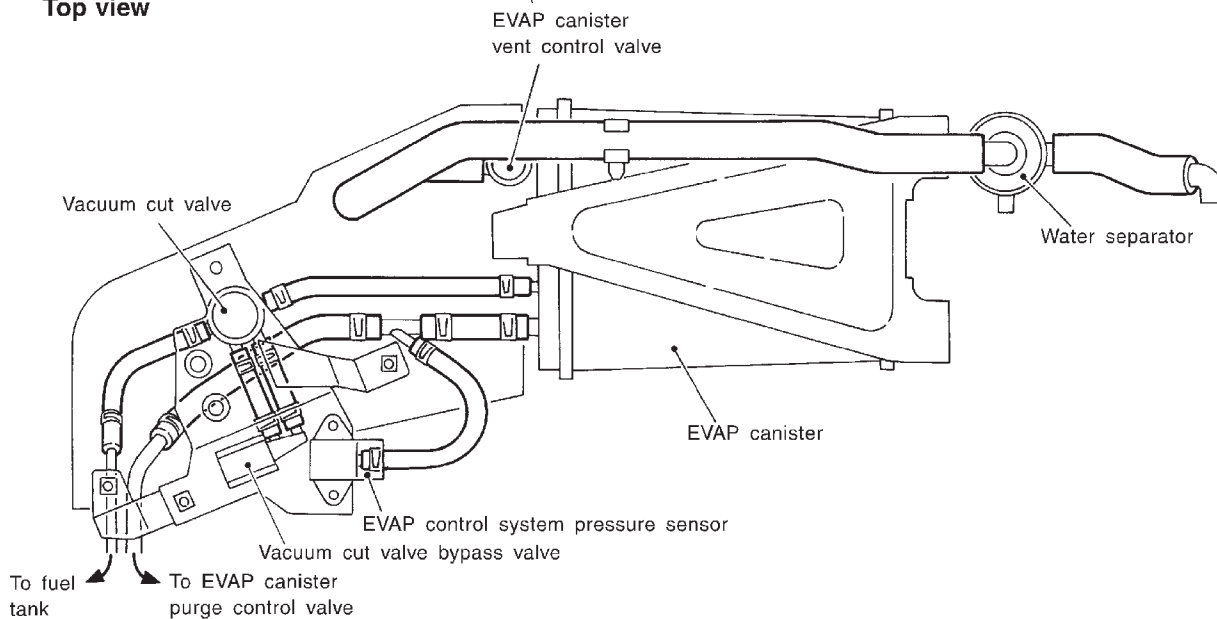
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Note: Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

Evaporative Emission Line Drawing (Cont'd)

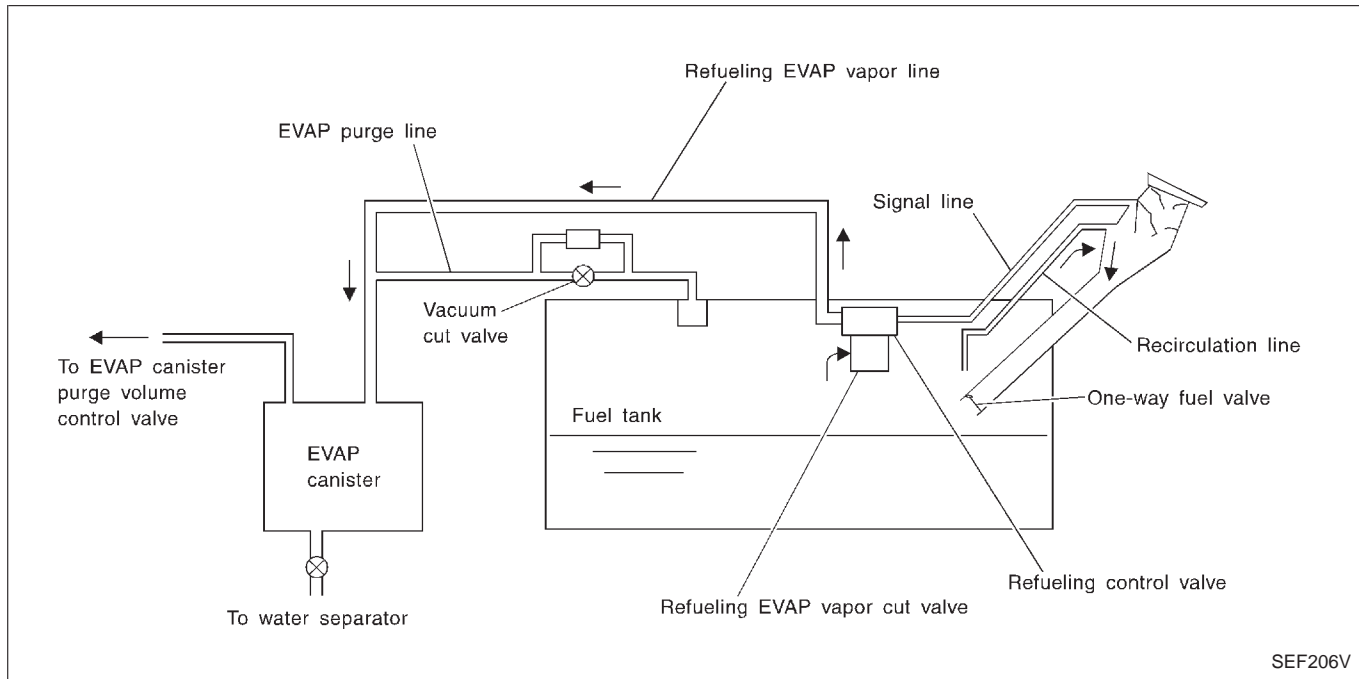


Top view



On Board Refueling Vapor Recovery (ORVR)

SYSTEM DESCRIPTION



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a **“CAUTION: INFLAMMABLE”** sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - a. Put drained fuel in an explosion-proof container and put lid on securely.
 - b. Release fuel pressure from fuel line. Refer to “Fuel Pressure Release”, EC-37.
 - c. Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
- Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

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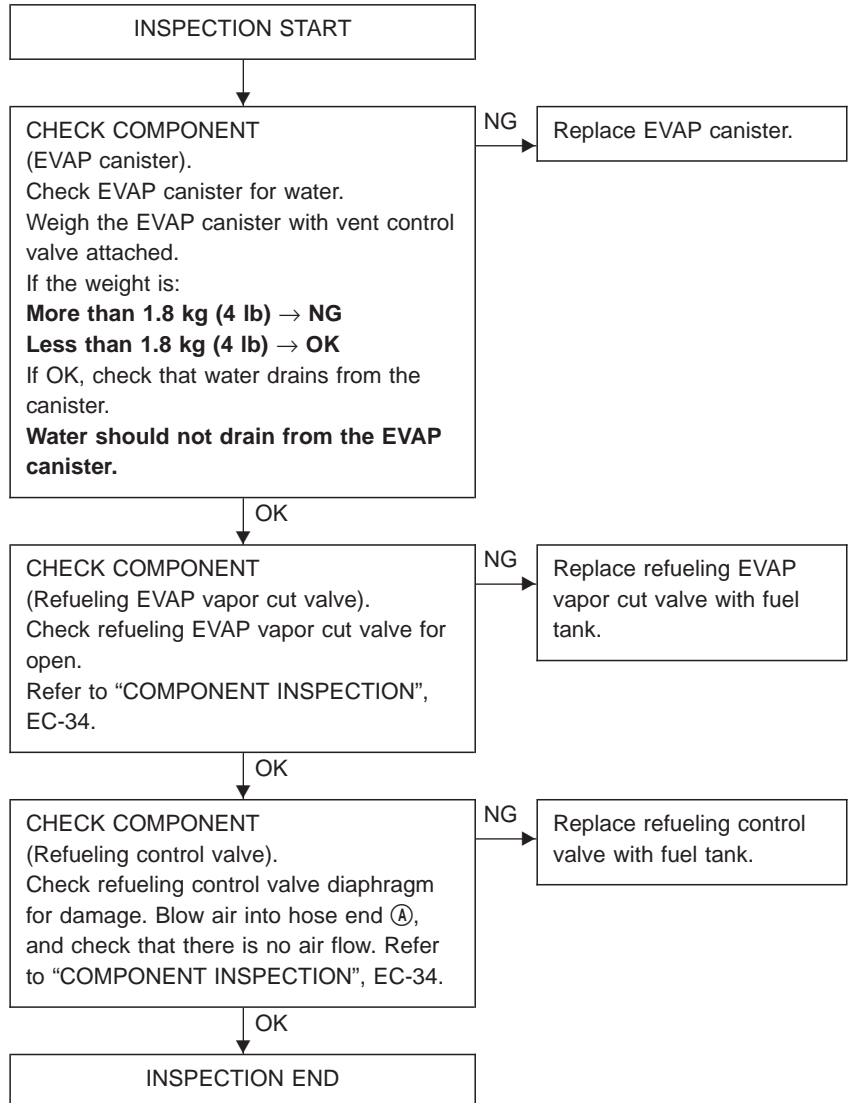
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On Board Refueling Vapor Recovery (ORVR) (Cont'd)

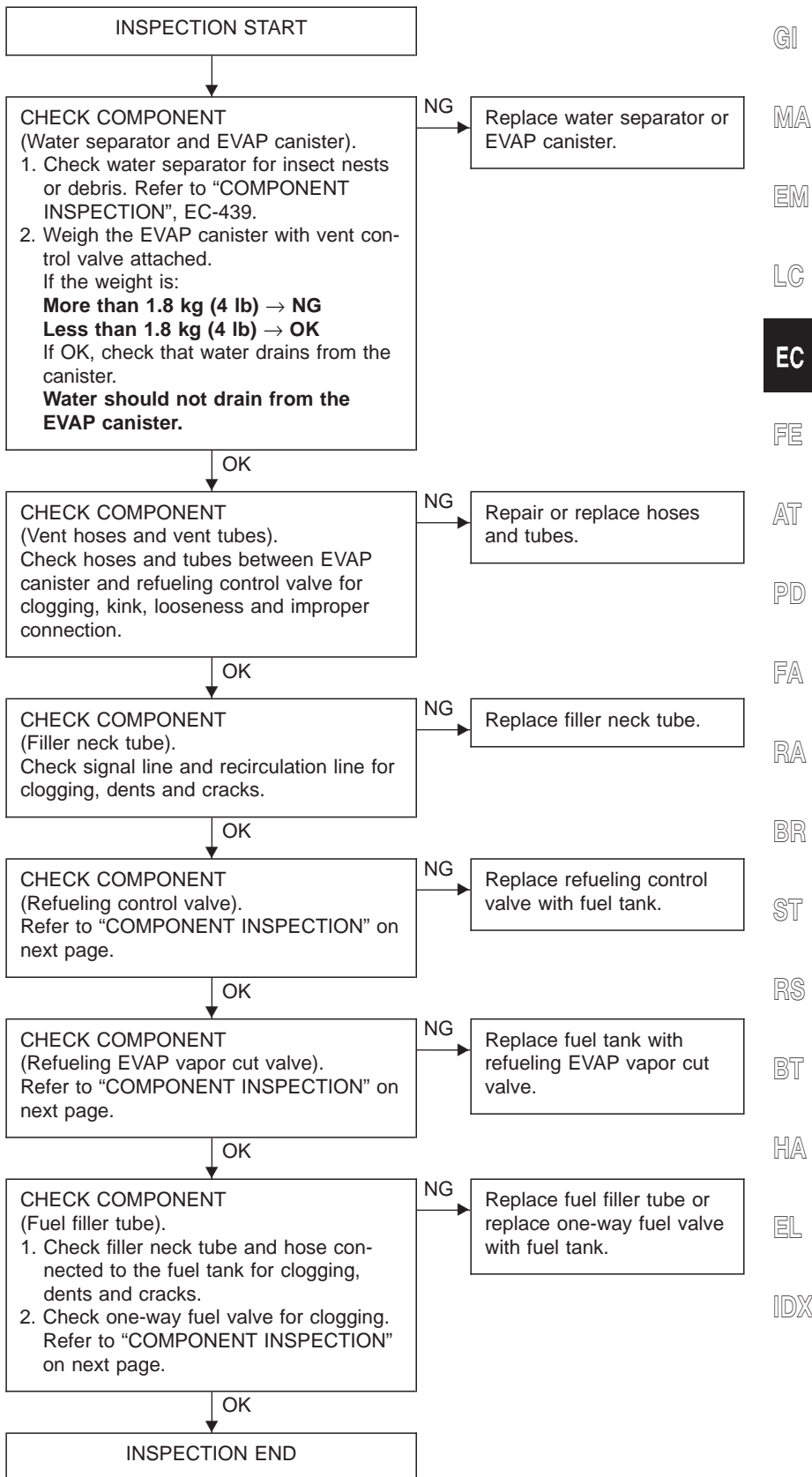
DIAGNOSTIC PROCEDURE

SYMPTOM: Fuel odor from EVAP canister is strong.



**On Board Refueling Vapor Recovery (ORVR)
(Cont'd)**

SYMPTOM: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.



EVAPORATIVE EMISSION SYSTEM

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

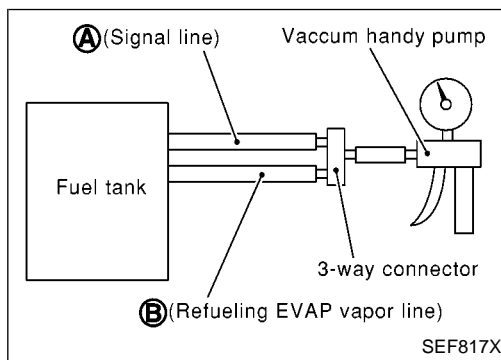
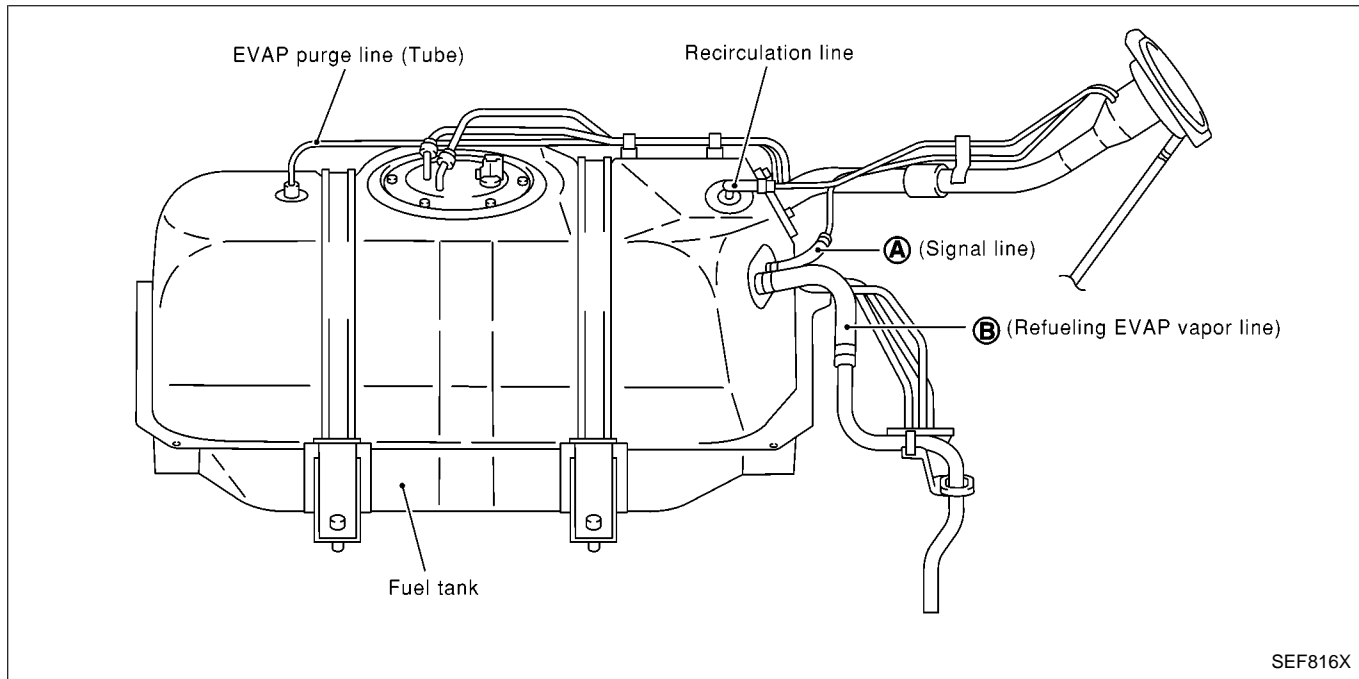
COMPONENT INSPECTION

Refueling control valve

Check refueling control valve as follows:

1. Remove fuel filler cap.
2. Check air continuity between hose ends (A) and (B).
Blow air into the hose end (B). Air should flow freely into the fuel tank.
3. Blow air into hose end (A) and check there is no leakage.
4. Apply pressure to both hose ends (A) and (B) [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. And check there is no leakage.

If NG, replace refueling control valve with fuel tank.



Refueling EVAP vapor cut valve

1. Remove fuel tank. Refer to "FUEL SYSTEM" in FE section.
Drain fuel from the tank as follows:

- a. Remove fuel feed hose located on the fuel gauge retainer.
- b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.

OR

- a. Remove fuel gauge retainer.
- b. Drain fuel from the tank using a hand pump into a fuel container.

2. Check refueling EVAP vapor cut valve for being stuck to close as follows.

Blow air into the refueling EVAP vapor cut valve (from hose end (B)), and check that the air flows freely into the tank.

3. Check EVAP vapor cut valve for being stuck to open as following.

- a. Connect vacuum pump to hose ends (A) and (B) using a suitable 3-way connector.
- b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

- c. Put fuel tank upside down.
- d. Apply vacuum pressure to both hose ends (A) and (B) [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.
If NG, replace refueling EVAP vapor cut valve with fuel tank.

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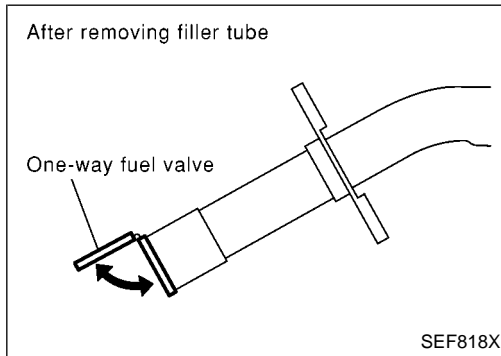
RS

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One-way fuel valve

1. Drain fuel from the tank.
Refer to "COMPONENT INSPECTION" of refueling EVAP vapor cut valve on previous page.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
When pushing with finger, the valve should open; when finger is released, the valve should shut.

Do not drop any material into the tank.

If NG, replace one-way fuel valve with fuel tank.

Description

This system returns blow-by gas to both the intake manifold and air cleaner.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

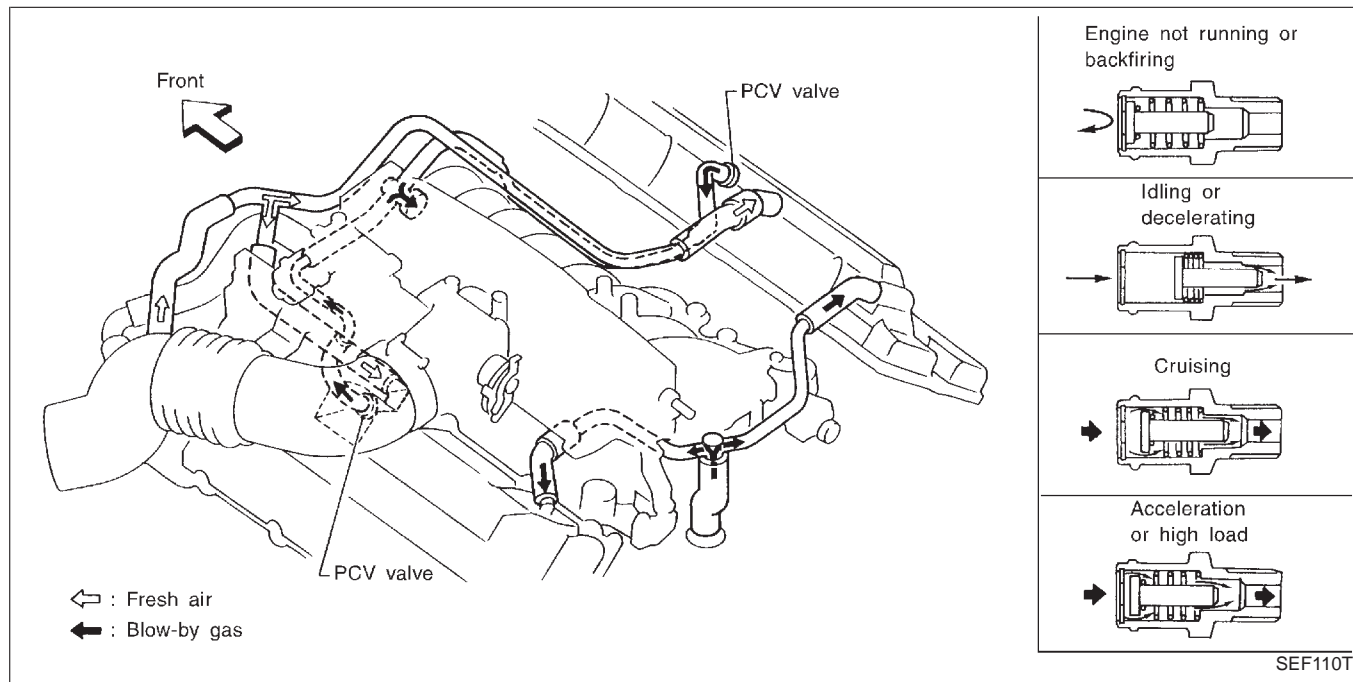
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

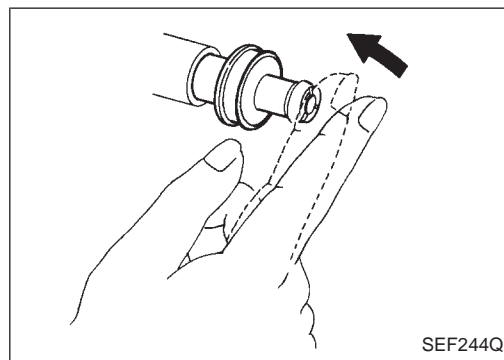
The ventilating air is then drawn from the air cleaner, through the hose connecting air cleaner to rocker cover, into the crankcase.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air cleaner under all conditions.



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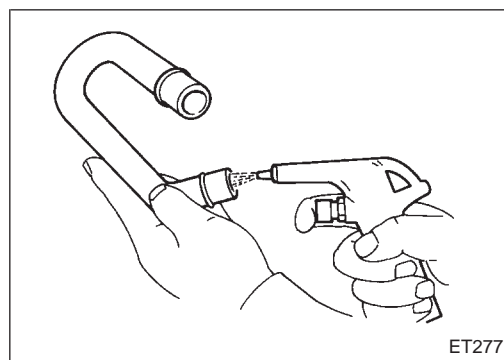


SEF244Q

Inspection

PCV (Positive Crankcase Ventilation) VALVE

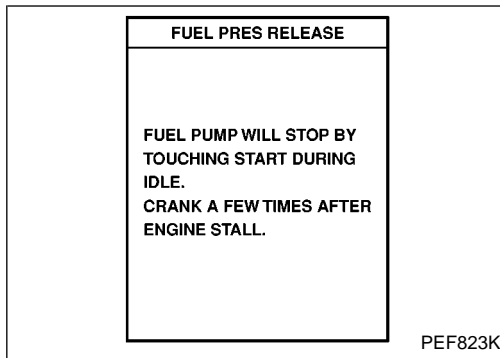
With engine running at idle, remove ventilation hose from PCV valve; if valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



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PCV HOSE

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

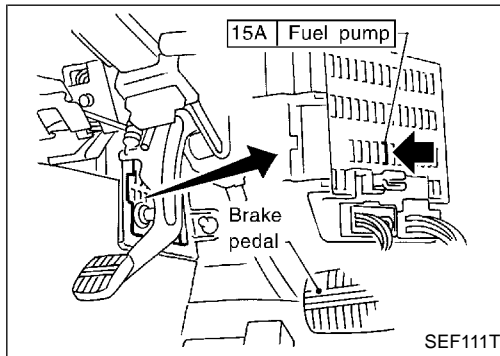


Fuel Pressure Release

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

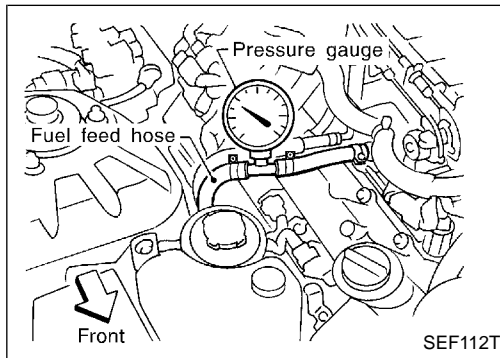
1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II. (Touch "START" and after engine stalls, crank it two or three times to release all fuel pressure.)
3. Turn ignition switch off.

GI
MA
EM



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

LC
EC



Fuel Pressure Check

- 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.

PD
FA
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1. Release fuel pressure to zero, refer to previous page.
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.

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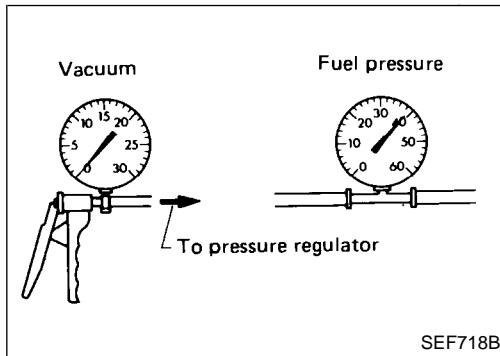
At idling:

Approximately 235 kPa (2.4 kg/cm², 34 psi)

A few seconds after ignition switch is turned OFF to ON:

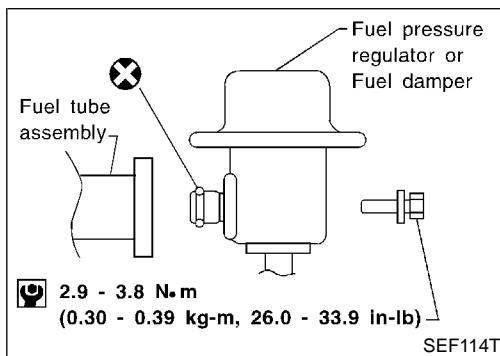
Approximately 294 kPa (3.0 kg/cm², 43 psi)

RS
BT



6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

HA



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

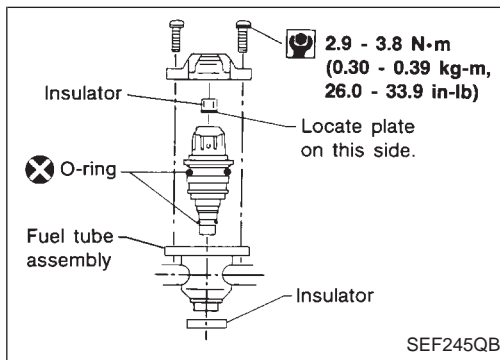
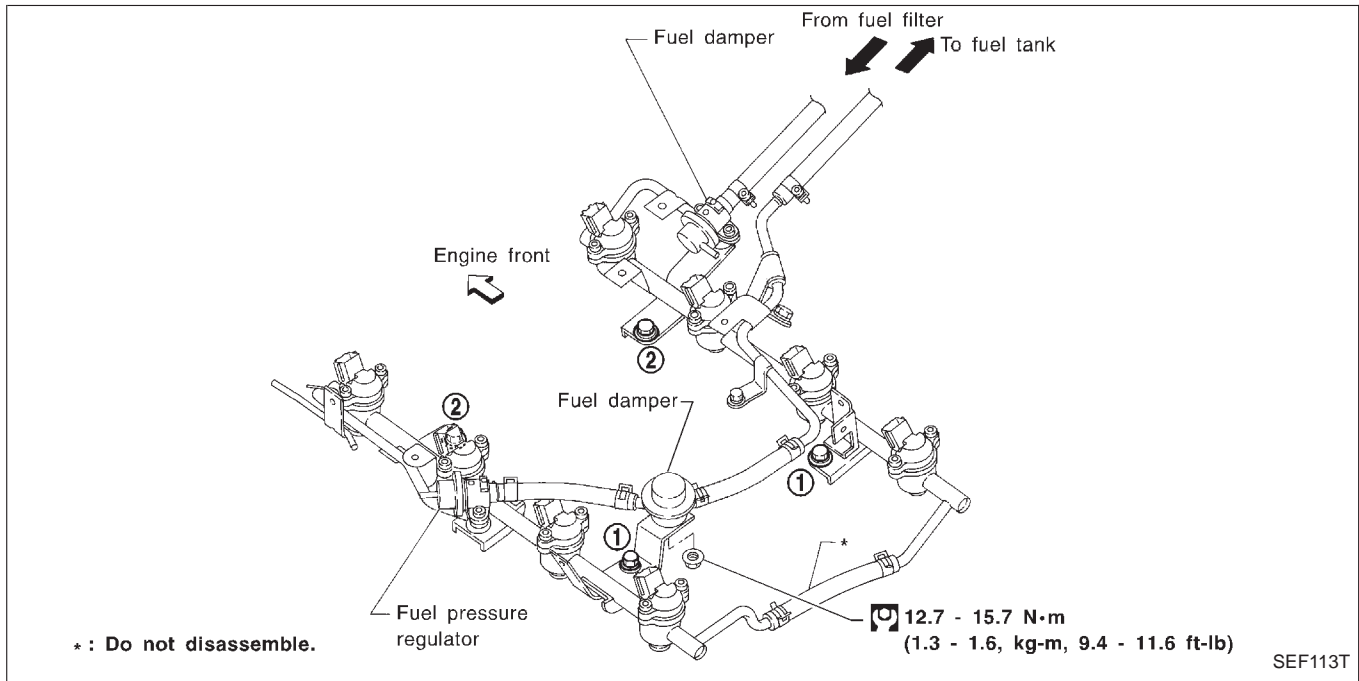
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Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

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2.9 - 3.8 N·m
(0.30 - 0.39 kg-m, 26.0 - 33.9 in-lb)

Injector Removal and Installation



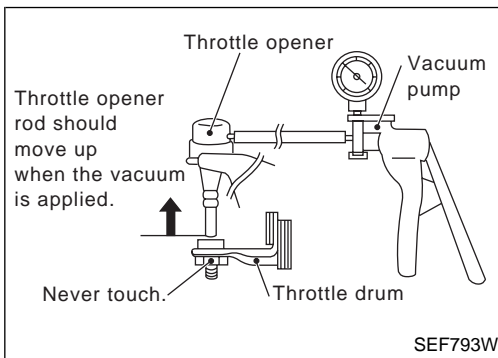
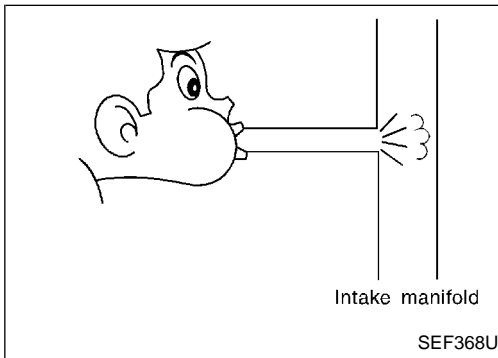
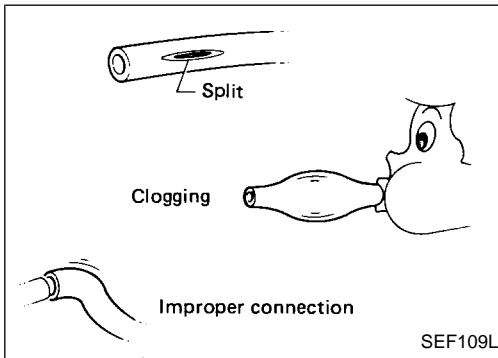
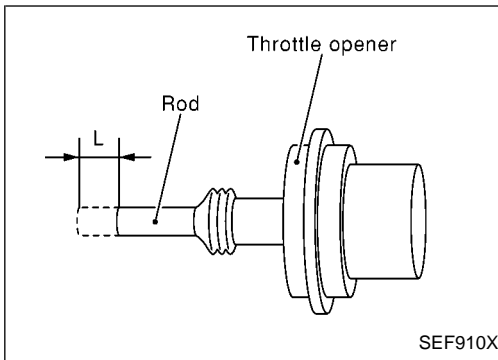
1. Release fuel pressure to zero, refer to previous page.
2. Remove intake manifold collector. Refer to EM section ("TIMING CHAIN").
3. Disconnect vacuum hose from pressure regulator.
4. Disconnect fuel hoses from fuel tube assembly.
 - **Do not disassemble fuel tube assembly.**
5. Disconnect injector harness connectors.
6. Remove injectors with fuel tube assembly.
 - **Push injector tail piece.**
 - **Do not pull on the connector.**
7. Push out any malfunctioning injector from fuel tube assembly.
8. Replace or clean injector as necessary.
9. Install injector to fuel tube assembly.
 - **Always replace O-rings with new ones.**
 - **Lubricate O-rings with a smear of engine oil.**
10. Install injectors with fuel tube assembly to intake manifold.

Tighten in numerical order shown in the figure.

 - a) First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
 - b) Then, tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).
11. Install fuel hoses to fuel tube assembly.
12. Reinstall any parts removed in reverse order of removal.

CAUTION:

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



Throttle Opener

INSPECTION

1. Start engine and let it idle.
2. Confirm the amount of the rod moves more than 1.65 mm (0.0650 in), the throttle drum becomes free from the rod of the throttle opener.

If NG, go to next step.

If OK, inspection is end.

3. Turn ignition switch "OFF".
4. Check vacuum source to throttle opener.
 - a. Check vacuum hose for disconnection or improper connection.
 - b. Remove vacuum hose connected to throttle opener.
 - c. Attach a vacuum gauge to vacuum hose, which is disconnected.

d. Start engine and let it idle.

e. Make sure that the vacuum is more than -40.0 kPa (-300 mmHg, -11.81 inHg).

f. Remove the vacuum gauge from intake manifold.

If NG, go to next step.

If OK, go to step 7.

5. Check vacuum hose for clogging and cracks.

If NG, replace or clean vacuum hose.

If OK, go to next step.

6. Blow air into the intake manifold and make sure air flows freely.

If NG, replace or clean intake manifold.

If OK, go to next step.

7. Check throttle opener.

a. Connect suitable vacuum hose to vacuum pump as shown at left.

b. 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.

c. Confirm the amount of the rod moves more than 1.65 mm (0.0650 in), and also the throttle drum becomes free from the rod of the throttle opener.

If NG, go to next step.

8. Check visually for cracking and/or distortion of throttle opener and rod.

If NG, replace throttle opener.

If OK, install the vacuum hose and repeat from step 1 to 2.

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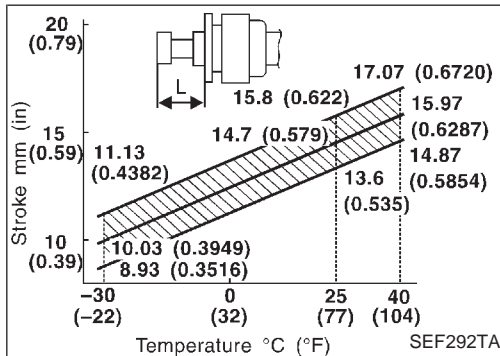
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Fast Idle Cam (FIC) Inspection and Adjustment

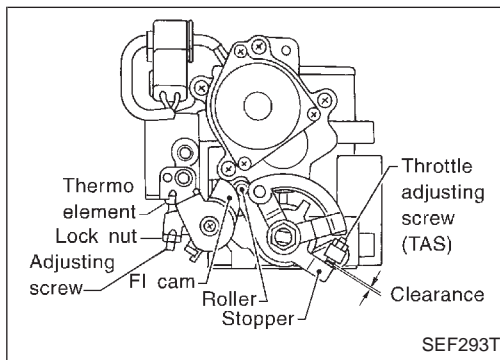
1. Remove throttle body from engine.
2. Wait for at least 3 hours.
(This step is necessary to bring the temperature of the thermo-element to the room temperature)



3. Measure thermo-element stroke (L) and room temperature.
4. Check thermo-element stroke (L) as shown in the figure.

CAUTION:
Do not adjust TAS.

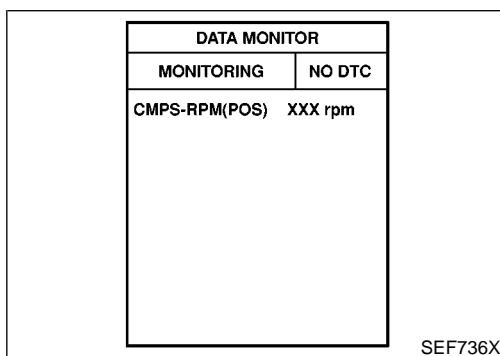
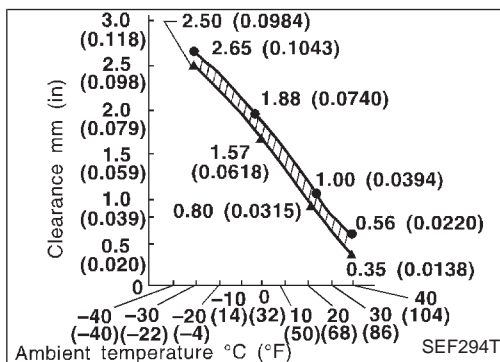
L: Thermo-element stroke	Judgement
Within oblique line	Thermo-element is normal → Adjust FI cam (go to step 5).
Out of oblique line	Replace thermo-element → Adjust FI cam (go to step 2).



5. Measure clearance between stopper and throttle adjusting screw (TAS) as shown in the figure. If out of specification, adjust the clearance using adjusting screw.

CAUTION:
Do not adjust throttle adjusting screw (TAS).

6. After adjustment, tighten lock nut of adjusting screw.
 : 1.5 - 2.0 N·m (0.15 - 0.2 kg·m, 13.0 - 17.4 in·lb)
7. Reinstall throttle body.
8. After warming up engine, check that there is a clearance between FI cam and roller.



Direct Ignition System — How to Check Idle Speed and Ignition Timing

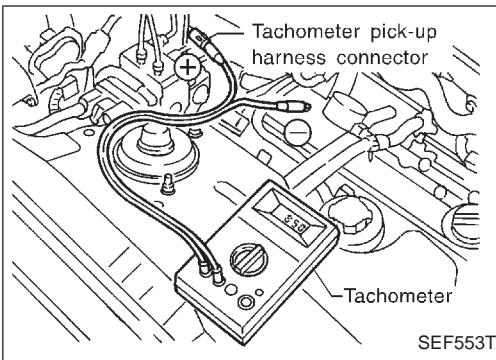
IDLE SPEED

- Method A (Using CONSULT-II)

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

BASIC SERVICE PROCEDURE

Direct Ignition System — How to Check Idle Speed and Ignition Timing (Cont'd)



- **Method B (Using check connector)**

Check the idle speed using check connector as shown in the figure. (Check connector is located in the harness protector).

GI

MA

EM

IGNITION TIMING

Any of the following two methods may be used.

- **Method A**

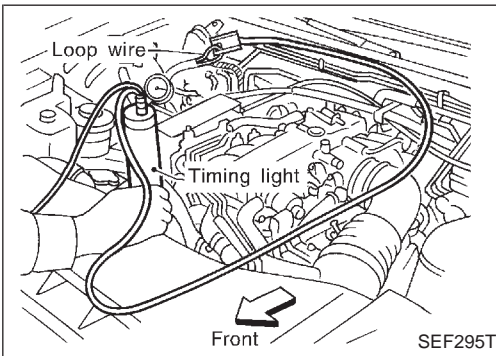
1. Attach timing light to loop wire as shown.
2. Check ignition timing.

LC

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- **Method B**

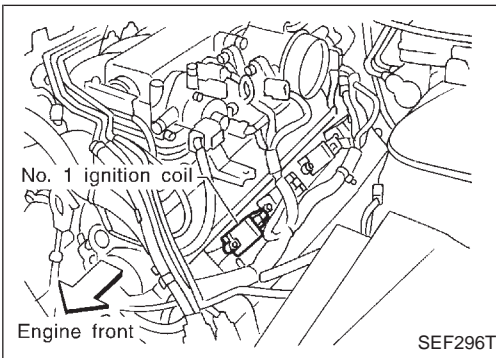
1. Remove intake air duct.
2. Remove No. 1 ignition coil.

PD

FA

RA

BR



3. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.
4. Install air duct.
5. Check ignition timing.

ST

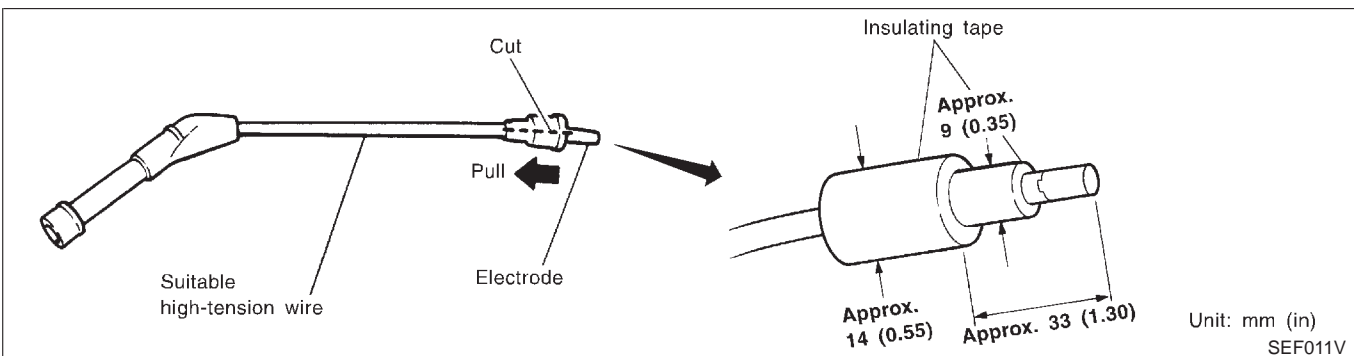
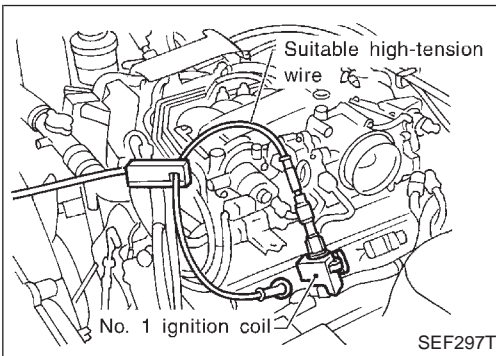
RS

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IDX



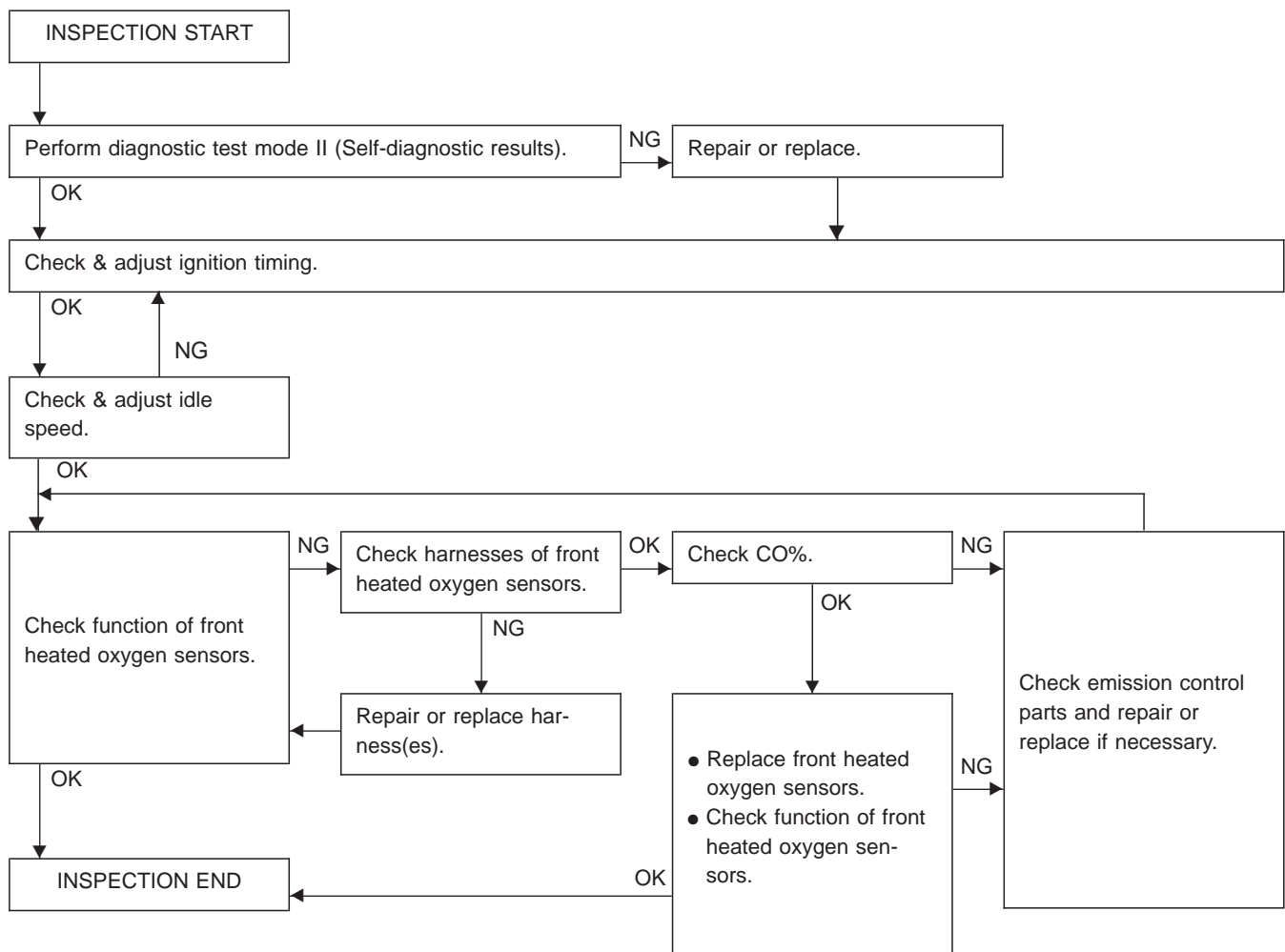
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

PREPARATION

- Make sure that the following parts are in good order.
- (1) Battery
- (2) Ignition system
- (3) Engine oil and coolant levels
- (4) Fuses
- (5) ECM harness connector
- (6) Vacuum hoses
- (7) Air intake system
(Oil filler cap, oil level gauge, etc.)
- (8) Fuel pressure
- (9) Engine compression
- (10) EGR valve operation
- (11) Throttle valve
- (12) EVAP system

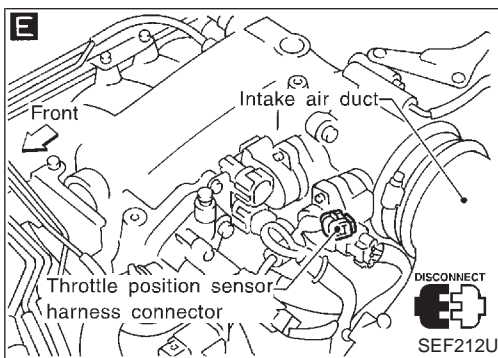
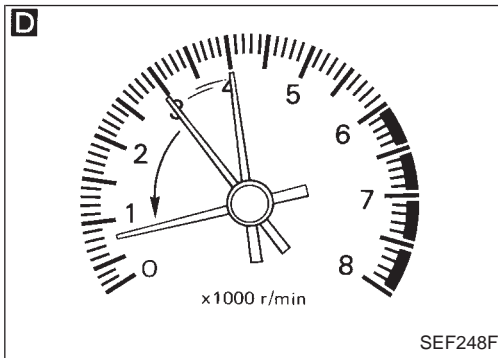
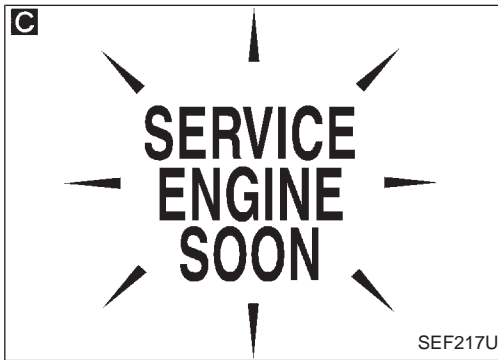
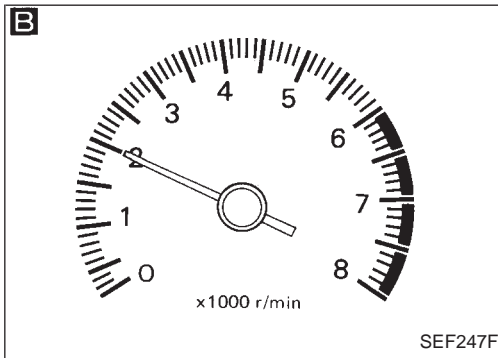
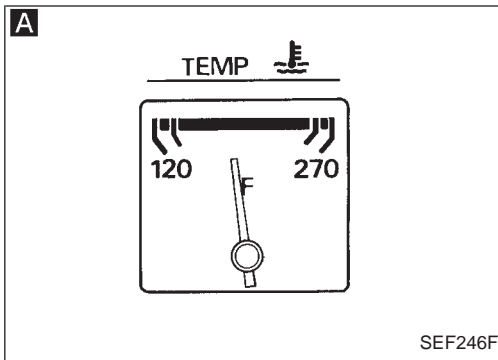
- On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
- When checking idle speed, ignition timing and mixture ratio of A/T models, shift lever to "N" position.
- When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower, rear window defogger.
- Keep front wheels pointed straight ahead.
- Make the check after the cooling fan has stopped.

Overall inspection sequence



BASIC SERVICE PROCEDURE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



START

Visually check the following:

- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle position

A Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge and ensure that engine speed is below 1,000 rpm.

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

C Perform diagnostic test mode II (Self-diagnostic results).

Repair or replace components as necessary.

Does engine run smoothly?

Clean injectors.

D Race engine two or three times under no-load, then run engine at idle speed.

E

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

F Check ignition timing with a timing light.

15°±2° BTDC (in "N" position)

Adjust ignition timing by turning camshaft position sensor after loosening securing bolts which secures camshaft position sensor.

Connect throttle position sensor harness connector.

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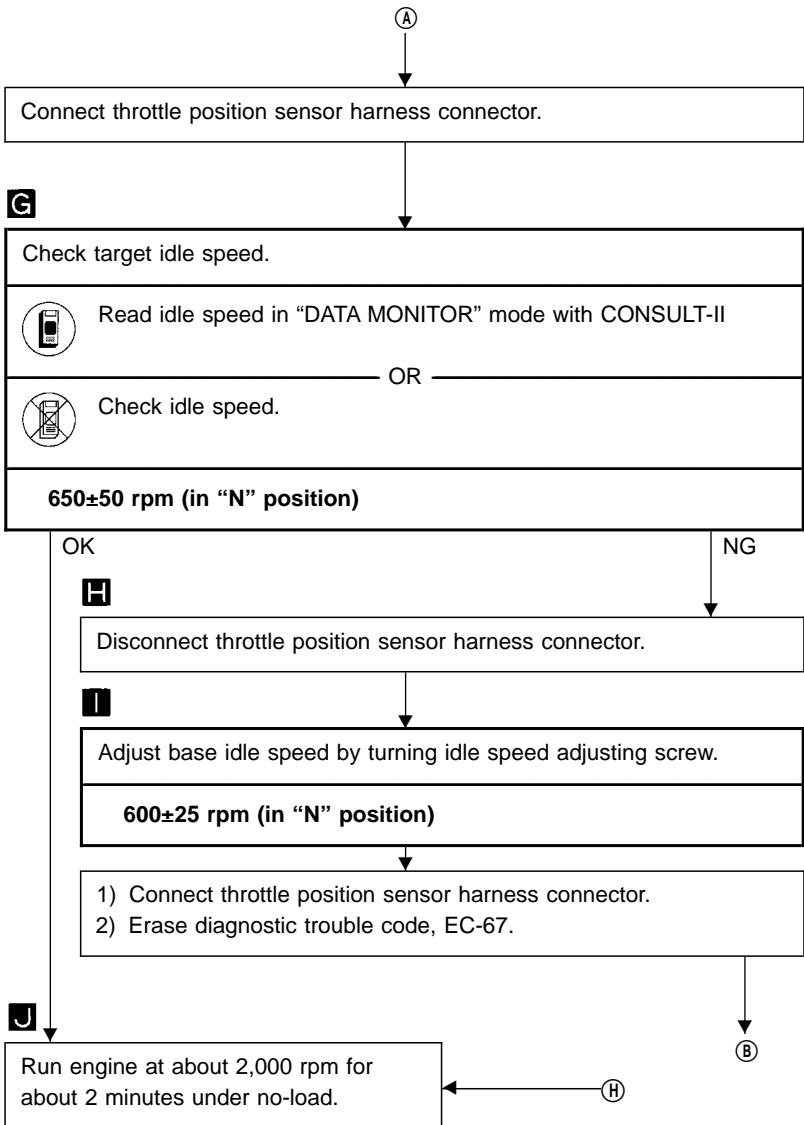
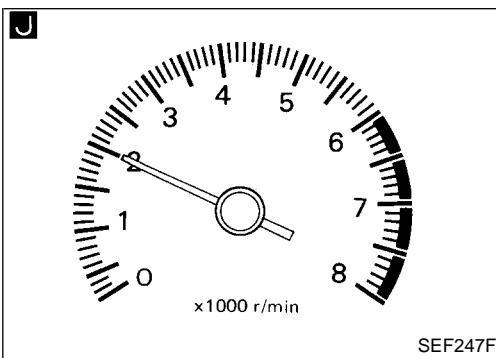
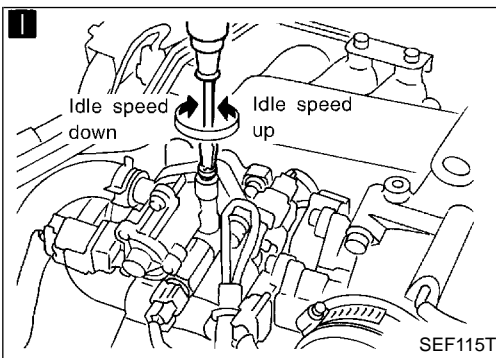
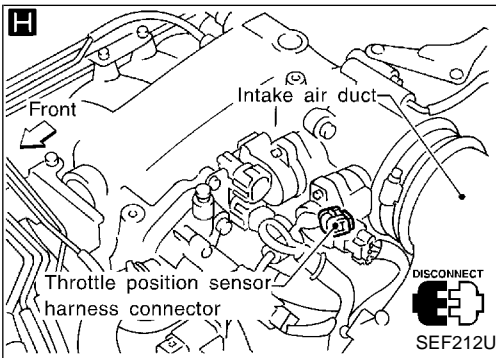
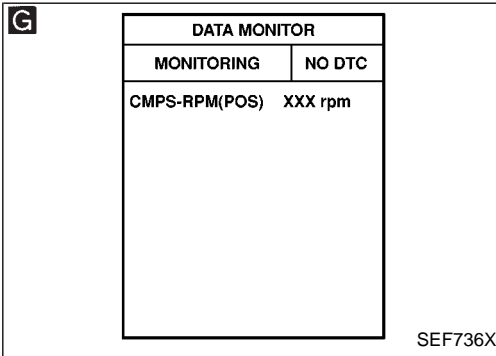
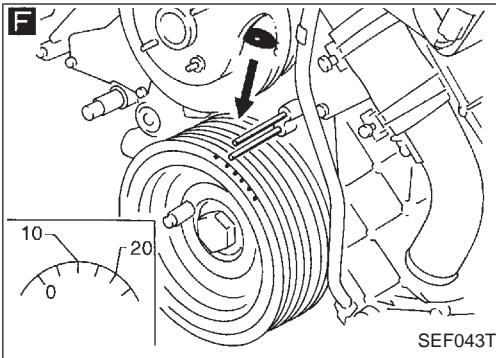
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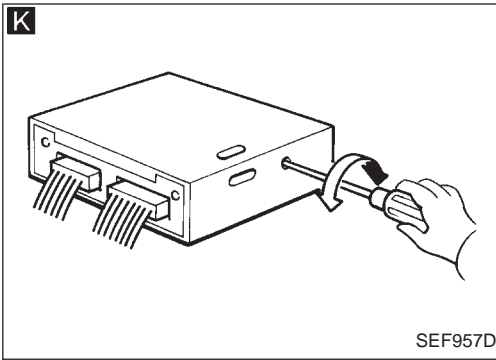
BASIC SERVICE PROCEDURE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



BASIC SERVICE PROCEDURE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



K Set on board diagnostic system of ECM to Diagnostic Test Mode II (Front heated oxygen sensor monitor).*

L

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

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L M

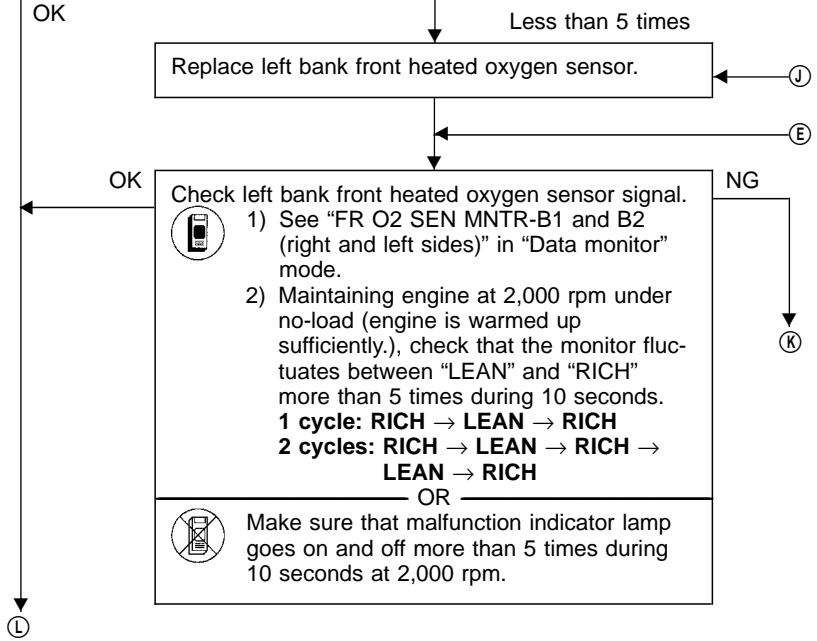
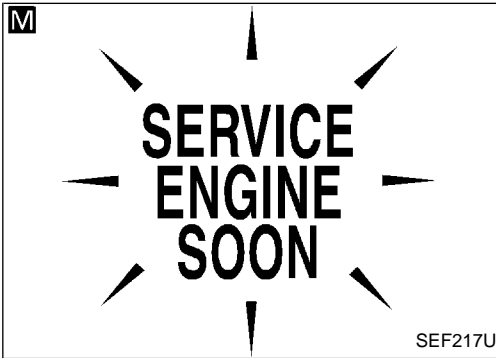
Check left bank front heated oxygen sensor signal.

- 1) See "FR O2 SEN MNTR-B1 and B2 (left and right sides)" in "Data monitor" mode.
- 2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
1 cycle: RICH → LEAN → RICH
2 cycles: RICH → LEAN → RICH → LEAN → RICH

OR

Make sure that malfunction indicator lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

Monitor does not fluctuate. Malfunction indicator lamp does not blink.



*: If the battery is weak, front heated oxygen sensor monitor may not function properly. Use this function after fully charging battery.

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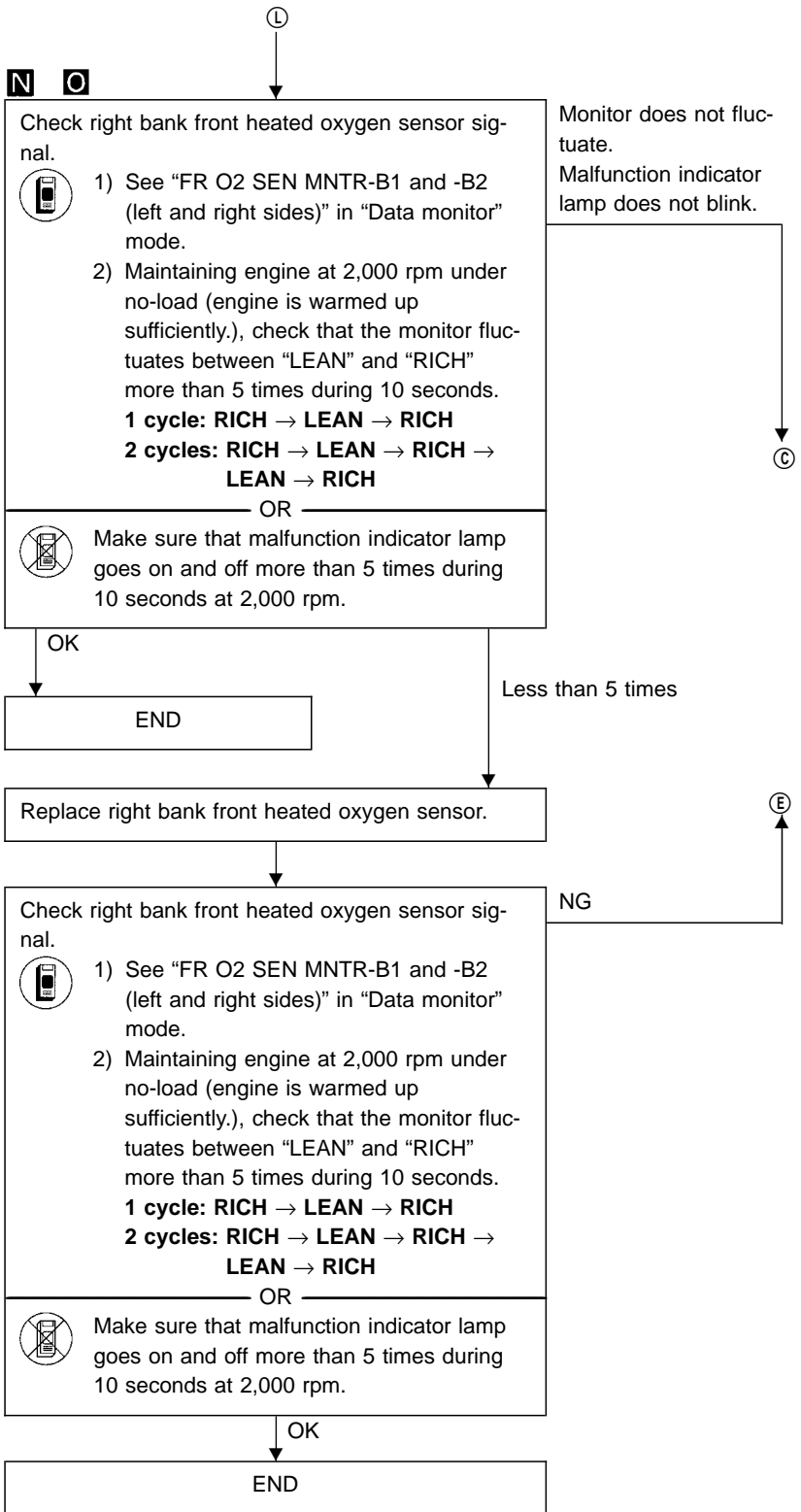
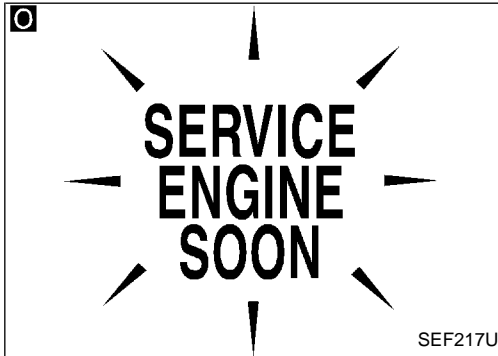
BASIC SERVICE PROCEDURE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

N

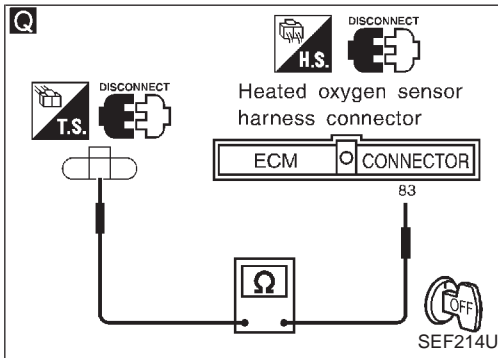
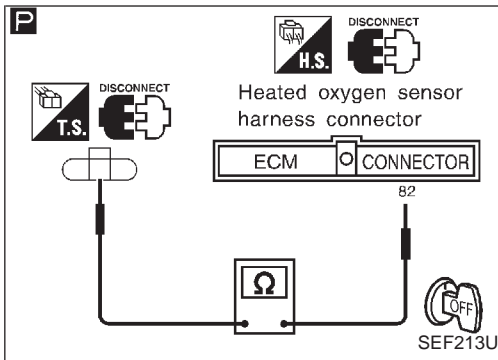
DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

SEF748X



BASIC SERVICE PROCEDURE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



P

Check right bank front heated oxygen sensor harness:

- 1) Turn off engine and disconnect battery ground cable
- 2) Disconnect ECM harness connector from ECM.
- 3) Disconnect right bank front heated oxygen sensor harness connector.
- 4) Check for continuity between terminal No. 82 of ECM harness connector and harness connector for front heated oxygen sensor.

Continuity exists.OK
Continuity does not exist.NG

OK

Repair or replace ECM harness.

Connect ECM harness connector to ECM.

Q

Check left bank front heated oxygen sensor harness:

- 1) Turn off engine and disconnect battery ground cable
- 2) Disconnect ECM harness connector from ECM.
- 3) Disconnect left bank front heated oxygen sensor harness connector.
- 4) Check for continuity between terminal No. 83 of ECM harness connector and harness connector for front heated oxygen sensor.

Continuity exists.OK
Continuity does not exist.NG

OK

Repair or replace ECM harness.

Connect ECM harness connector to ECM.

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BASIC SERVICE PROCEDURE

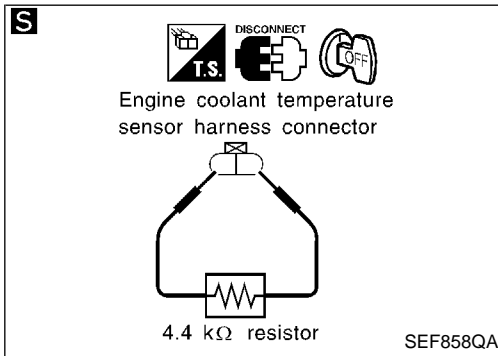
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

R

ACTIVE TEST	
ENG COOLANT TEMP	5 °C
MONITOR	
CMPS-RPM(POS)	XXX rpm
INJ PULSE-B1	XXX msec
INJ PULSE-B2	XXX msec
IGN TIMING	XXX BTDC

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- R S**
- ⑥
- 1) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
2) Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".
- OR
- 1) Disconnect engine coolant temperature sensor harness connector.
2) Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



T

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

U

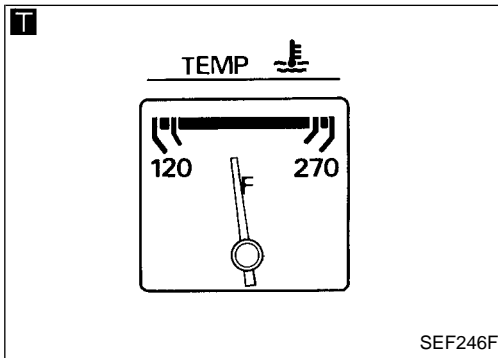
Race engine two or three times under no-load, then run engine at idle speed.

Check "CO" %.

Idle CO: 0.4 - 9.4% with engine running smoothly

After checking CO%,

1) Disconnect the resistor from terminals of engine coolant temperature sensor.
2) Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



NG

Connect front heated oxygen sensor harness connectors to front heated oxygen sensors.

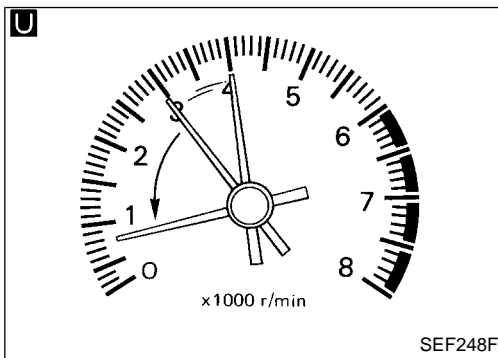
Check fuel pressure regulator.

Check mass air flow sensor.

Check injector.
Clean or replace if necessary.

Check engine coolant temperature sensor.

Check ECM function* by substituting another known good ECM.



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

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.

Introduction

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

- Diagnostic Trouble Code (DTC)Mode 3 of SAE J1979
- Freeze Frame dataMode 2 of SAE J1979
- System Readiness Test (SRT) codeMode 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 limitsMode 6 of SAE J1979

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

	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-II	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-98.).

Two Trip Detection Logic

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The 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.

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up					
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 (0701, 0608 - 0601) is being detected	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 (0701, 0608 - 0601) has been detected	—	X	—	X	—	X	—
Closed loop control — DTC: P1148 (0307), P1168 (0308)	—	X	—	X	—	X	—
Fail-safe items (Refer to EC-98.)	—	X		X*1	—	X*1	—
Except above	—	—	X		X	X	X

*1: Except “ECM”.

Emission-related Diagnostic Information

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the first trip DTC did not reoccur, the first 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 first 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 first 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-63.




For malfunctions in which 1st trip DTCs are displayed, refer to EC-60. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of 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 page EC-89. Then perform "Diagnostic trouble code confirmation procedure" or "Overall function check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to read DTC and 1st trip DTC

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

-  1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
 These DTCs are controlled by NISSAN.
-  2. CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
 These DTCs are prescribed by SAE J2012.
-  (CONSULT-II 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-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

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

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

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

DTC display	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">SELF DIAG RESULTS</th> </tr> <tr> <th>DTC RESULTS</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">IACV-AAC VALVE [P0505]</td> <td style="text-align: center;">0</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	SELF DIAG RESULTS		DTC RESULTS	TIME	IACV-AAC VALVE [P0505]	0			1st trip DTC display	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">SELF DIAG RESULTS</th> </tr> <tr> <th>DTC RESULTS</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">IACV-AAC VALVE [P0505]</td> <td style="text-align: center;">1t</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	SELF DIAG RESULTS		DTC RESULTS	TIME	IACV-AAC VALVE [P0505]	1t		
	SELF DIAG RESULTS																		
	DTC RESULTS	TIME																	
	IACV-AAC VALVE [P0505]	0																	
SELF DIAG RESULTS																			
DTC RESULTS	TIME																		
IACV-AAC VALVE [P0505]	1t																		

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Emission-related Diagnostic Information (Cont'd)

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed 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 are displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-77.

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 - P0308 (0701, 0608 - 0601) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114)
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 frame 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-63.

SYSTEM READINESS TEST (SRT) CODE

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.

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.

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**Emission-related Diagnostic Information
(Cont'd)**

SRT Item

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

SRT item (CONSULT-II 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-II.

Emission-related Diagnostic Information
(Cont'd)

SRT Set Timing

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

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle			
			← ON → OFF	← ON → OFF	← ON → OFF	← ON → OFF
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".

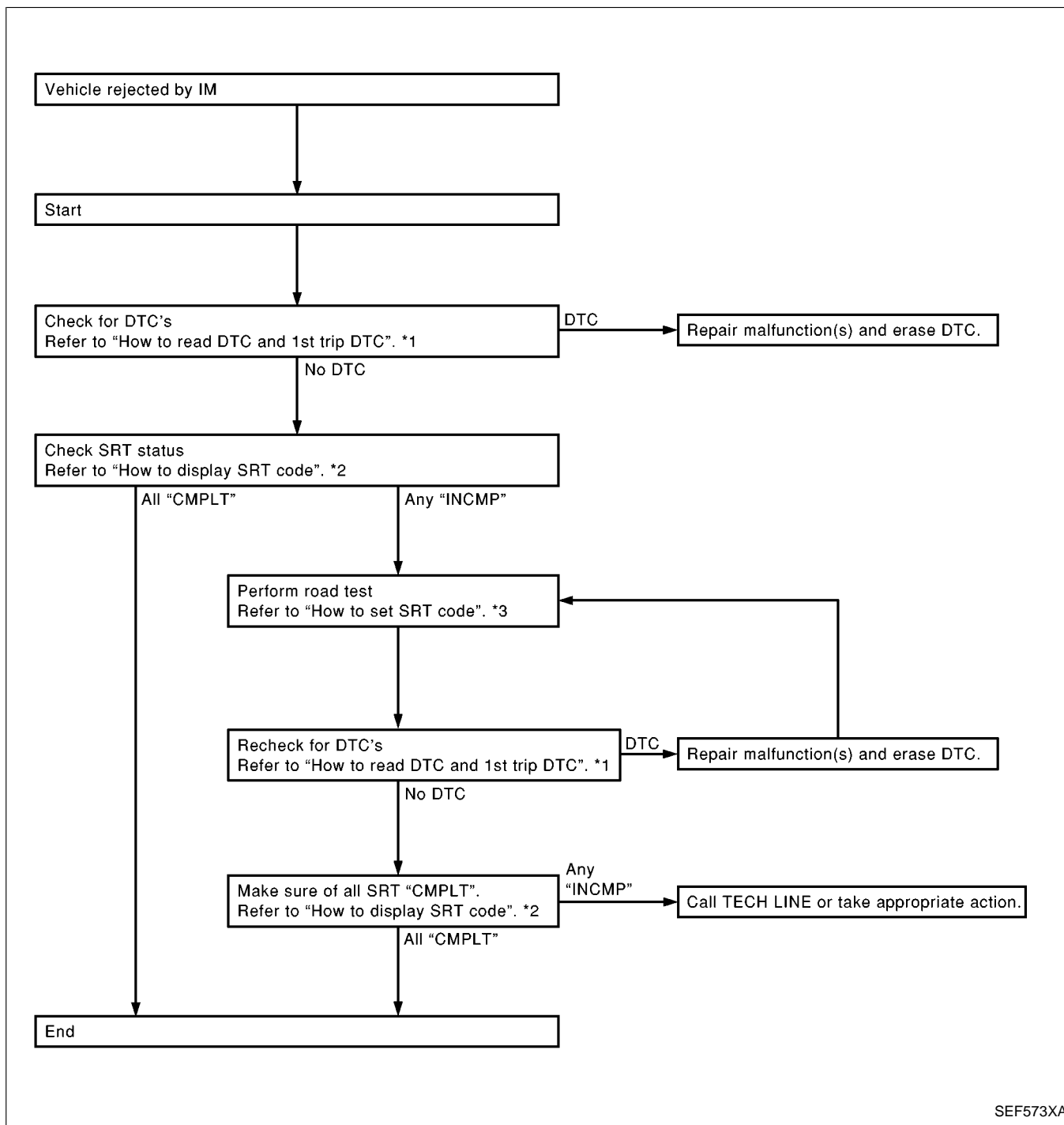
NOTE:

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

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.

Emission-related Diagnostic Information
(Cont'd)



SEF573XA

*1 EC-50

*2 EC-54

*3 EC-55

How to display SRT code

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

2. Selecting Mode 1 with GST (Generic Scan Tool)

Emission-related Diagnostic Information (Cont'd)

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SENSOR	CMPLT
O2 SEN HEATER	CMPLT
EGR SYSTEM	INCMP

PEF215U

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

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



With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-52.



Without CONSULT-II

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

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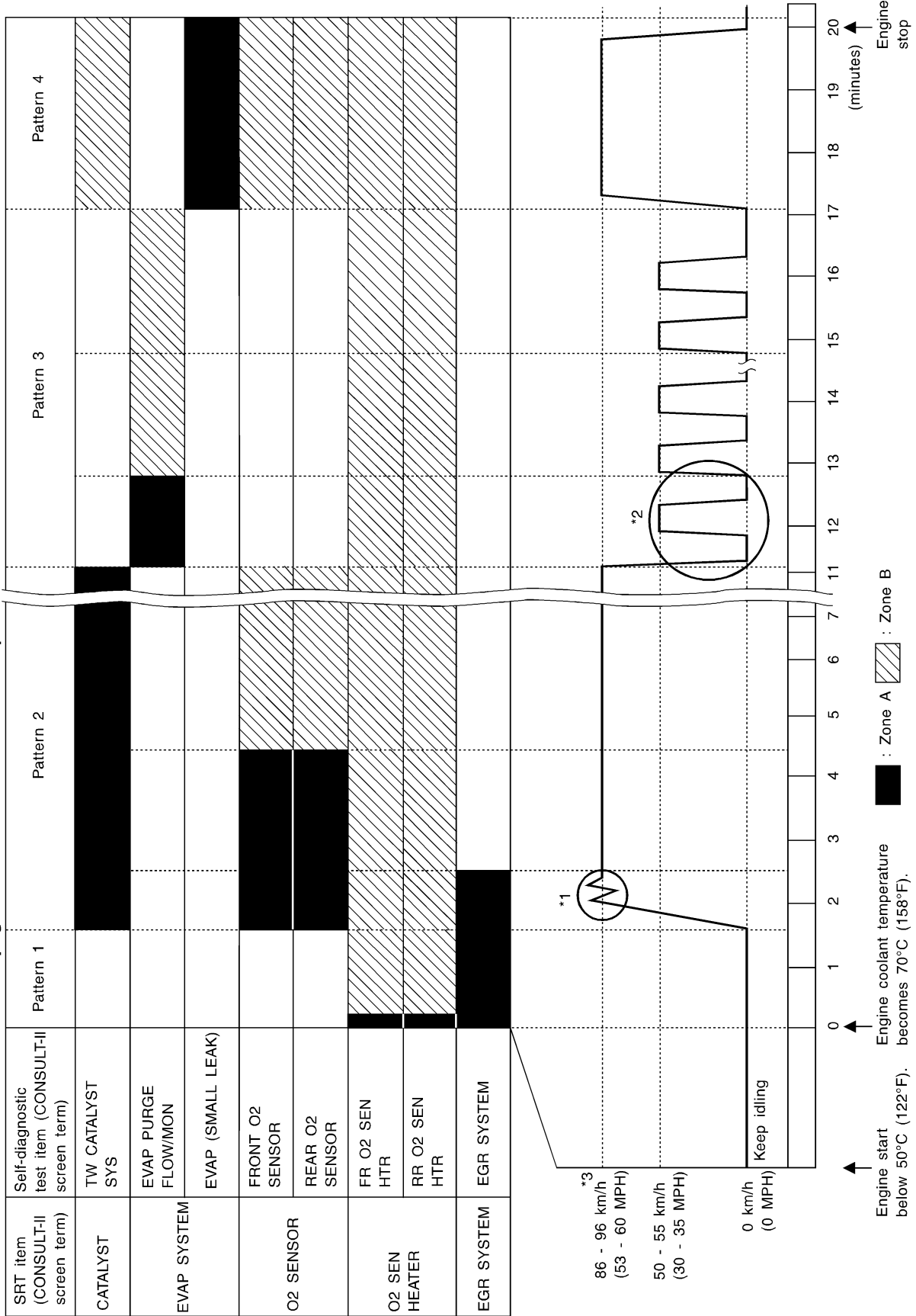
IDX

Emission-related Diagnostic Information
(Cont'd)

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.

Driving pattern



Emission-related Diagnostic Information (Cont'd)

- 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 temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.

Under different conditions [For example: ambient temperature is 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 67 and 128 is 3.0 - 4.3 V.)
 - 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 67 and 128 is lower than 1.4 V.)
 - The engine is started at a fuel tank temperature warmer than 0°C (32°F) (where the voltage between the ECM terminal 91 and ground is less than 4.1V).

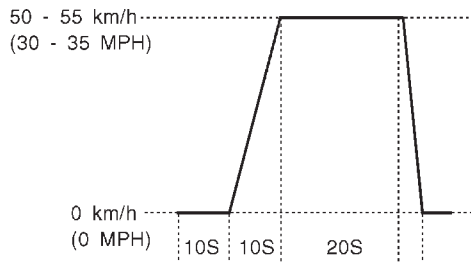
- Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

- Pattern 3:
- The driving pattern outlined in *2 must be repeated at least 3 times.

- 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.
- Decelerate vehicle to 0 km/h (0 MPH) and let it idle.
 - Repeat driving pattern shown below at least 10 times.
 - During acceleration, hold the accelerator pedal as steady as possible. (The THROTL POS SEN valve of CONSULT-II should be between 0.8 to 1.2 V.)**
 - Repeat steps and 2 until the EGR system SRT is set.



SEF414S

*3: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested transmission gear position

Set the selector lever in the “D” position with “OD” ON.

GI

Suggested maximum speed in each gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

MA

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed.

EM

Always observe posted speed limits, and drive according to the road conditions, which will 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.

LC

Gear	km/h (MPH)
1st	50 (30)
2nd	95 (60)
3rd	145 (90)
4th	—
5th	—

EC

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**Emission-related Diagnostic Information
(Cont'd)**

TEST VALUE AND TEST LIMIT (GST only — not applicable to CONSULT-II)

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 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 (14 test items).

These data (test limit) are specified by Test ID (TID) and Component ID (CID). These data can be displayed on the GST screen.

X: Applicable
—: Not applicable

SRT item	Self-diagnostic test item	Test value		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Left bank)	01H	01H	Max.	X
	Three way catalyst function (Right 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
O2 SENSOR	Front heated oxygen sensor (Left 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 (Right 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 (Left bank)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
	Rear heated oxygen sensor (Right bank)	1CH	06H	Max.	X
		21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
		24H	07H	Max.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value		Test limit	Application	
		TID	CID			
O2 SENSOR HEATER	Front heated oxygen sensor heater (Left bank)	29H	08H	Max.	X	GI
		2AH	88H	Min.	X	MA
	Front heated oxygen sensor heater (Right bank)	2BH	09H	Max.	X	EM
		2CH	89H	Min.	X	EM
	Rear heated oxygen sensor heater (Left bank)	2DH	0AH	Max.	X	LC
		2EH	8AH	Min.	X	LC
	Rear heated oxygen sensor heater (Right bank)	2FH	0BH	Max.	X	EC
		30H	8BH	Min.	X	EC
EGR SYSTEM	EGR function	31H	8CH	Min.	X	FE
		32H	8CH	Min.	X	FE
		33H	8CH	Min.	X	AT
		34H	8CH	Min.	X	AT
		35H	0CH	Max.	X	PD
	EGRC-BPT valve function	36H	0CH	Max.	X	PD
		37H	8CH	Min.	X	FA

GI

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Emission-related Diagnostic Information (Cont'd)

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	P0000	0505	—	—	—	—
MAF SEN/CIRCUIT	P0100	0102	—	—	X	EC-124
ABSL PRES SEN/CIRC	P0105	0803	—	—	X	EC-132
AIR TEMP SEN/CIRC	P0110	0401	—	—	X	EC-140
COOLANT T SEN/CIRC	P0115	0103	—	—	X	EC-145
THRTL POS SEN/CIRC	P0120	0403	—	—	X	EC-150
*COOLAN T SEN/CIRC	P0125	0908	—	—	X	EC-161
FRONT O2 SENSOR-B1	P0130	0303	X	X	X*3	EC-166
FRONT O2 SENSOR-B1	P0131	0411	X	X	X*3	EC-174
FRONT O2 SENSOR-B1	P0132	0410	X	X	X*3	EC-180
FRONT O2 SENSOR-B1	P0133	0409	X	X	X*3	EC-186
FRONT O2 SENSOR-B1	P0134	0412	X	X	X*3	EC-195
FR O2 SE HEATER-B1	P0135	0901	X	X	X*3	EC-202
REAR O2 SENSOR-B1	P0137	0511	X	X	X*3	EC-208
REAR O2 SENSOR-B1	P0138	0510	X	X	X*3	EC-216
REAR O2 SENSOR-B1	P0139	0707	X	X	X*3	EC-224
REAR O2 SENSOR-B1	P0140	0512	X	X	X*3	EC-231
RR O2 SE HEATER-B1	P0141	0902	X	X	X*3	EC-237
FRONT O2 SENSOR-B2	P0150	0503	X	X	X*3	EC-202
FRONT O2 SENSOR-B2	P0151	0415	X	X	X*3	EC-174
FRONT O2 SENSOR-B2	P0152	0414	X	X	X*3	EC-180
FRONT O2 SENSOR-B2	P0153	0413	X	X	X*3	EC-186
FRONT O2 SENSOR-B2	P0154	0509	X	X	X*3	EC-195
FR O2 SE HEATER-B2	P0155	1001	X	X	X*3	EC-202
REAR O2 SENSOR-B2	P0157	0314	X	X	X*3	EC-208
REAR O2 SENSOR-B2	P0158	0313	X	X	X*3	EC-216
REAR O2 SENSOR-B2	P0159	0708	X	X	X*3	EC-224
REAR O2 SENSOR-B2	P0160	0315	X	X	X*3	EC-231
RR O2 SE HEATER-B2	P0161	1002	X	X	X*3	EC-237
FUEL SYS LEAN/BK1	P0171	0115	—	—	X	EC-243
FUEL SYS RICH/BK1	P0172	0114	—	—	X	EC-249
FUEL SYS LEAN/BK2	P0174	0210	—	—	X	EC-243
FUEL SYS RICH/BK2	P0175	0209	—	—	X	EC-249
FUEL TEMP SEN/CIRC	P0180	0402	—	—	X	EC-255
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-260
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-260
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-260

*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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page	
	CONSULT-II GST*2	ECM*1					
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-260	GI
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-260	MA
CYL 5 MISFIRE	P0305	0604	—	—	X	EC-260	
CYL 6 MISFIRE	P0306	0603	—	—	X	EC-260	EM
CYL 7 MISFIRE	P0307	0602	—	—	X	EC-260	
CYL 8 MISFIRE	P0308	0601	—	—	X	EC-260	LC
KNOCK SEN/CIRC-B1	P0325	0304	—	—	X	EC-265	
KNOCK SEN/CIRC-B2	P0330	0212	—	—	X	EC-265	EC
CPS/CIRCUIT (OBD)	P0335	0802	—	—	X	EC-268	
CAM POS SEN/CIR	P0340	0101	—	—	X	EC-273	
EGR SYSTEM	P0400	0302	X	X	X*3	EC-279	FE
EGRC-BPT VALVE	P0402	0306	X	X	X*3	EC-288	
TW CATALYST SYS-B1	P0420	0702	X	X	X*3	EC-293	AT
TW CATALYST SYS-B2	P0430	0703	X	X	X*3	EC-293	
EVAP SMALL LEAK	P0440	0705	X	X	X*3	EC-296	PD
PURG VOLUME CONT/V	P0443	1008	—	—	X	EC-307	
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-313	FA
EVAPO SYS PRES SEN	P0450	0704	—	—	X	EC-318	
EVAP GROSS LEAK	P0455	0715	—	X	X*3	EC-324	RA
VEH SPEED SEN/CIRC	P0500	0104	—	—	X	EC-333	
IACV/AAC VLV/CIRC	P0505	0205	—	—	X	EC-338	BR
CLOSED TP SW/CIRC	P0510	0203	—	—	X	EC-344	
A/T COMM LINE	P0600	0504	—	—	—	EC-350	ST
ECM	P0605	0301	—	—	X	EC-353	
PNP SW/CIRC	P0705	1101	—	—	X	AT-81	RS
ATF TEMP SEN/CIRC	P0710	1208	—	—	X	AT-85	
VEH SPD SEN/CIR AT	P0720	1102	—	—	X	AT-89	BT
ENGINE SPEED SIG	P0725	1207	—	—	X	AT-92	
A/T 1ST GR FNCTN	P0731	1103	—	—	X	AT-95	HA
A/T 2ND GR FNCTN	P0732	1104	—	—	X	AT-100	
A/T 3RD GR FNCTN	P0733	1105	—	—	X	AT-104	EL
A/T 4TH GR FNCTN	P0734	1106	—	—	X	AT-108	
TCC SOLENOID/CIRC	P0740	1204	—	—	X	AT-114	EL
A/T TCC S/V FNCTN	P0744	1107	—	—	X	AT-118	
L/PRESS SOL/CIRC	P0745	1205	—	—	X	AT-125	IDX
SFT SOL A/CIRC	P0750	1108	—	—	X	AT-129	
SFT SOL B/CIRC	P0755	1201	—	—	X	AT-133	
MAP/BAR SW SOL/CIR	P1105	1302	—	—	X	EC-356	
INT/V TIM CONT-B1	P1110	0805	—	—	X	EC-365	

*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.

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
TP SEN2/CIRCUIT	P1120	0406	—	—	X	EC-373
TANDEM TP SEN/CIRC	P1125	0110	—	—	X	EC-379
INTV TIM CONT-B2	P1135	1301	—	—	X	EC-365
INTK TIM S/CIRC-B1	P1140	1303	—	—	X	EC-380
INTK TIM S/CIRC-B2	P1145	1304	—	—	X	EC-380
CLOSED LOOP-B1	P1148	0307	—	—	X	EC-386
CLOSED LOOP-B2	P1168	0308	—	—	X	EC-386
TACM SW SIGNALS	P1210	0106	—	—	X	EC-388
FPCM/CIRCUIT	P1220	1305	—	—	X	EC-391
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-397
CPS/CIRC (OBD) COG	P1336	0905	—	—	X	EC-405
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-410
EGR TEMP SEN/CIRC	P1401	0305	—	—	X	EC-415
EGR SYSTEM	P1402	0514	X	X	X*3	EC-421
EVAP SMALL LEAK	P1440	0213	X	X	X	EC-430
PURG VOLUME CONT/V	P1444	0214	—	—	X	EC-442
VENT CONTROL VALVE	P1446	0215	—	—	X	EC-450
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-455
VENT CONTROL VALVE	P1448	0309	—	—	X	EC-462
VC/V BYPASS/V	P1490	0801	—	—	X	EC-468
VC CUT/V BYPASS/V	P1491	0311	—	—	X	EC-473
PURG CONT/V S/V	P1492	0807	—	—	X	EC-479
PURG CONT/V & S/V	P1493	0312	—	—	X	EC-485
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-350
TP SEN/CIRC A/T	P1705	1206	—	—	X	AT-137
P-N POS SW/CIRCUIT	P1706	1003	—	—	X	EC-492
O/R CLTCH SOL/CIRC	P1760	1203	—	—	X	AT-143

*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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION



How to erase DTC (With CONSULT-II)

Note: If the diagnostic trouble code is not for A/T related items (see EC-4), skip steps 2 through 4.

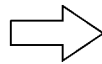
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
 2. Turn CONSULT-II "ON" and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". [The DTC in the TCM (Transmission Control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

GI
MA
EM
LC
EC

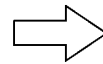
How to erase DTC (With CONSULT-II)

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

SELECT SYSTEM
ENGINE
A/T



SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

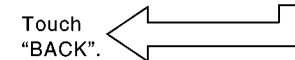
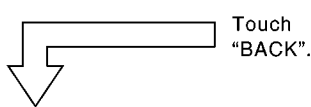


SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

2. Turn **CONSULT-II** "ON", and touch "A/T".

3. Touch "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the TCM will be erased.)



SELECT SYSTEM
ENGINE
A/T

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC CONFIRMATION
ECM PART NUMBER

SELF DIAG RESULTS	
DTC RESULTS	TIME
SFT SOL A/CIRC [P0750]	0

5. Touch "ENGINE".

6. Touch "SELF-DIAG RESULTS".

7. Touch "ERASE". (The DTC in the ECM will be erased.)

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



How to erase DTC (With GST)

Note: If the diagnostic trouble code is not for A/T related items (see page EC-4), 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.

IDX

Emission-related Diagnostic Information (Cont'd)

2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).



How to erase DTC (No Tools)

Note: If the diagnostic trouble code is not for A/T related items (see EC-4), 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-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-66.)

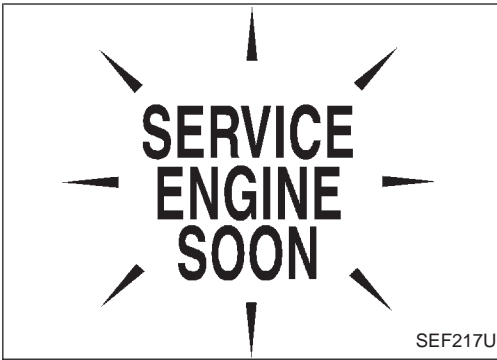
NOTE:

- If the battery terminal is disconnected, the emission-related diagnostic information will be lost within 24 hours.
- Erasing the emission-related diagnostic information, using CONSULT-II 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)

The malfunction indicator lamp is located on the instrument panel.

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the malfunction indicator lamp does not light up, refer to EL section WARNING LAMPS or see EC-533.
2. When the engine is started, the malfunction indicator lamp should go off.
 - If the lamp remains on, the on board diagnostic system has detected an engine system malfunction.

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ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

LC

Diagnostic Test Mode I

1. BULB CHECK : This function checks the bulb for damage (blown, open circuit, etc.) of the malfunction indicator lamp. If the MIL does not come on, check MIL circuit and ECM test mode. (See next page.)
2. MALFUNCTION WARNING : This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (2 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

EC

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Diagnostic Test Mode II

3. SELF-DIAGNOSTIC RESULTS : This function allows DTCs and 1st trip DTCs to be read.
4. FRONT HEATED OXYGEN SENSOR MONITOR : This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

FA

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MIL Flashing without DTC

If the ECM is in Diagnostic Test Mode II, the MIL may flash when the engine is running. In this case, check ECM test mode selector following "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page.

ST

How to switch the diagnostic test (function) modes and details of the above functions are described later. (See page EC-66.)

RS

Condition		Diagnostic Test Mode I	Diagnostic Test Mode II
Ignition switch in "ON" position 	Engine stopped 	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	FRONT HEATED OXYGEN SENSOR MONITOR

BT

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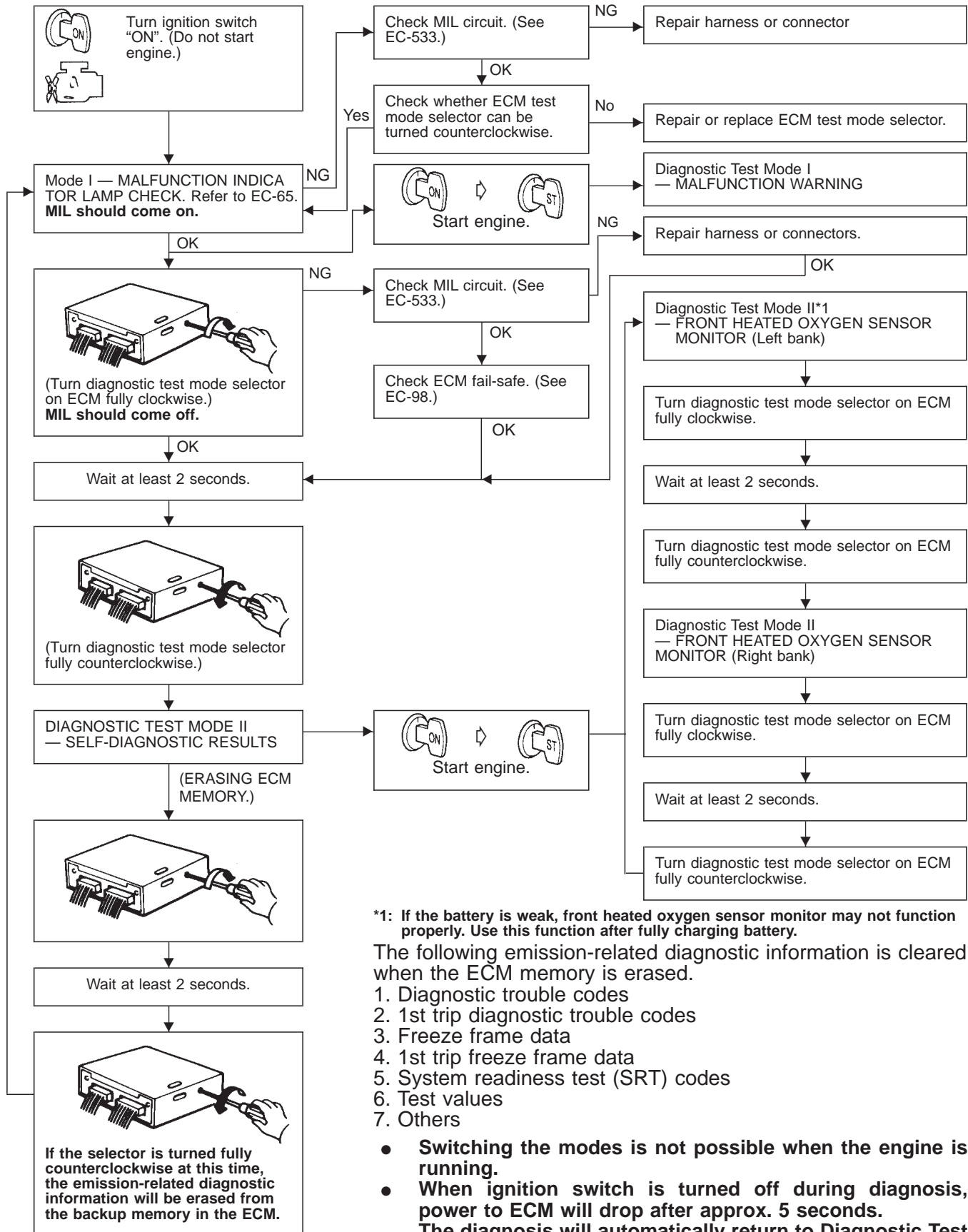
EL

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

HOW TO SWITCH DIAGNOSTIC TEST MODES



ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE I—BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP on the instrument panel should stay ON. If it remains OFF, check the bulb. (See the WARNING LAMPS in the EL section. Or see EC-533.)

DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

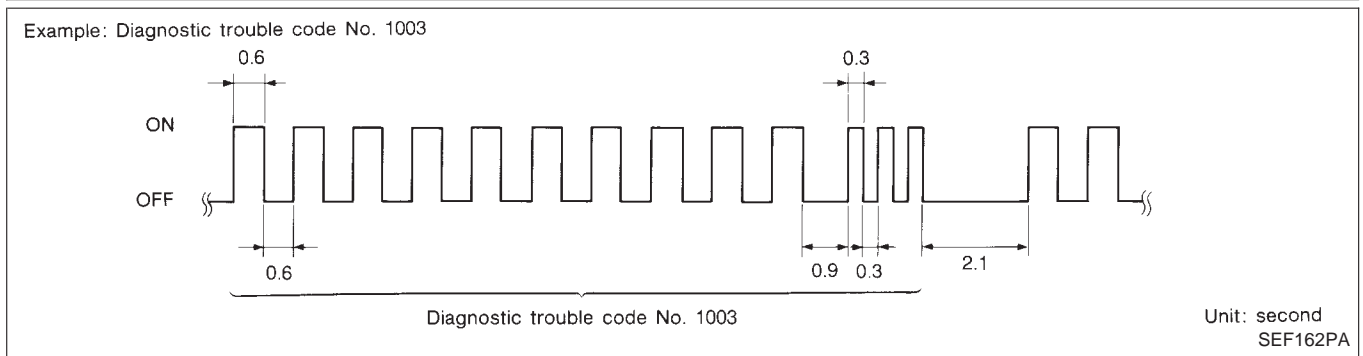
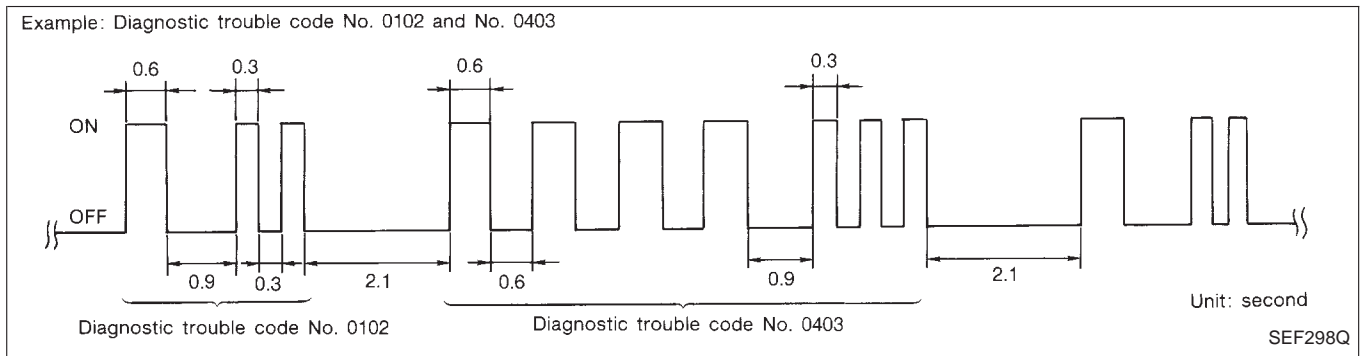
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction

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

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

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

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode 1 (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 malfunction indicator lamp 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 diagnostic trouble code numbers. The DTC "0505" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE INDEX, refer to page EC-4.)

HOW TO ERASE DIAGNOSTIC TEST MODE II (Self-diagnostic results)

The diagnostic trouble code 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".)

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE II—FRONT HEATED OXYGEN SENSOR MONITOR

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

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

*: 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.

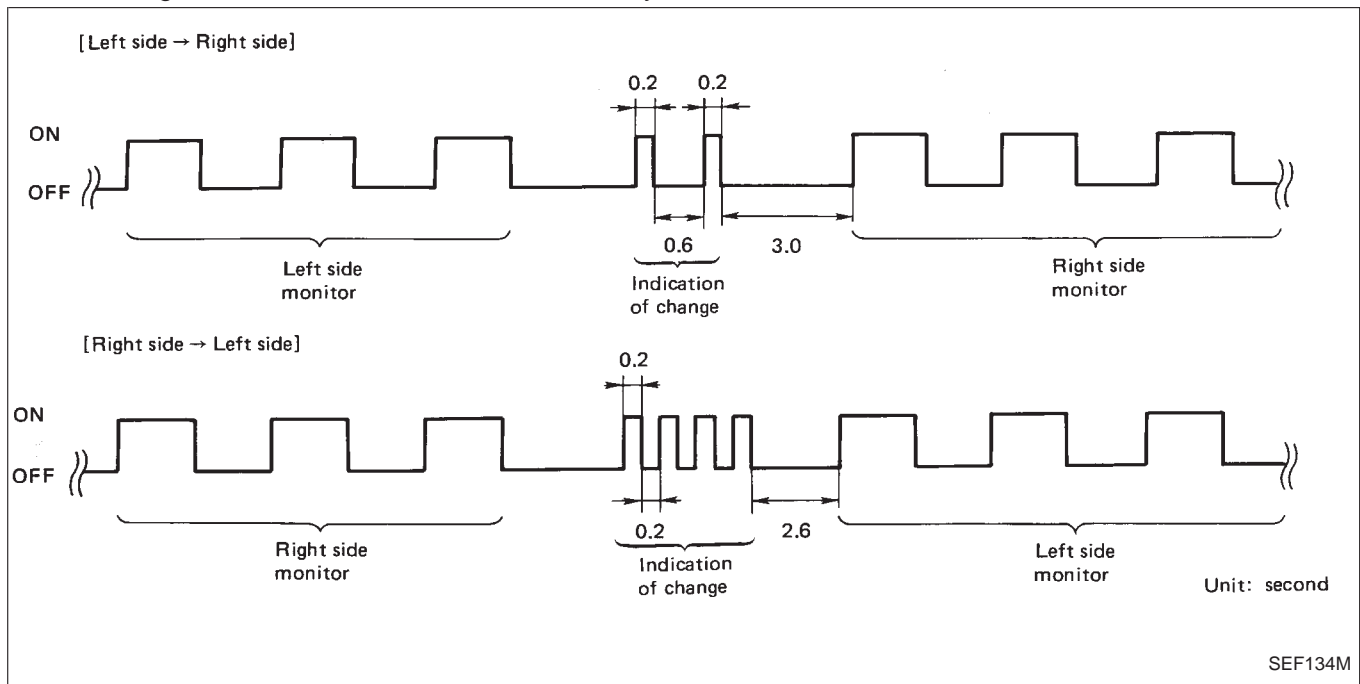
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MALFUNCTION INDICATOR LAMP comes ON more than 5 times every 10 seconds when measured at 2,000 rpm under no-load.

If the battery is weak, front heated oxygen sensor monitor may not function properly. Use this function after fully charging battery.

How to switch monitored sensor from left bank to right bank or vice versa

● The following procedure should be performed while the engine is running.

1. Turn diagnostic test mode selector on ECM fully clockwise.
2. Wait at least 2 seconds.
3. Turn diagnostic test mode selector on ECM fully counterclockwise.



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

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Malfunction Indicator Lamp (MIL) (Cont'd) IVIS (Infiniti Vehicle Immobiliser System — NATS)

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

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OBD System Operation Chart

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

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-49.
- 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-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

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SUMMARY CHART

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)

RS
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For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-71.

For details about patterns “A” and “B” under “Other”, see EC-71.

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

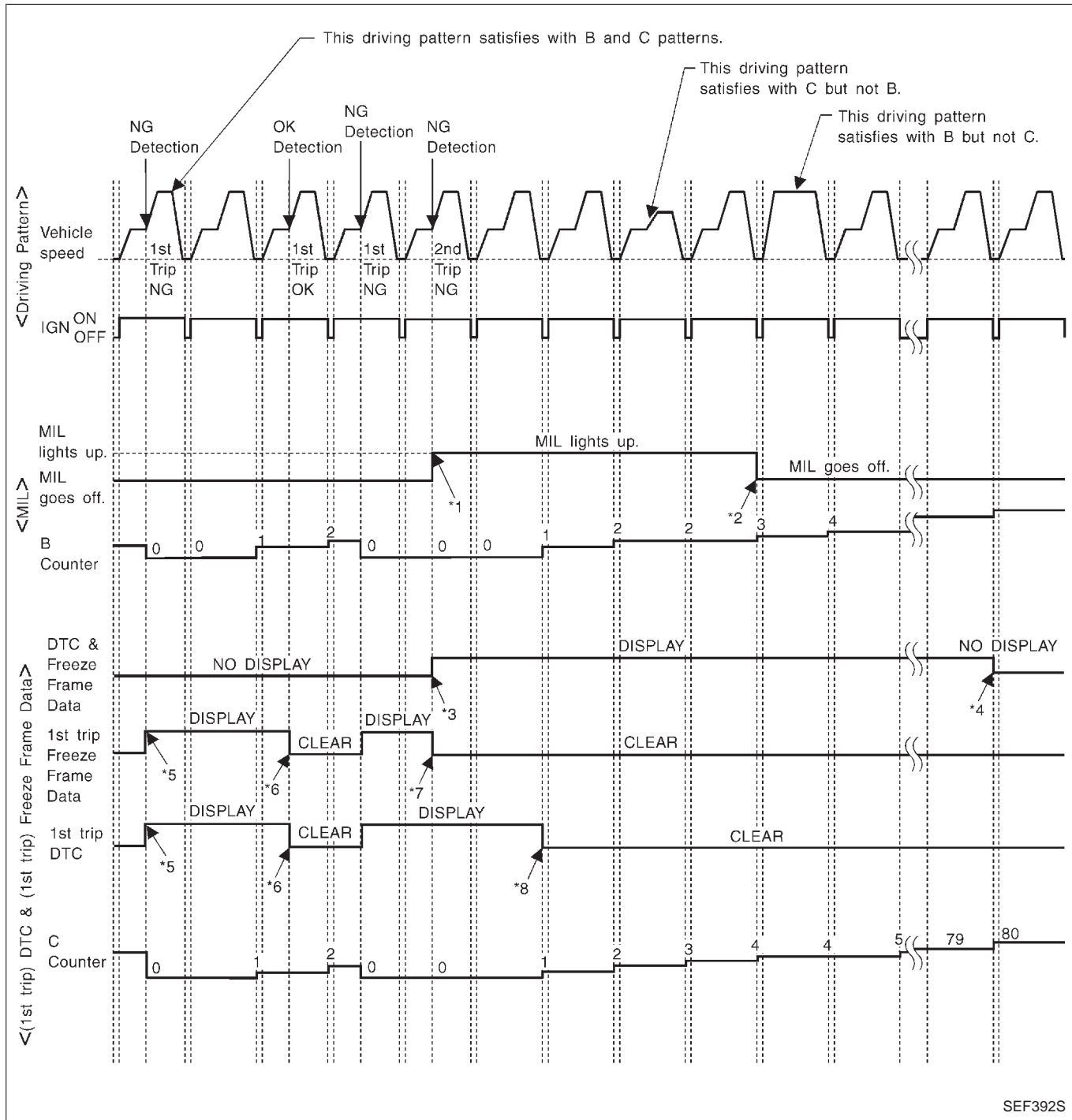
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

EL
IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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



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- *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 a time (pattern C) without the same malfunction after DTC is stored in ECM.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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

<Driving pattern B>

Driving pattern B means the vehicle operation as follows:

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

- The B counter will reset when the malfunction is detected once regardless of the driving pattern.
- The B counter will count up times driving pattern B is satisfied without the malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

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<Driving pattern C>

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) $\times (1 \pm 0.1)$ [%]

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).

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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 a time without the same malfunction after DTC is stored in ECM.

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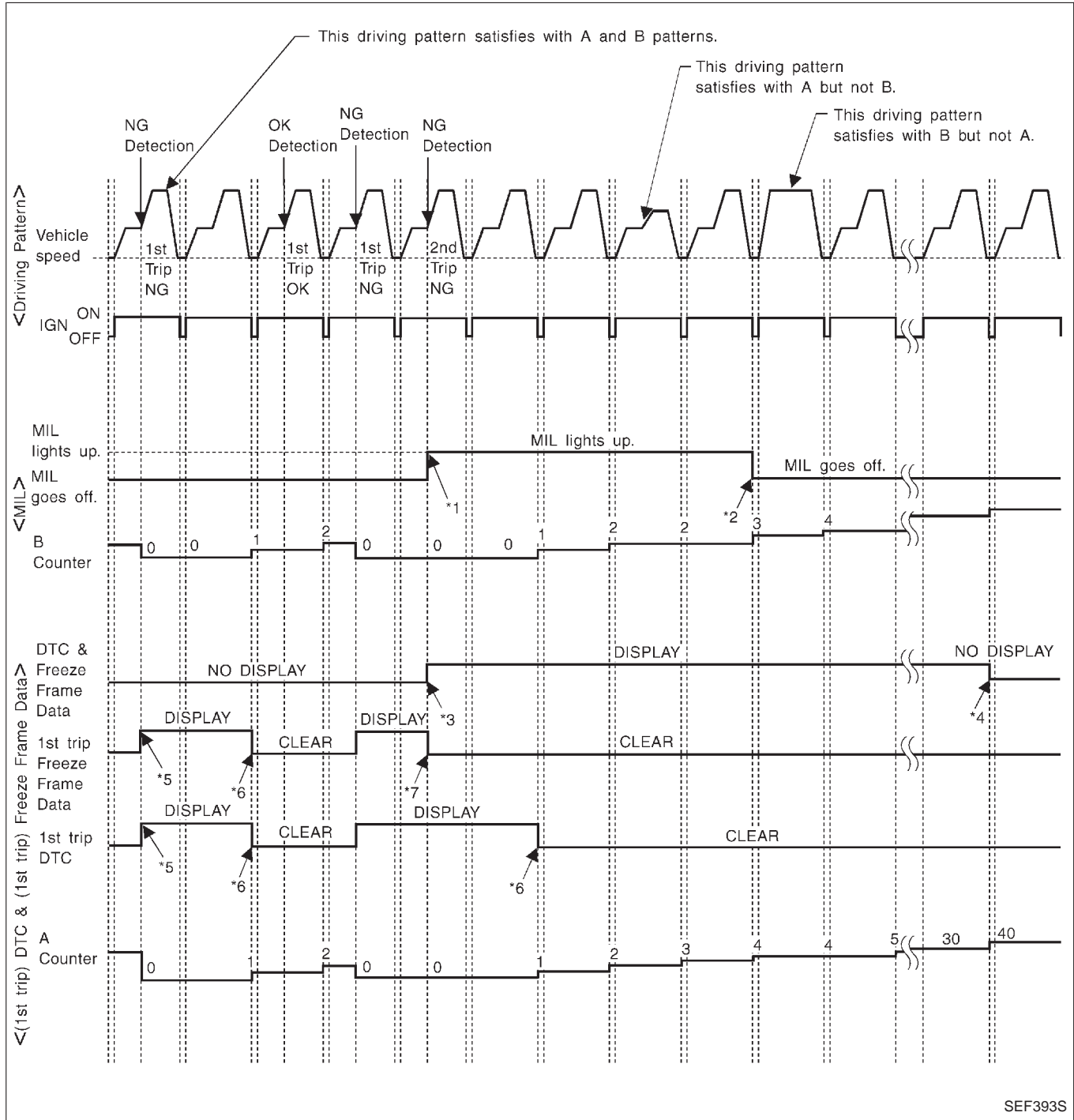
EL

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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"



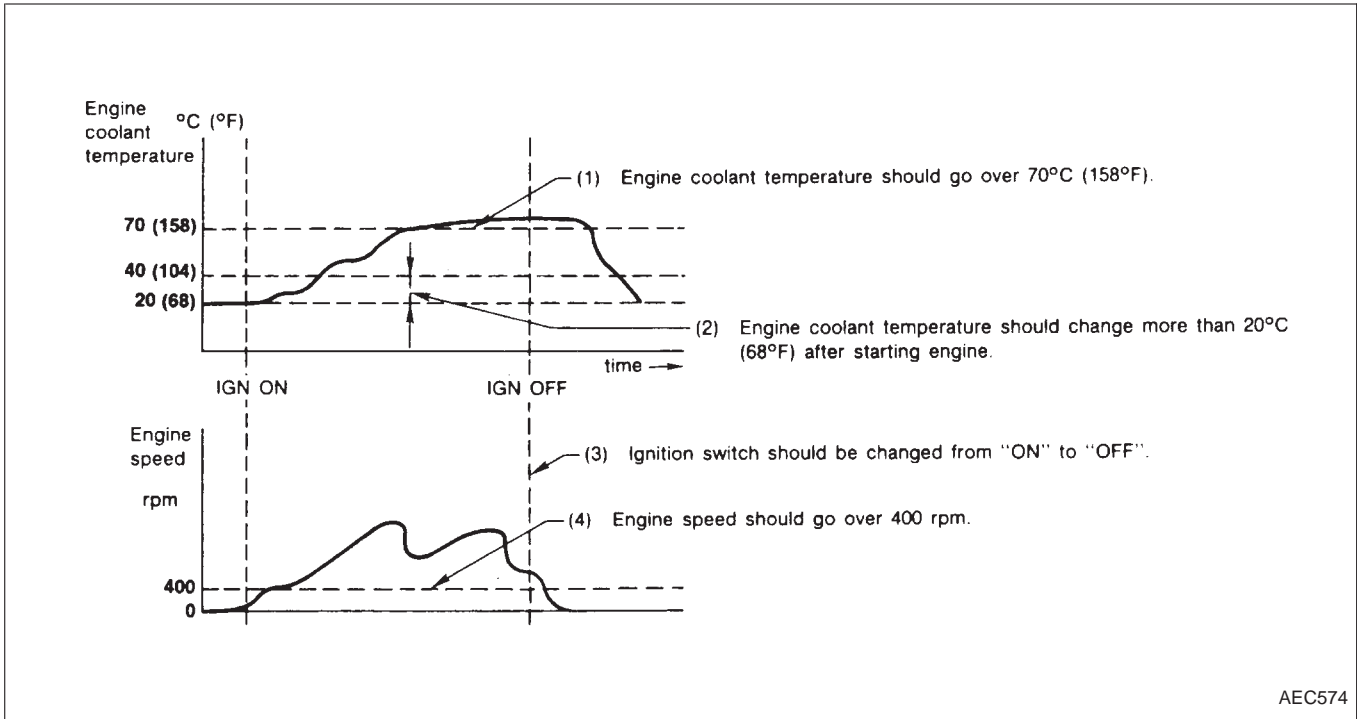
- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in 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 a time (pattern A) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

OBD System Operation Chart (Cont'd)

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

<Driving pattern A>



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

<Driving pattern B>

Driving pattern B means the vehicle operation as follows:

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

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

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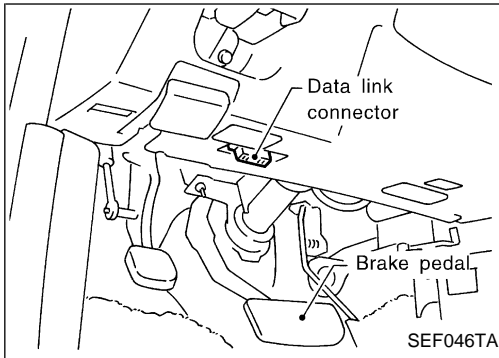
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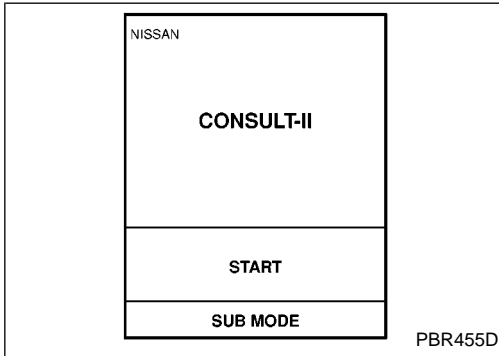
IDX



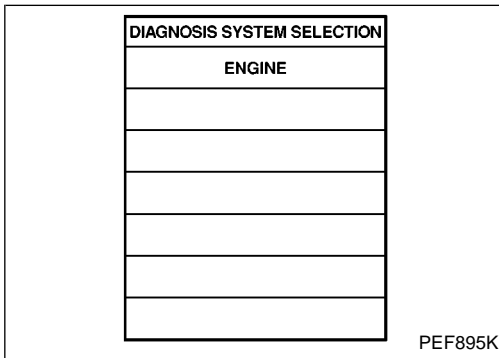
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

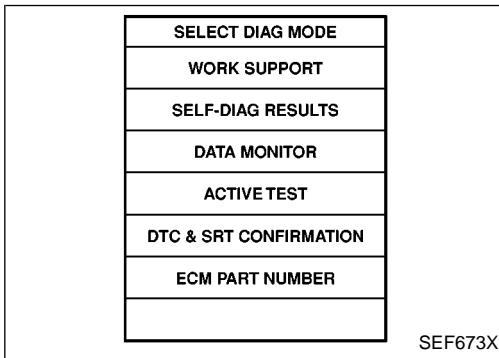
1. Turn off ignition switch.
2. Connect "CONSULT-II" to data link connector which is located beside the hood lock release handle.



3. Turn on ignition switch.
4. Touch "START".



5. Touch "ENGINE".



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

For further information, see the CONSULT-II Operation Manual.

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item		DIAGNOSTIC TEST MODE								
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	ACTIVE TEST	DTC CONFIRMATION			
			FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUPPORT		
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X			GI	
		Mass air flow sensor		X		X			MA	
		Engine coolant temperature sensor		X	X	X	X			EM
		Front heated oxygen sensor		X		X		X	X	EM
		Rear heated oxygen sensor		X		X		X	X	
		Vehicle speed sensor		X	X	X				LC
		Throttle position sensor	X	X		X				LC
		Fuel tank temperature sensor		X		X	X			
		EVAP control system pressure sensor		X		X				
		Absolute pressure sensor		X		X				EC
		EGR temperature sensor		X		X				
		Intake air temperature sensor		X		X				FE
		Crankshaft position sensor (OBD)		X						FE
		Knock sensor		X						
		Ignition switch (start signal)				X				AT
		Closed throttle position switch		X						AT
		Closed throttle position switch (throttle position sensor signal)				X				PD
		Air conditioner switch				X				PD
		Park/Neutral position switch		X		X				FA
		Power steering oil pressure switch				X				FA
	Air conditioner switch				X				RA	
	Battery voltage				X				RA	
	Ambient air temperature switch				X					
	OUTPUT	Injectors				X	X			
Power transistor (Ignition timing)			X (Ignition signal)		X	X			BR	
IACV-AAC valve		X	X		X	X				
EVAP canister purge volume control valve			X		X	X		X	ST	
Air conditioner relay					X					
Fuel pump relay		X			X	X				
EGRC-solenoid valve			X		X	X			RS	
Front heated oxygen sensor heater			X		X		X			
Rear heated oxygen sensor heater			X		X		X			
EVAP canister purge control solenoid valve			X		X	X			BT	
EVAP canister vent control valve			X		X	X				
Vacuum cut valve bypass valve			X		X	X		X	HA	
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-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-51.

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CONSULT-II (Cont'd)

FUNCTION

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

WORK ITEM	CONDITION	USAGE
IACV-AAC/V ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting ignition timing and idle speed
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● 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 THE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● 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 detecting EVAP vapor leak point of EVAP system

CONSULT-II (Cont'd)

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

Regarding items of “DTC and 1st trip DTC”, refer to “DIAGNOSTIC TROUBLE CODE INDEX” (See EC-4.).

Freeze frame data and 1st trip freeze frame data

Freeze frame data item*1	Description	
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> Engine control component part/control system has a trouble code, it is displayed as “PXXXX”. [Refer to “Alphabetical & P No. Index for DTC (EC-4).]] 	GI
FUEL SYS-B1*2	<ul style="list-style-type: none"> “Fuel injection system status” at the moment a malfunction is detected is displayed. One mode in the following is displayed. <ul style="list-style-type: none"> “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 heated oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop 	MA EM LC
FUEL SYS-B2*2	<ul style="list-style-type: none"> “MODE 4”: Closed loop - using heated oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop 	EC
CAL/LD VALUE [%]	<ul style="list-style-type: none"> The calculated load value at the moment a malfunction is detected is displayed. 	FE
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> The engine coolant temperature at the moment a malfunction is detected is displayed. 	AT
S-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> “Short-term fuel trim” at the moment a malfunction is detected is displayed. 	
S-FUEL TRM-B2 [%]	<ul style="list-style-type: none"> The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. 	PD
L-FUEL TRM-B1 [%]	<ul style="list-style-type: none"> “Long-term fuel trim” at the moment a malfunction is detected is displayed. 	
L-FUEL TRM-B2 [%]	<ul style="list-style-type: none"> The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim. 	FA
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> The engine speed at the moment a malfunction is detected is displayed. 	RA
VEHICL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed at the moment a malfunction is detected is displayed. 	BR
ABSOL PRESS [kPa] or [kg/cm ²] or [psi]	<ul style="list-style-type: none"> The absolute pressure at the moment a malfunction is detected is displayed. 	ST
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> The base fuel schedule at the moment a malfunction is detected is displayed. 	RS
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature at the moment a malfunction is detected is displayed. 	BT

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

*2: Regarding model Y33, “-B1” indicates left bank and “-B2” indicates right bank.

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CONSULT-II (Cont'd)

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS:RPM (POS) [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the POS signal (1° signal) of the crankshaft position sensor (POS). 	
MAS AIR/FL SE [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> 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-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the front heated oxygen sensor is displayed. 	
FR O2 SEN-B2 [V]	○			
RR O2 SEN-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the rear heated oxygen sensor is displayed. 	
RR O2 SEN-B2 [V]	○			
FR O2 MNTR-B1 [RICH/LEAN]	○	○	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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-B2 [RICH/LEAN]	○	○		
RR O2 MNTR-B1 [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of rear heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the amount of oxygen after three way catalyst is relatively large. LEAN ... means the amount of oxygen after three way catalyst is relatively small. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
RR O2 MNTR-B2 [RICH/LEAN]	○	○		
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
THRTL/P SEN2 [V]	○		<ul style="list-style-type: none"> Secondary throttle position sensor signal voltage is displayed. 	
FUEL T/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel tank temperature judged from the tank fuel temperature sensor signal voltage is displayed. 	
EGR TEMP SEN [V]	○		<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 	
INT/A TEMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically. Regarding Y33 model, "-B1" indicates left bank and "-B2" indicates right bank.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal. 	GI
CLSD THL/P SW [ON/OFF]			<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition from the closed throttle position switch signal. 		MA
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 		EM
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		LC
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position switch signal. 		EC
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 		FE
LOAD SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicate [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating. OFF ... rear defogger is not operating. 		AT
AMB TEMP SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicate [ON/OFF] condition from the ambient temperature signal. ON ... When the ambient temperature is lower than specified value. OFF ... When the ambient temperature is higher than specified value. 		PD
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		FA
A/C PRESS SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicate [ON/OFF] condition of air conditioner pressure switch signal. ON ... A/C pressure is higher than specified value. OFF ... A/C pressure is lower than specified value. 		RA
INJ PULSE-B1 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	ST
INJ PULSE-B2 [msec]					RS
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 		BT
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	HA
IACV-AAC/V [step]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 		EL
PURG VOL C/V [step]		○	<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control valve computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		IDX
A/F ALPHA-B1 [%]			<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. 	
A/F ALPHA-B2 [%]					
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 		

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 	
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
INT/V SOL-B1 INT/V SOL-B2 [ON/OFF]			<ul style="list-style-type: none"> The control condition of the intake valve timing control solenoid valve is indicated. ON ... Intake valve timing control is operating. OFF ... Intake valve timing control is not operating. 	
INT/V TIM-B1 INT/V TIM-B2 [deg]			<ul style="list-style-type: none"> Indicate [deg] of intake camshaft advanced angle. 	
COOLING FAN [HI/OFF]			<ul style="list-style-type: none"> The control condition of the cooling fan (determined by ECM according to the input signal) is indicated. HI ... High speed operation OFF ... Stop 	
EGRC SOL/V [ON/OFF] (flow/cut)			<ul style="list-style-type: none"> The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. OFF ... EGR is cut-off ON ... EGR is operational 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> 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]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor's heater determined by ECM according to the input signals. 	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor's heater determined by ECM according to the input signals. 	
RR O2 HTR-B2 [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	
PURG CONT S/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EVAP canister purge control solenoid valve (computed by the engine control module according to the input signals) is indicated. ON ... Canister purge is operational OFF ... Canister purge operation is cut-off 	
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "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]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
FPCM DR VOLT [V]			<ul style="list-style-type: none"> The voltage between fuel pump and FPCM is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FPCM [LOW/HI]			<ul style="list-style-type: none"> The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signal) is indicated. LOW ... Low amount of fuel flow HI ... High amount of fuel flow 	GI MA
MAP/BARO SW/V [MAP/BARO]			<ul style="list-style-type: none"> 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 ... Barometric pressure 	EM LC
ABSOL PRES/SE [V]			<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	LC
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	EC
PULSE [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> 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.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening step using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust ignition timing (by moving camshaft position sensor)
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Ignition coil with power transistor Spark plugs
COOLING FAN	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "ON" and "OFF" using CONSULT-II. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connector Cooling fan motor
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay
EGRC SOLENOID VALVE	<ul style="list-style-type: none"> Ignition switch: ON Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector EGRC-solenoid valve
VALVE TIMING SOL	<ul style="list-style-type: none"> Ignition switch: ON Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector Intake valve timing control solenoid valve
SELF-LEARNING CONT	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control valve opening step using CONSULT-II. 	Engine speed changes according to the opening step.	<ul style="list-style-type: none"> Harness and connector EVAP canister purge volume control valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> Change the fuel tank temperature using CONSULT-II. 		
VENT CONT/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the VENT CONT/V "ON" and "OFF" with CONSULT-II and listen for operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness or connector EVAP canister vent control valve
VC/V BYPASS/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the VC/V BYPASS/V "ON" and "OFF" with CONSULT-II and listen for operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness or connector Vacuum cut bypass valve
PURG CONT S/V	<ul style="list-style-type: none"> Engine: Run engine at 2,000 rpm. Turn the EVAP canister purge control solenoid valve "ON" and "OFF" using CONSULT-II and listen for operating sound. 	EVAP canister purge control solenoid valve makes an operating sound. Check vacuum signal for EVAP canister purge control valve. VC ON ... Vacuum exists. VC OFF ... Vacuum does not exist.	<ul style="list-style-type: none"> Harness and connector EVAP canister purge control solenoid valve Vacuum hose
MAP/BARO SW/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT-II and listen for operating sound. 	MAP/BARO switch solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector MAP/BARO switch solenoid valve
FPCM	<ul style="list-style-type: none"> Ignition switch: ON Select "LOW" and "HI" with CONSULT-II and check that "FPCM D/R VOLT" of CONSULT-II changes. 	"FPCM D/R VOLT" of CONSULT-II changes as follows; LOW ... Approx. 4.7V HI ... Approx. 0.4V	<ul style="list-style-type: none"> Harness and connector FPCM

CONSULT-II (Cont'd)

DTC CONFIRMATION MODE

SRT STATUS mode

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-51.

SRT Work Support Mode

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

DTC WORK SUPPORT mode

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURGE FLOW P1447	Refer to corresponding trouble diagnosis for DTC.	EC-455
	VC CUT/V BP/V P1491		EC-473
	PURG CN/V & S/V P1493		EC-486
	PURG VOL CN/V P1444		EC-442
	EVAP SML LEAK P0440		EC-296
	EVAP SML LEAK P1440		EC-430
FR O2 SENSOR	FR O2 SEN-B1 P0131		EC-174
	FR O2 SEN-B1 P0132		EC-180
	FR O2 SEN-B1 P0133		EC-186
	FR O2 SEN-B1 P0130		EC-166
	FR O2 SEN-B2 P0151		EC-174
	FR O2 SEN-B2 P0152		EC-180
	FR O2 SEN-B2 P0153		EC-186
	FR O2 SEN-B2 P0150		EC-166
RR O2 SENSOR	RR O2 SEN-B1 P0137		EC-208
	RR O2 SEN-B1 P0138		EC-216
	RR O2 SEN-B1 P0139		EC-224
	RR O2 SEN-B2 P0157		EC-208
	RR O2 SEN-B2 P0158		EC-216
	RR O2 SEN-B2 P0159		EC-224
EGR SYSTEM	EGR SYSTEM P0400	EC-279	
	EGRC-BPT/VLV P0402	EC-288	
	EGR SYSTEM P1402	EC-421	

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (Recording vehicle data)

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

1. "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed 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-II screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

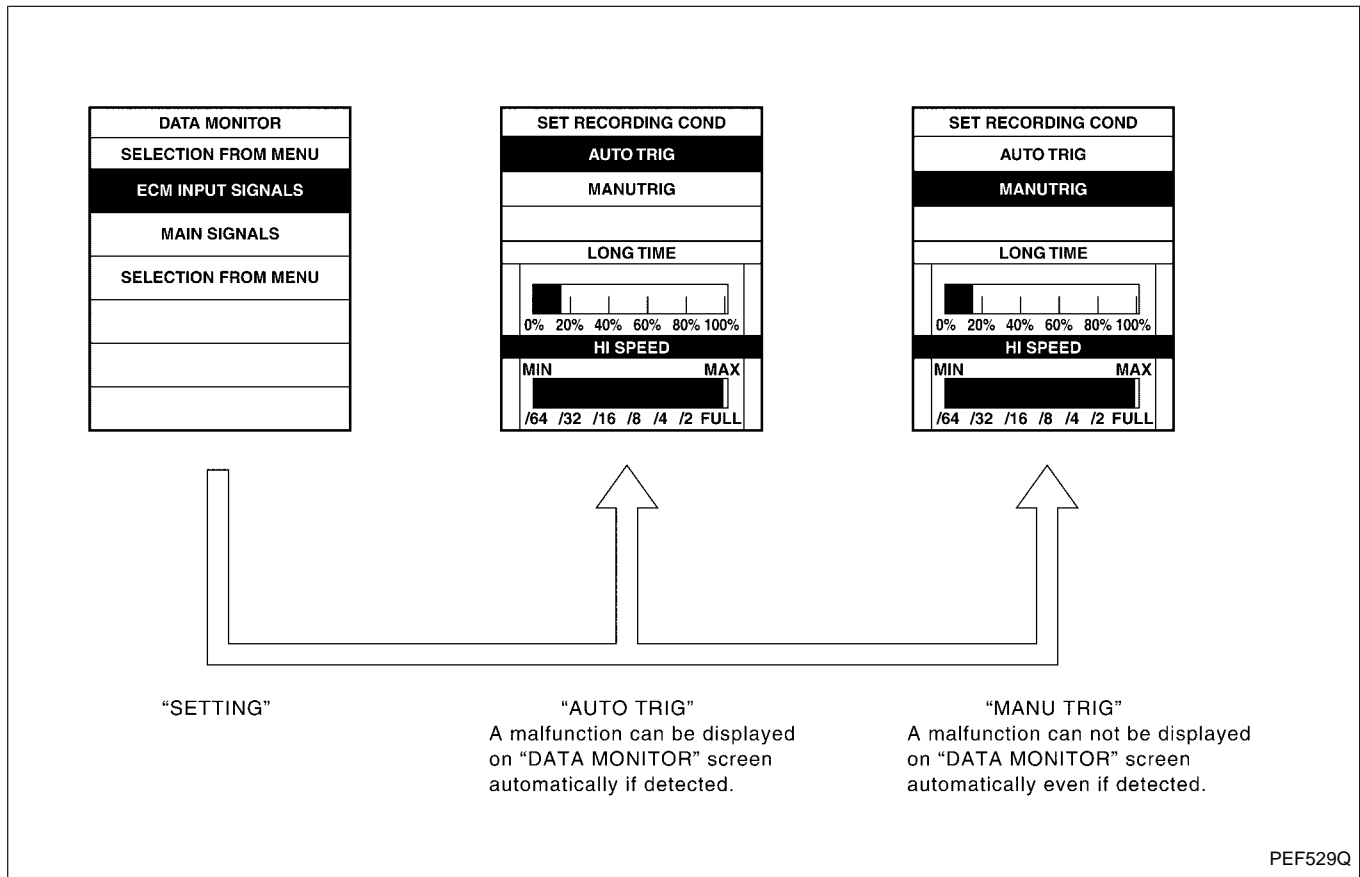
Use these triggers as follows:

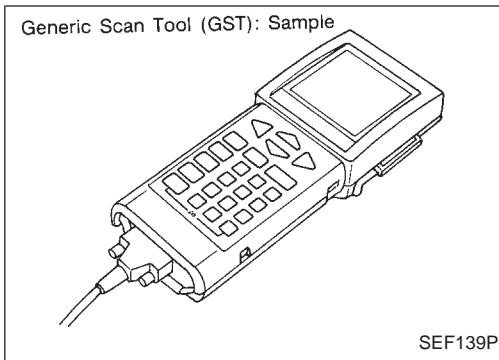
1. "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DTC CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to 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-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.





Generic Scan Tool (GST)

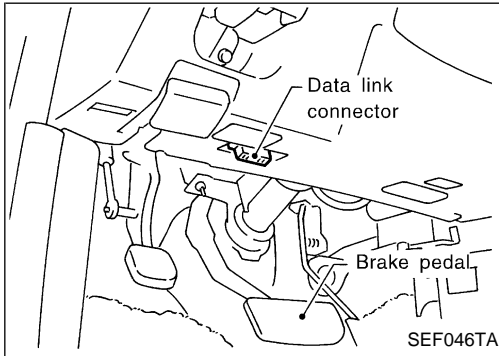
DESCRIPTION

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.

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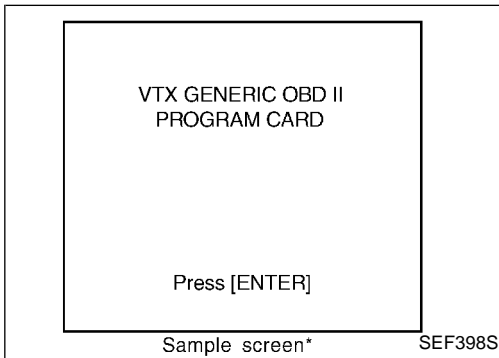


GST INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "GST" to data link connector which is located under LH dash panel near the hood lock release handle.

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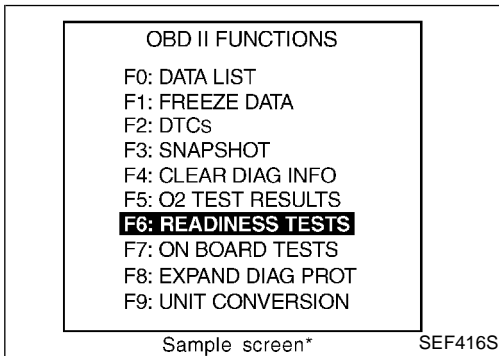
3. Turn ON ignition switch.
4. Enter the program according to instruction on the screen or in the operation manual.

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

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

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

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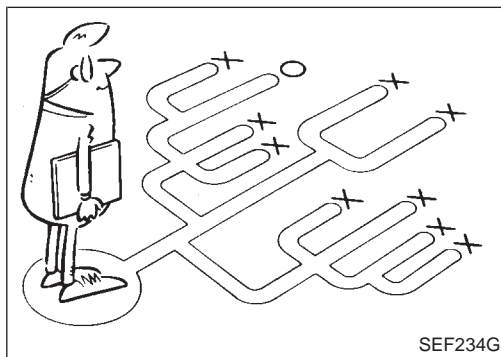
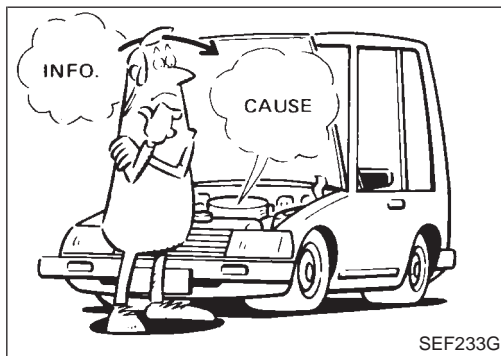
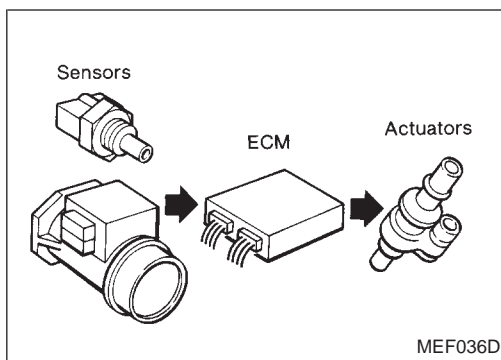
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Generic Scan Tool (GST) (Cont'd)

FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-77).]
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: <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> ● EVAP canister vent control open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● 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 test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.



KEY POINTS

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

SEF907L

Introduction

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no 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-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-89.

Before undertaking actual checks, take just 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 below 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

There are many operating conditions that lead to the malfunctions of engine components. A good knowledge of such conditions can make troubleshooting faster and more accurate.

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

Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

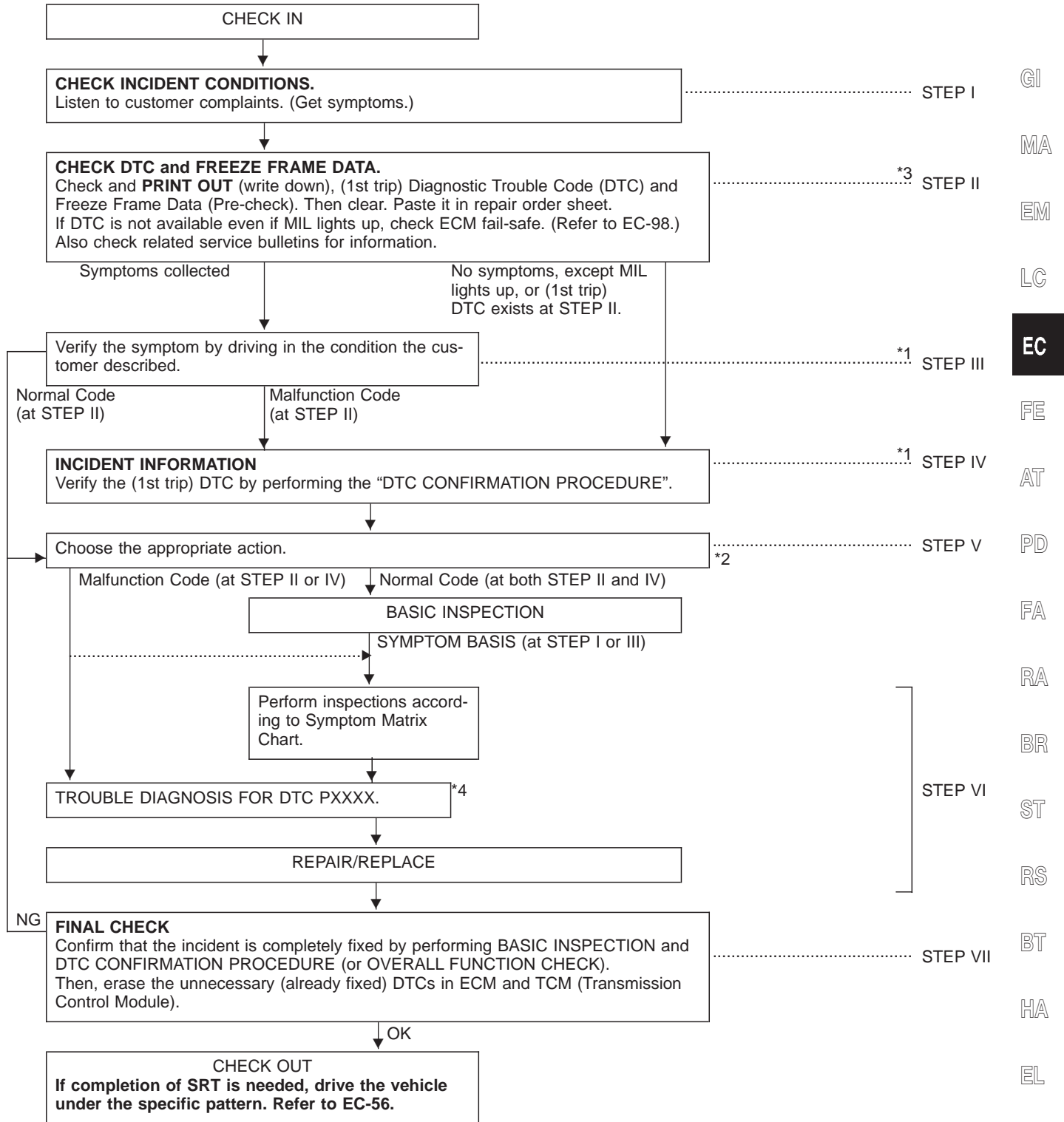
Some conditions may cause the malfunction indicator lamp to come on steady or blink and DTC to be detected. Examples:

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

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TROUBLE DIAGNOSIS — Work Flow

Work Flow



*1: If the incident cannot be duplicated, see “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-117.

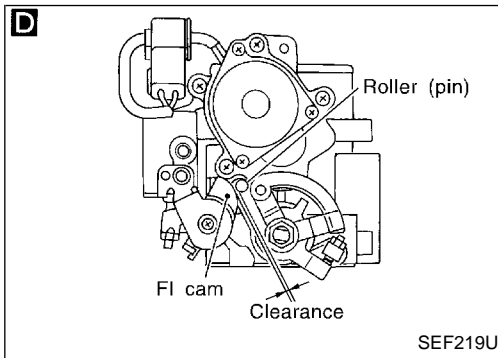
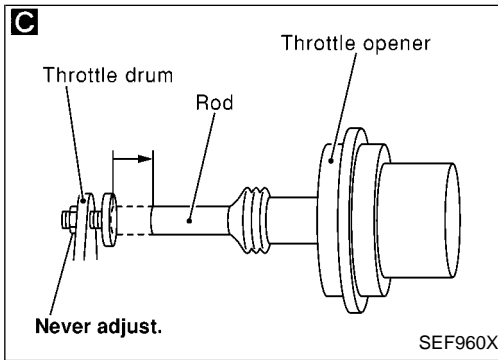
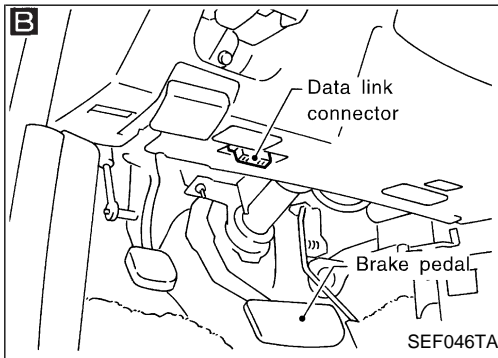
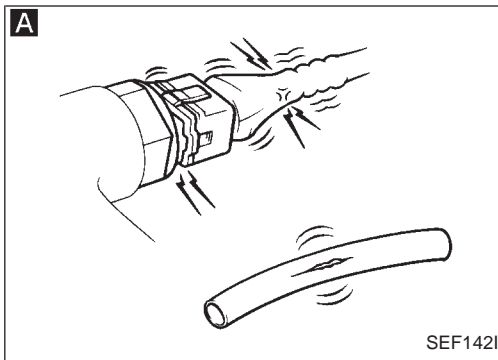
*2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-118).

*3: If time data of “SELF-DIAG RESULTS” is other than “0” or “1t” refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT”, EC-117.

*4: If the malfunction part cannot be found, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-117.

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-87.
STEP II	<p>Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-63.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.</p> <p>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 page EC-99.)</p> <p>Also check related service bulletins for information.</p>
STEP III	<p>Try to confirm the symptom and under what conditions the incident occurs.</p> <p>The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>If the malfunction code is detected, skip STEP IV and perform STEP V.</p>
STEP IV	<p>Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the “DTC CONFIRMATION PROCEDURE”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool.</p> <p>During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>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.</p> <p>The “NG” result of the “OVERALL FUNCTION CHECK” is the same as the (1st trip) DTC detection.</p>
STEP V	<p>Take the appropriate action based on the results of STEP I through IV.</p> <p>If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX.</p> <p>If the normal code is indicated, proceed to the BASIC INSPECTION on next page. Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-99.)</p>
STEP VI	<p>Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode.</p> <p>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-102.</p> <p>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.</p>
STEP VII	<p>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.</p> <p>Perform the “DTC CONFIRMATION PROCEDURE” and confirm the normal code (Diagnostic trouble code 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.</p> <p>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-63.)</p>



Basic Inspection

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.

A

BEFORE STARTING

1. Check service records for recent repairs of related problems, 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

B

CONNECT CONSULT-II TO THE VEHICLE.

Connect "CONSULT-II" to the data link connector and select "ENGINE" from the menu. (Refer to page EC-74.)

C

THROTTLE OPENER INSPECTION

1. Start engine and let it idle.
2. Confirm the throttle drum becomes free from the rod of the throttle opener.

NG → Refer to "INSPECTION", "Throttle Opener", EC-39.

D

CHECK FI CAM.

Warm up engine to normal operating temperature and make sure there is clearance between FI cam and roller (pin).

NG → Check FI cam, refer to EC-40.

Ⓐ
(Go to next page.)

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TROUBLE DIAGNOSIS — Basic Inspection

Basic Inspection (Cont'd)

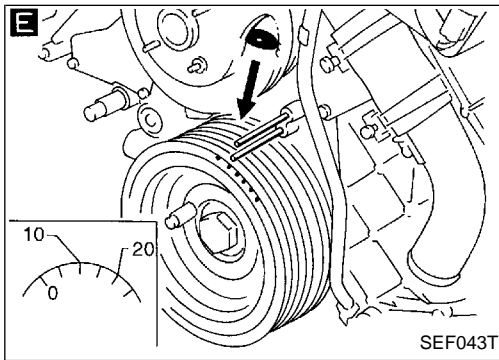
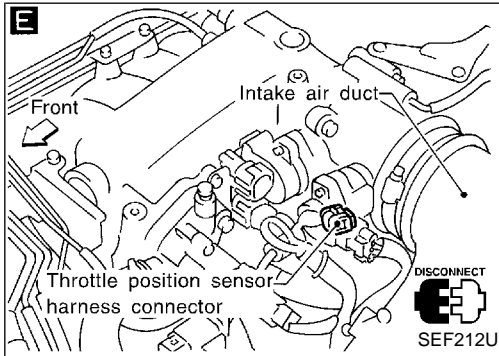
E

IACV-AAC/V ADJ

SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION

~ENG WARMED UP
~NO LOAD

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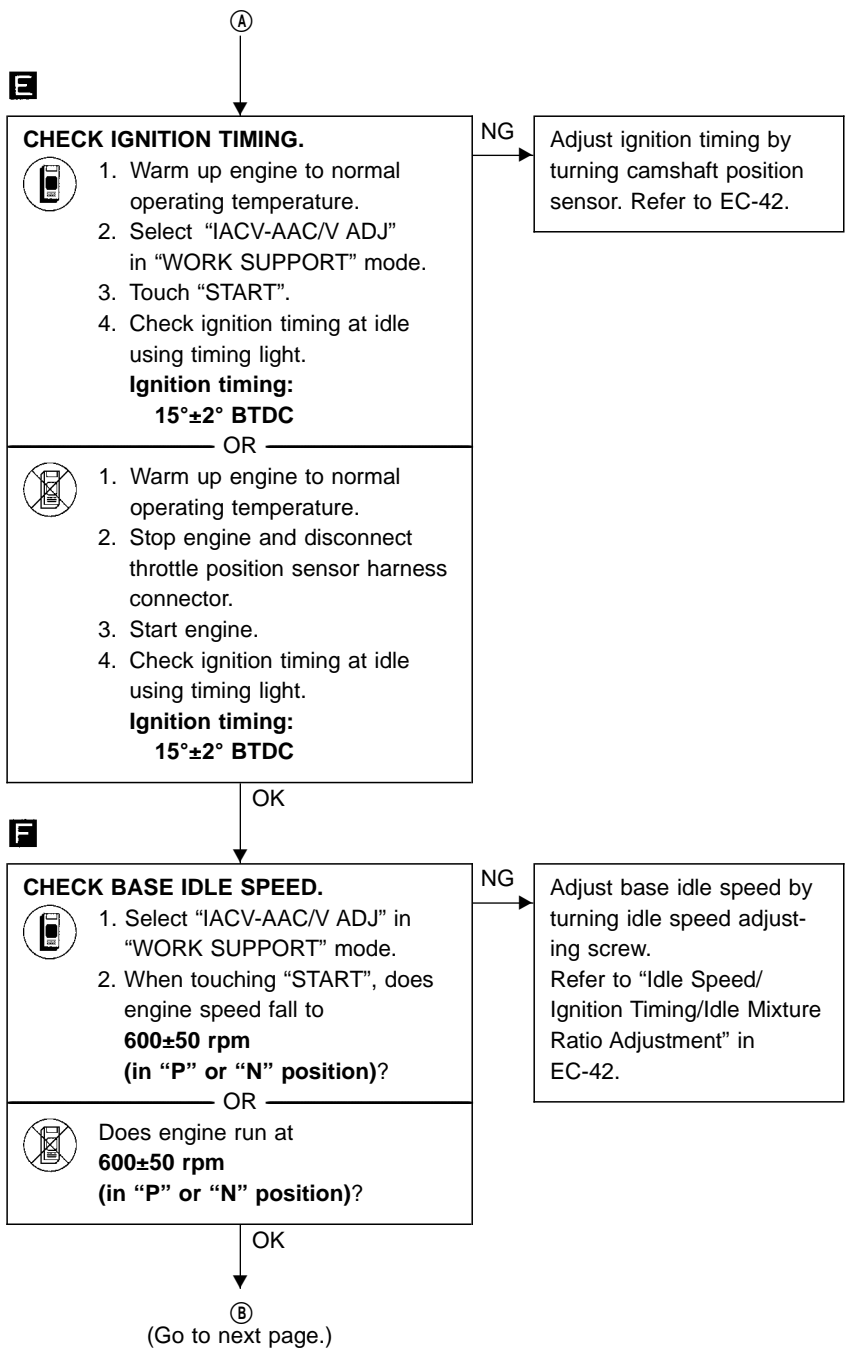
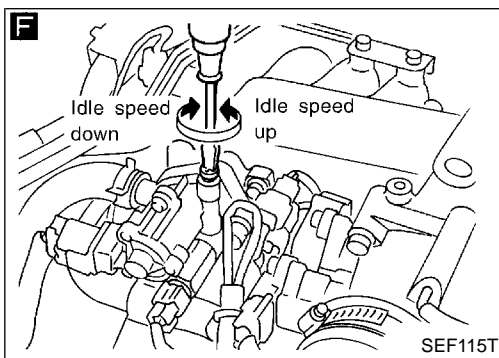
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IACV-AAC/V ADJ

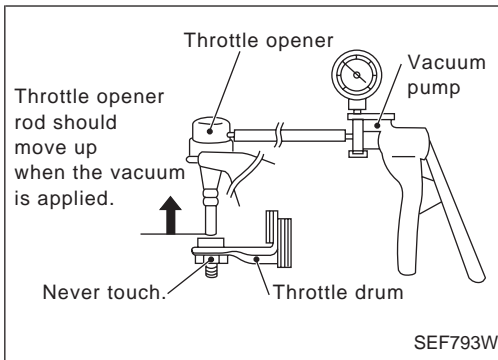
SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION

~ENG WARMED UP
~NO LOAD

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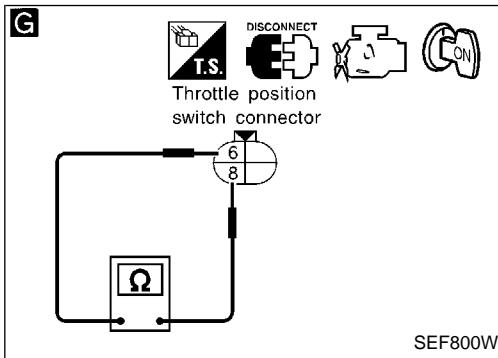
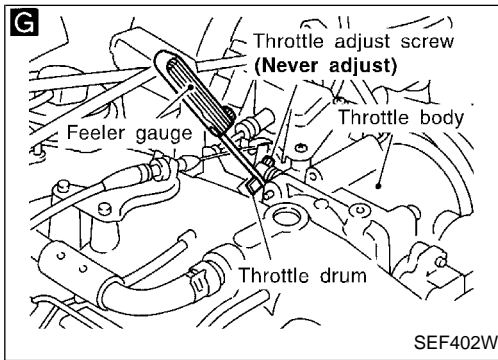
Basic Inspection (Cont'd)



G

DATA MONITOR	
MONITORING	NO FAIL
CLSD THL/P SW	ON

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G

ⓑ

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION. (Check throttle position sensor idle position.)

- Always check ignition timing and base idle speed before performing the followings.

- Warm up engine to normal operating temperature.
- Check FI cam, refer to procedure **D**.
- Stop engine.
- Remove the vacuum hose connected to the throttle opener.
- Connect suitable vacuum hose to the vacuum pump and the throttle opener as shown in the figure.
- Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum become free from the rod of the throttle opener. During the TPS adjustment, the vacuum should be applied (Until step **1**).
- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Select "CLSD THL/P SW" from the menu.
- Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.2 mm (0.008 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.

"CLSD THL/P SW" signal should remain "ON" while inserting 0.2 mm (0.008 in) feeler gauge.

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

OR

- Disconnect closed throttle position switch harness connector.
- Connect the tester probe to closed throttle position switch terminals **ⓐ** and **ⓑ**.
- Check harness continuity under the following conditions.
 - Insert the 0.2 mm (0.008 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check continuity.

"Continuity should exist" while inserting 0.2 mm (0.008 in) feeler gauge.

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

H

ADJUSTMENT

Refer to "THROTTLE POSITION SENSOR IDLE POSITION ADJUSTMENT".

Go to EC-95.

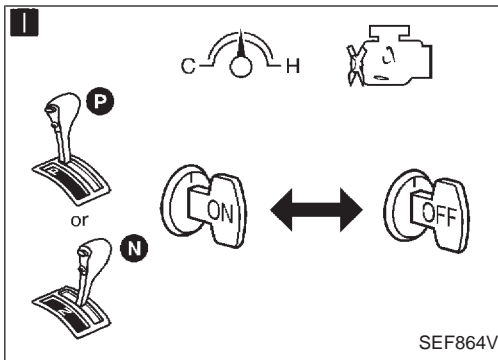
ⓐ

- Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
- Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load and then run engine at idle speed.

ⓒ
(Go to next page.)

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Basic Inspection (Cont'd)



I

DATA MONITOR	
MONITORING	NO DTC
CLSD THL/P SW	ON
CLSD THL POS	OFF

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I

DATA MONITOR	
MONITORING	NO DTC
CLSD THL/P SW	ON
CLSD THL POS	ON

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I

RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.
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.

- Start engine.
- Warm up engine to normal operating temperature.
- Select "CLSD THL POS" in "DATA MONITOR" mode (Manual trigger) with CONSULT-II.
- Stop engine. (Turn ignition switch "OFF".)
- Turn ignition switch "ON" and wait at least 5 seconds.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Repeat steps 5 and 6 until "CLSD THL POS" in "DATA MONITOR" mode with CONSULT-II changes to "ON".

OR

- Repeat steps 5 and 6, 20 times.

Stop engine, release vacuum then remove the vacuum hose and handy vacuum pump from the throttle opener. Reinstall the original vacuum hose to the throttle opener securely.

CHECK TARGET IDLE SPEED.

Read the engine idle speed in "DATA MONITOR" mode with CONSULT-II.
650±50 rpm (in "P" or "N" position)
 OR

Check target idle speed.
650±50 rpm (in "P" or "N" position)

Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" in EC-42.

After this inspection, unnecessary diagnostic trouble code No. might be displayed.

- Erase the stored memory in ECM and TCM (Transmission Control Module). Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" (EC-63) and "HOW TO ERASE DTC" in AT section.
- Erase the store memory in ABS/TCS control unit. Refer to "TROUBLE DIAGNOSIS FOR ABS/TCS C/U SIGNAL", EC-497 or refer to ("TROUBLE DIAGNOSIS", HOW TO ERASE SELF-DIAGNOSTIC RESULTS") in BR section.

INSPECTION END

Basic Inspection (Cont'd)

THROTTLE POSITION SENSOR IDLE POSITION ADJUSTMENT

Note:

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

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure **D**.
3. Stop engine.

Note: If handy vacuum pump is already set, go to step 7.

4. Remove the vacuum hose connected to the throttle opener.
5. Connect suitable vacuum hose to the vacuum pump and the throttle opener as shown in the figure.
6. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum become free from the rod of the throttle opener. During the TPS adjustment the vacuum should be applied.
7. Loosen throttle position sensor fixing bolts.

8. Turn ignition switch “ON”.
9. Select “DATA MONITOR” mode with CONSULT-II.
10. Select “CLSD THL/P SW” from the menu.
11. Read “CLSD THL/P SW” signal under the following conditions.

- Insert 0.2 mm (0.008 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure and check the following.

- **Open throttle valve and then close.**
- **“CLSD THL/P SW” signal should remain “OFF” when the throttle valve is closed. (If signal is “ON”, turn throttle position sensor body counterclockwise until the signal switches to “OFF”.)**

12. Temporarily tighten sensor body fixing bolts as follows.
 - **Gradually move the sensor body clockwise and stop it when “CLSD THL/P SW” signal switches from “OFF” to “ON”, then tighten sensor body fixing bolts.**

13. Make sure the signal is “ON” when the throttle valve is closed and “OFF” when it is opened. Repeat it 2 or 3 times.

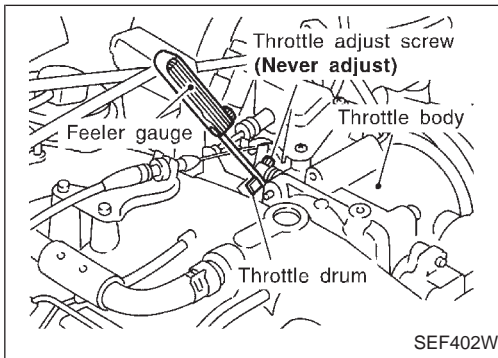
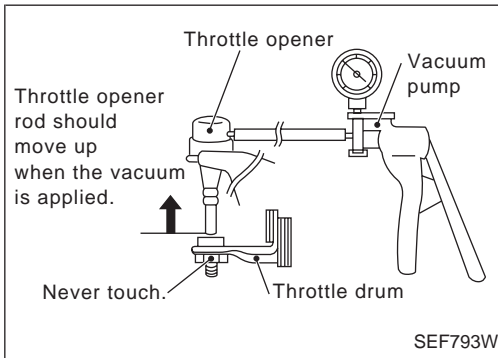
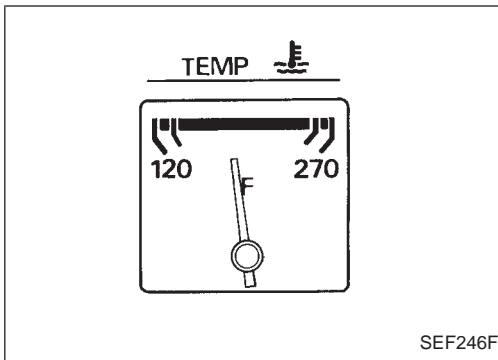
14. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge and check the following. Make sure the signal remains “OFF” when the throttle valve is closed. Repeat it 2 or 3 times.

15. Tighten throttle position sensor. Check that the “CLOSED THL/SW” signal remains “OFF” while closing throttle valve. If NG, repeat from the step 4.

After this adjustment, go to procedure **II RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.**

OR

8. Disconnect closed throttle position sensor harness connector.
9. Connect tester probe to the closed throttle position switch terminals ⑥ and ⑧ and check continuity under the following conditions.



DATA MONITOR	
MONITORING	NO FAIL
CLSD THL/P SW	ON

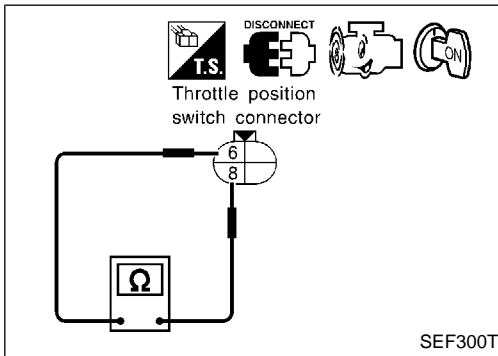
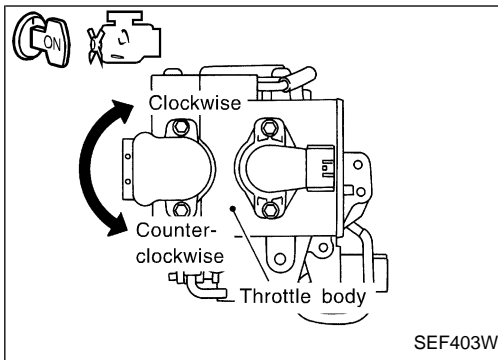
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DATA MONITOR	
MONITORING	NO FAIL
CLSD THL/P SW	OFF

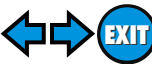
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Basic Inspection (Cont'd)



- Insert the 0.2 mm (0.008 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure and check the following.
 - **Open throttle valve then close.**
 - **The continuity should not exist while closing the throttle valve. If the continuity exists, turn throttle position sensor body counterclockwise until the continuity does not exist.**
10. Temporarily tighten sensor body fixing bolts as follows.
 - **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.**
 11. Make sure the continuity exists when the throttle valve is closed and continuity does not exist when it is opened. Repeat it 2 or 3 times.
 12. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge and check the following. Make sure the continuity does not exist when the throttle valve is closed. Repeat it 2 or 3 times.
 13. Tighten throttle position sensor. Check that the continuity does not exist while closing the throttle valve. If NG, repeat from the step 5. **After this adjustment, go to procedure ■ RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY.**



Diagnostic Trouble Code (DTC) Inspection Priority Chart

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	● ECM (P0605, 0301)	● Vehicle speed sensor (P0500, 0104)	● Engine coolant temperature sensor (P0115, 0103) (P0125, 0908)	GI
	● Mass air flow sensor (P0100, 0102)	● Intake air temperature sensor (P0110, 0401)	● Ignition signal circuit (P1320, 0201)	MA
	● Throttle position sensor (P0120, 0403)	● Knock sensor (P0325, 0304), (P0330, 0212)	● Park/Neutral position switch (P1706, 1003)	EM
	● EGRC-solenoid (P1400, 1005)	● Crankshaft position sensor (OBD) circuit (P0335, 0802) (P1336, 0905)	● Camshaft position sensor (P0340, 0101)	LC
	● A/T communication line (P0600, 0504), (P1605, 0804)	● Tank fuel temperature sensor (P0180, 0402)		EC
2	● EGR temperature sensor (P1401, 0305)	● Rear heated oxygen sensor (P0137 - P0140) (0150 - 0152, 0707), (P0157 - P0160) (0313 - 0315, 0708)	● EVAP control system pressure sensor (P0450, 0704)	FE
	● A/T related sensors, solenoid valves and switches (P0705 - P0725, 1101 - 1208) (P0740, 1108 - 1206)	● Front heated oxygen sensor's heater (P0135, 0901) (P0155, 1001)	● Vacuum cut valve bypass valve (P1491, 0311) (P1490, 0807)	AT
	● Absolute pressure sensor (P0105, 0803)	● Closed throttle position switch (P0510, 0203)	● EVAP canister vent control valve (P0446, 0903) (P1446, 0215) (P1448, 0309)	PD
	● MAP/BARO switch solenoid valve (P1105, 1302)	● Intake valve timing control position sensor circuit (P1140, 1303), (P1145, 1304)	● EVAP canister purge volume control valve (P1444, 0214) (P0443, 1008)	FA
	● Tandem throttle position sensor (P1125, 0110)	● Front heated oxygen sensor (P0130 - P0134, 0303, 0409 - 0412) (P0150 - P0154, 0413 - 0415, 0503, 0509)	● EVAP control system purge flow monitoring (P1447, 0111)	RA
	● Secondary throttle position sensor (P1120, 0406)	● Rear heated oxygen sensors heater (P0141, 0902), (P0161, 1002)	● EVAP canister purge control valve/solenoid valve (P1493, 0312), (P1492, 0807)	BR
				ST
3	● EGR function (P0400, 0302) (P1402, 0514)	● TCS signal (P1210, 0106)	● Fuel pump control module (FPCM) (P1220, 1305)	RS
	● EVAP control system (SMALL LEAK) (P0440, 0705) (P1440, 0213) (GROSS LEAK) (P0455, 0715)	● Misfire (P0300 - P0308, 0701 - 0601)	● Fuel injection system function (P0172, 0114), (P0171, 0115), (P0175, 0209), (P0174, 0210)	BT
	● EGRC-BPT valve function (P0402, 0306)	● Closed loop control (P1148, 0307) (P1168, 0308)	● Three way catalyst function (P0420, 0702) (P0430, 0703)	HA
	● IACV-AAC valve (P0505, 0205)	● A/T function (P0731 - P0734, 1103 - 1106) (P0744, 1107)	● Intake valve timing control function (P1110, 0805), (P1135, 1301)	EL
			IDX	

Fail-Safe Chart

The ECM enters fail-safe mode, if any of the following malfunctions are 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-II GST	ECM*			
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-II displays the engine coolant temperature decided by ECM.	
			Condition	Engine coolant temperature decided (CONSULT-II display)
			Just as ignition switch is turned ON or Start	40°C (104°F)
			More than 4 minutes after ignition 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 amount of mass air flow and the engine speed. Therefore, acceleration will be poor.	
				Driving condition
			When engine is idling	Normal
			When accelerating	Poor acceleration
P1210	0106	TCS signal circuit	TCS does not operate. For details, refer to BR section ("TROUBLE DIAGNOSIS FOR TCS").	
Unable to access ECM	Unable to access Diagnostic Test Mode II	ECM	<p>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 MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver. However, it is not possible to access ECM and DTC cannot be confirmed.</p> <p>Engine control with ECM fail-safe When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.</p>	
				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 value.
			Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.
			Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.
			Replace ECM, if ECM fail-safe condition is confirmed.	

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

Symptom Matrix Chart

SYSTEM — Basic engine control system		SYMPTOM														Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERCOOLS	OVERCHARGING		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	3			3				2	EC-521
	Fuel pressure regulator system	2	3	4	4	4	4	4	4	4		4					EC-37
	Injector circuit	1	1	2	2	2	2	2	2			2					EC-513
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4					EC-26
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1				EC-36
	Incorrect idle speed adjustment	3	3				1	1	1	1		1					EC-42
	IACV-AAC valve circuit	1	1	2	2	2	2	2	2	2		2					EC-338
	IACV-FICD solenoid circuit		3				2	3	3	2							EC-525
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1			1	1		1					EC-42
	Ignition circuit	1	1	2	3	2		2	3			2					EC-397
EGR	EGRC-solenoid valve	2	3	3	3	3		3				3					EC-410
	EGR system	2	1	2	3	3	3	2	3	3		3					EC-421
Main power supply and ground circuit		2	3	3	3	3		2	2		3	3				3	EC-118
Cooling	Cooling fan circuit	3	3	3	3	3	3	3	3	3	1	2		1		3	EC-501
Air conditioner circuit		3	3	3	3	3	3	3	3	3		3				3	HA section

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

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine control system		SYMPTOM														Reference page
		HARD/NO START/RESTART (EXCP: HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERCOOLS	OVERCHARGING	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	HA
Engine control	Camshaft position sensor circuit	2	2	2	2	2	3	3	3							EC-273
	Mass air flow sensor circuit	1	1	2	3	2	2	2	2	2		2				EC-124
	Front heated oxygen sensor circuit	2	1	2	3	2		2	3			2				EC-195, 166
	Engine coolant temperature sensor circuit	1	1	3	3	3	3	2	3	3	2	3				EC-145, 161
	Throttle position sensor circuit		1	2		2	3	2	2	3		2				EC-150
	Incorrect throttle position sensor adjustment		2	3		3	1	3	3	1		3				EC-91
	Intake valve timing control system		3	3		3		3				3				EC-365, 380
	Vehicle speed sensor circuit		3	3		3						3				EC-333
	Knock sensor circuit	2	3	2	2	2	3	2				3				EC-265
	ECM	3	3	3	3	3	3	3	3	3	3	3				EC-353, 98
	Start signal circuit	2														EC-519
	Park/Neutral position switch circuit			3		3		3	3			3				EC-492
	FPCM	2	2	2		2		2								EC-391
Power steering oil pressure switch circuit		2					3	3							EC-525	

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

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM		SYMPTOM														Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERCOOLS	OVERCHARGING		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	1P	1X	HA	
Fuel	Fuel tank	5															FE section
	Fuel piping	2		5	5	2		5	5			5					—
	Vapor lock		5														
	Valve deposit																
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5					
Air	Air duct	5															
	Air cleaner																AT
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5		5		5	5			5					FE section
	Throttle body, Throttle wire	5			5		5			5	5						
	Air leakage from intake manifold/Collector/Gasket																
Cranking	Battery																FA
	Alternator circuit	1	1	1		1		1	1			1			1	1	EL section
	Starter circuit																
	Theft warning circuit	3															
	PNP switch	4															AT section
	Drive plate	6															EM section
Engine	Cylinder head																EM section
	Cylinder head gasket										4						
	Cylinder block																
	Piston	6	6	6	6	6		6	6			6	6				
	Piston ring																
	Connecting rod																
	Bearing																
	Crankshaft																
Valve mechanism	Timing chain	6	6	6	6	6		6	6			6	6				BT
	Camshaft	5	5	5	5	5		5	5			5					
	Intake valve																
	Exhaust valve	6	6	6	6	6		6	6			6	6				
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5	5	5			5						EM section & FE section
	Three way catalytic converter																
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5			5	5				5	EL
	Oil level (Low)/Filthy oil																
Cooling	Radiator/Hose/Radiator filler cap																LC section
	Thermostat						5			5				2			
	Water pump																
	Water gallery	5	5	5	5	5					4	5					
	Cooling fan						5			5				2			
	Coolant level (low)/Contaminated coolant																
IVIS (Infiniti Vehicle Immobiliser System — NATS)		1	1														EC-69 or EL section

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

CONSULT-II Reference Value in Data Monitor Mode

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 (POS) 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 (POS)	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 		Almost the same speed as the CONSULT-II value.
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	1.0 - 1.7V
		2,500 rpm	Approx. 2.1V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 		More than 82°C (180°F)
FR O2 SEN-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V
FR O2 SEN-B2			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
FR O2 MNTR-B1			
FR O2 MNTR-B2			
RR O2 SEN-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Revving engine from idle to 2,000 rpm quickly	0 - 0.3V ↔ 0.6 - 1.0V
RR O2 SEN-B2			LEAN ↔ RICH
RR O2 MNTR-B1			
RR O2 MNTR-B2			
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 		Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 		11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up ● 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 valve: fully closed	0.15 - 0.85V
		Throttle valve: fully opened	3.5 - 4.7V
THRTL/P SEN2	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve: fully closed	0.60 - 1.15V
		Throttle valve: fully open	4.3 - 4.7V
EGR TEMP SEN	<ul style="list-style-type: none"> ● Engine: After warming up 		Less than 4.5V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 		OFF → ON → OFF
CLSD THL POS	<ul style="list-style-type: none"> ● Engine: After warming up ● 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 valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch: "OFF"	OFF
		Air conditioner switch: "ON" (Compressor operates.)	ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
AMB TEMP SW	<ul style="list-style-type: none"> ● Engine: Running 	Ambient air temperature more than 23.5°C	ON
		Ambient air temperature less than 20.5°C	OFF
LOAD SIGNAL	<ul style="list-style-type: none"> ● Engine: Running 	Rear window defogger or headlamp "ON"	ON
		Except above	OFF
A/C PRESS SW	<ul style="list-style-type: none"> ● Engine: Running 	A/C pressure is more than 1,422 - 1,618 kPa (14.5 - 16.5 kg/cm ² , 206 - 235 psi)	ON
		A/C pressure is less than 1,128 - 1,422 kPa (11.5 - 14.5 kg/cm ² , 164 - 206 psi)	OFF

Note: B1 indicates Left bank, B2 indicates Right bank.

TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION		SPECIFICATION	
IGNITION SW	● Ignition switch: ON → OFF		ON → OFF	
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	2.4 - 3.2 msec.	GI
INJ PULSE-B2		2,000 rpm	1.9 - 2.8 msec.	
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec	MA
		2,000 rpm	2.5 - 3.5 msec	
IGN TIMING	ditto	Idle	15° BTDC	EM
		2,000 rpm	More than 25° BTDC	
IACV-AAC/V	ditto	Idle	2 - 10 step	
		2,000 rpm	—	LC
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	50 - 159%	
A/F ALPHA-B2				
EVAP SYS PRES	● Ignition switch: ON		Approx. 3.4V	EC
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON	
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 1 second) ● Engine running and cranking		ON	FE
	Except as shown above		OFF	
INT/V SOL-B1	● Engine is running ● Engine speed is more than 2,000 rpm ● Quickly depressed accelerator pedal. ● Vehicle speed is more than 4 km/h (2 MPH)		OFF → ON (Using "INT/V TIM-B1(-2)", the difference of degree between "OFF" and "ON" is approximately 20 deg.)	AT
INT/V SOL-B2				PD
INT/V TIM-B1	● Engine is running		Advanced angle (degree signal) of the intake camshaft should be displayed.	
INT/V TIM-B2				FA
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F) at vehicle speed less than 80 km/h (50 MPH)	HIGH	RA
		Engine coolant temperature is 105°C (221°F) or more	HIGH	BR
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "D" ● No-load	Idle	OFF (Cut)	ST
		Revving engine up from idle to 3,000 rpm	ON (Flow)	
VENT CONT/V	● Ignition switch: ON		OFF	RS
FR O2 HTR-B1	● Engine speed: Idle		ON	
FR O2 HTR-B2	● Engine speed: Above 3,200 rpm		OFF	BT
RR O2 HTR-B1	● Engine speed: Idle [after driving 2 minutes at 70 km/h (43 MPH) or more]		ON	
RR O2 HTR-B2	● Engine speed: Above 3,600 rpm ● Ignition switch: ON (Engine stopped)		OFF	HA
VC/V BYPASS/V	● Ignition switch: ON		OFF	
PURG CONT S/V	● Engine: After warming up	Idle	OFF	
		2,000 rpm	ON	EL
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	13.0 - 32%	
		2,500 rpm	13.0 - 25.5%	IDX
ABSOL TH-P/S	● Engine: After warming up ● 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 valve fully closed	0.0%	
		Throttle valve fully opened	Approx. 88%	

TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION		SPECIFICATION
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	3.0 - 6.0 g·m/s
		2,500 rpm	12.9 - 25.3 g·m/s
FPCM	<ul style="list-style-type: none"> ● Within 16 seconds after starting engine, when engine coolant temperature is more than 100°C (212°F) 		HIGH → LOW
FPCM D/R VOLT	<ul style="list-style-type: none"> ● Within 16 seconds after starting engine, when engine coolant temperature is more than 100°C (212°F) 		Approx. 5V → Approx. 0.4V
MAP/BARO SW/V	<ul style="list-style-type: none"> ● For 5 seconds after starting engine 		BARO
	<ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch "ON" ● More than 5 seconds after starting engine 		MAP
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Engine: After warming up 	For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.2V

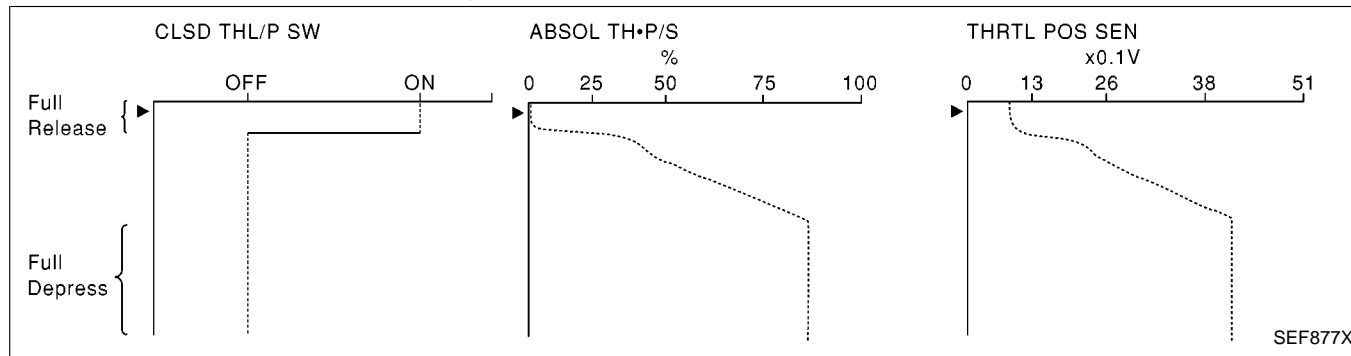
Major Sensor Reference Graph in Data Monitor Mode

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

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

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”.

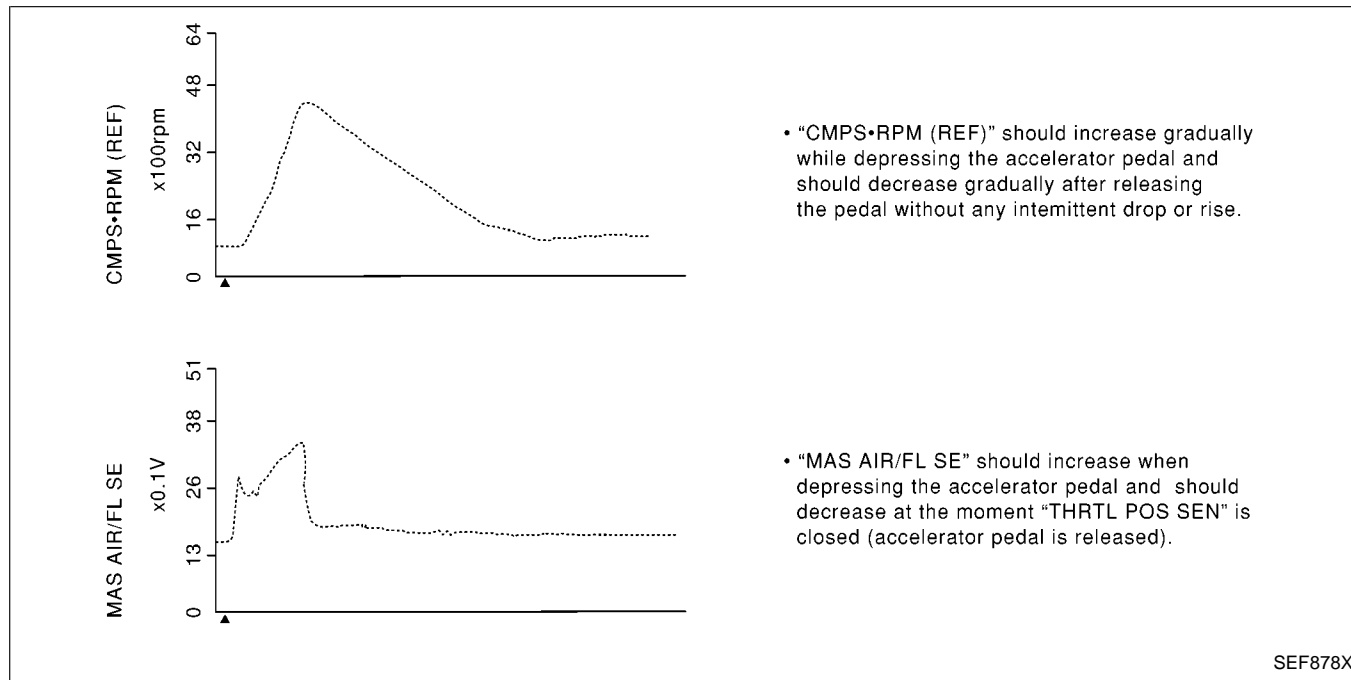
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL/P SW” is changed from “ON” to “OFF”.



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

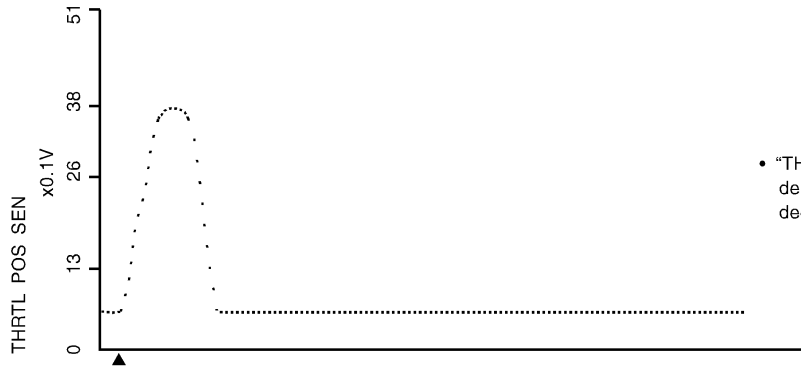
Below is the data for “CMPS·RPM (POS)”, “MAS AIR/FL SE”, “THRTL POS SEN”, “RR O2 SENSOR”, “FR O2 SENSOR” and “INJ PULSE” when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.

Each value is for reference, the exact value may vary.

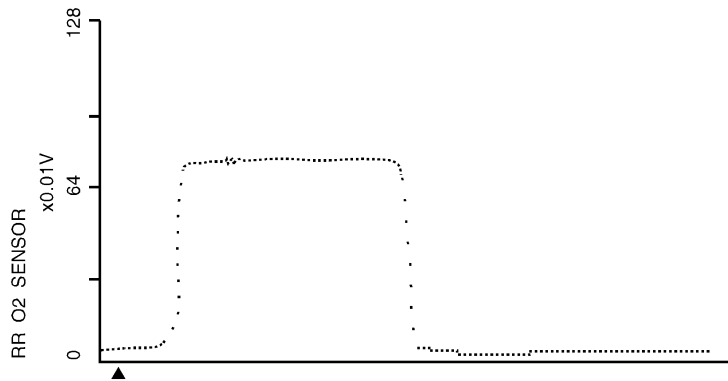


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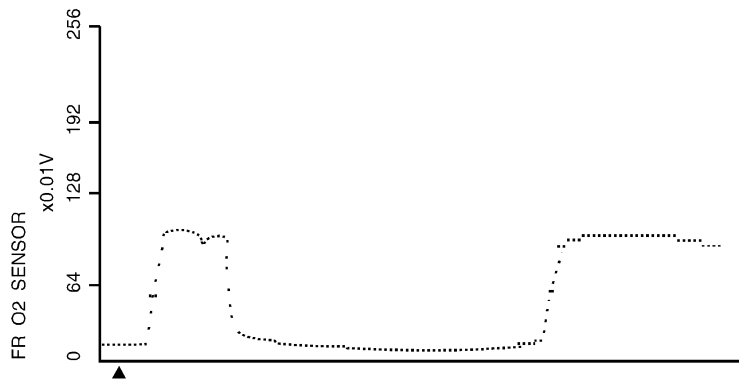
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



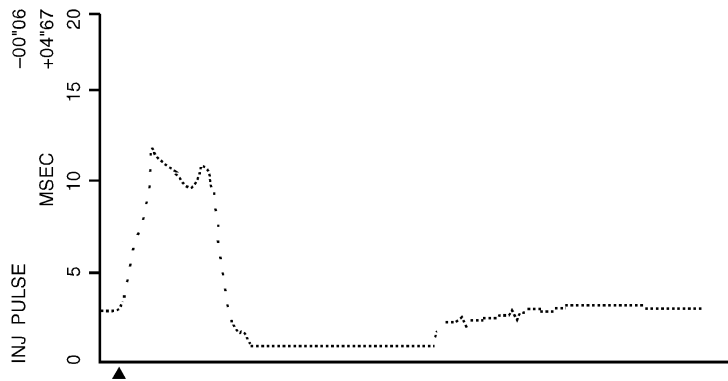
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



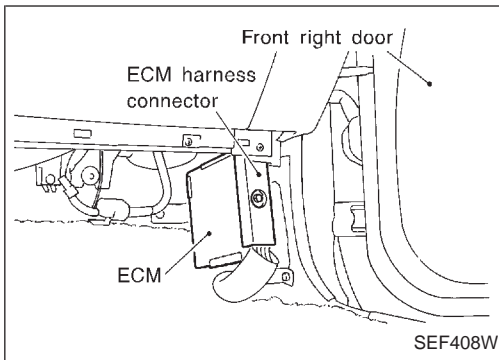
- "RR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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



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



ECM Terminals and Reference Value

PREPARATION

1. ECM is located behind right side front pillar lower garnish. For this inspection, remove the glove box.

GI

MA

EM

LC

EC

FE

AT

PD

FA

RA

BR

ST

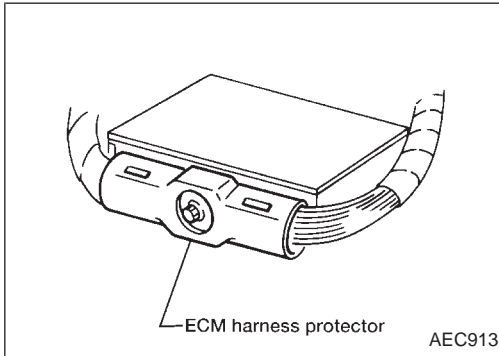
RS

BT

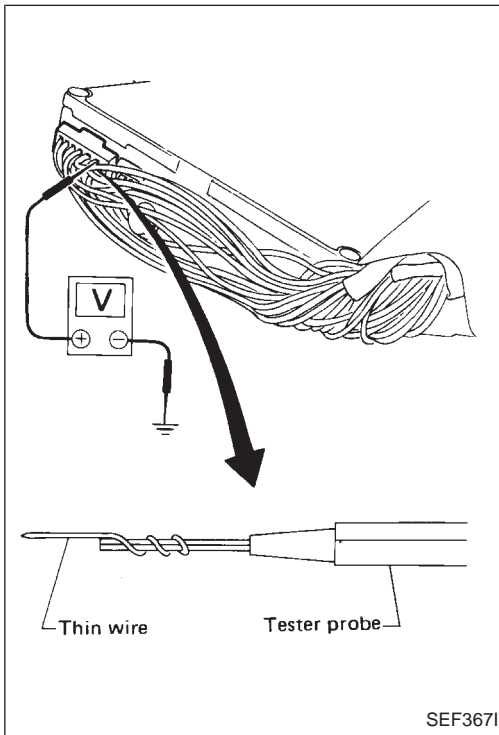
HA

EL

IDX



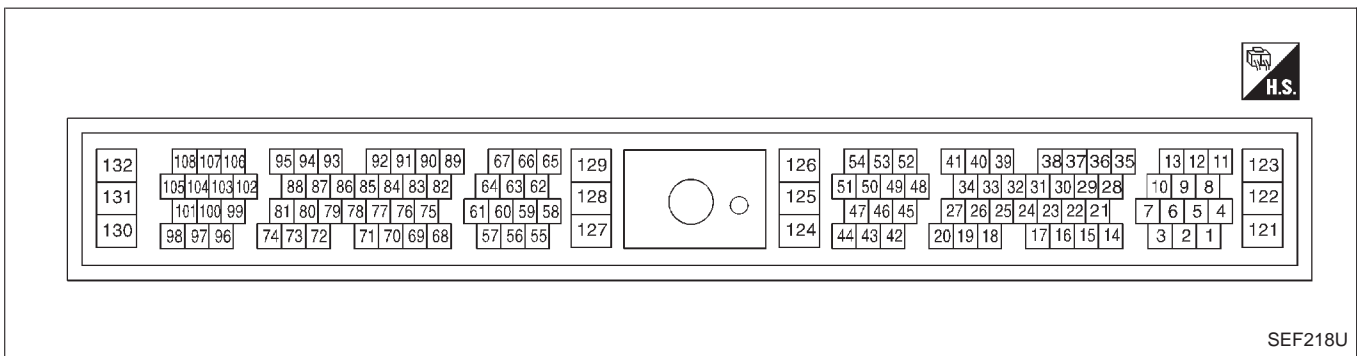
2. Remove ECM harness protector.



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

- Open harness securing clip to make resting 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



SEF218U

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1 2 3 14 4 5 6 7	R/B R/W R/Y R/L W/R PU/R GY/L LG	Injector No. 1 Injector No. 8 Injector No. 7 Injector No. 3 Injector No. 6 Injector No. 5 Injector No. 4 Injector No. 2	Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V) SEF549T
			Engine is running. └ Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V) SEF550T
			Engine is running. (Warm-up condition) └ Lift up drive wheels and rev engine from idle to 3,000 rpm in "D" position.	0 - 0.7V
			Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Idle speed	0.1 - 14V
			Engine is cranking.	Approximately 0.4V
			Engine is running. └ Idle speed	Approximately 10V
16 17	L/Y G/W	Front heated oxygen sensor heater (right bank) Front heated oxygen sensor heater (left bank)	Engine is running. └ Engine speed is below 3,200 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
18 19	Y/R L	Rear heated oxygen sensor heater (right bank) Rear heated oxygen sensor heater (left bank)	Engine is running. └ At idle [after driving 2 minutes at 70 km/h (43 MPH) or more]	0 - 0.5V
			Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Engine speed is above 3,600 rpm.	

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
20	P/B	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)	GI
22	Y	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)	MA
			Engine is running. └ Engine speed is 2,000 rpm	Approximately 0V	EM
24 25	BR/Y BR	Intake valve timing control solenoid valve (right bank) Intake valve timing control solenoid valve (left bank)	Engine is running. └ Intake valve timing control solenoid is operating.	Approximately 0V	LC
			Engine is running. └ Intake valve timing control solenoid is not operating.	Battery voltage	EC
34 27	LG LG/R	Cooling fan relay-2 Cooling fan relay-1 and -3	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)	FE
			Engine is running. └ Cooling fan is operating.	0 - 1V	AT
28 29 35 36	BR/Y G G/OR L/B	EVAP canister purge volume control valve	Engine is running. └ Idle speed	0 - 0.4V or BATTERY VOLTAGE (11 - 14V)	PD FA
41	W	MAP/BARO switch solenoid valve	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approximately 0V	RA
			Engine is running. └ For 5 seconds after starting engine		BR
			Engine is running. └ Idle speed (For 5 minutes after starting engine) └ More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)	ST RS
42	B/P	Fuel pump relay	Ignition switch "ON" └ For 5 second after turning ignition switch "ON"	0 - 1V	BT
			Engine is running. └ Ignition switch "ON" └ 5 second after turning ignition switch "ON"		BATTERY VOLTAGE (11 - 14V)

EL

IDX

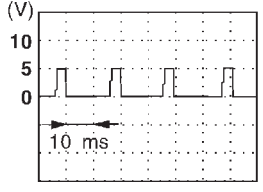
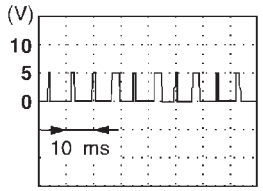
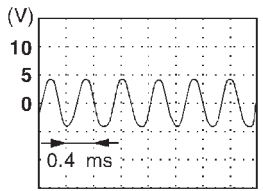
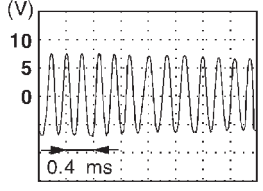
TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
43 44 46 47 50 51 53 54	Y/R G/R L/R GY PU/W GY/R W/R R/L	Ignition signal (No. 1) Ignition signal (No. 8) Ignition signal (No. 7) Ignition signal (No. 3) Ignition signal (No. 6) Ignition signal (No. 5) Ignition signal (No. 4) Ignition signal (No. 2)	<p>Engine is running. └ Idle speed</p> <p>Engine is running. └ Engine speed is 2,000 rpm.</p>	<p>Approximately 0.38V</p> <p>SEF538T</p> <p>Approximately 0.55V</p> <p>SEF539T</p>
45	LG/B	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
48	PU/W	Malfunction indicator lamp	<p>Ignition switch "ON"</p> <p>Engine is running. └ Idle speed</p>	<p>Approximately 0.1V</p> <p>BATTERY VOLTAGE (11 - 14V)</p>
49	B/R	Air conditioner relay	<p>Engine is running. └ Both air conditioner switch and blower switch are "ON".</p> <p>Engine is running. └ Air conditioner switch is "OFF".</p>	<p>0 - 1V</p> <p>BATTERY VOLTAGE (11 - 14V)</p>
52	W/G	Tachometer	<p>Engine is running. └ Idle speed</p> <p>Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.</p>	<p>Approximately 7V</p> <p>SEF540T</p> <p>Approximately 0 - 14V</p> <p>SEF541T</p>

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
55 58	P	Crankshaft position sensor (REF)	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Idle speed	Approximately 0.6 - 1.0V  SEF046V	GI MA EM LC
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Engine speed is 2,000 rpm.	Approximately 0.8 - 0.9V  SEF544T	EC FE AT
56	W/L	Power supply (Back-up)	<div style="border: 1px solid black; padding: 2px;">Ignition switch "OFF"</div>	BATTERY VOLTAGE (11 - 14V)	PD
57	B/R	Crankshaft position sensor (OBD)	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Idle speed	Approximately 1.7V (AC voltage)  SEF545T	FA RA BR ST
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) └ Engine speed is 2,000 rpm.	Approximately 0V (—)  SEF546T	RS BT HA EL

IDX

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
59	L	Camshaft position sensor (POS)	Engine is running. (Warm-up condition) └ Idle speed	Approximately 2.5V SEF547T
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	Approximately 2.4V SEF548T
61	L/W	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition)* └ Accelerator pedal released	Approximately 0.5V
			Ignition switch "ON" (Warm-up condition)* └ Accelerator pedal fully depressed	Approximately 4.2V
62	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
63	G	Throttle position sensor	Ignition switch "ON" (Warm-up condition)* └ Accelerator pedal fully released	0.15 - 0.85V
			Ignition switch "ON" (Warm-up condition) └ Accelerator pedal fully depressed	3.5 - 4.7V
64	W	Absolute pressure sensor	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approximately 4.4V
			Engine is running. └ For 5 seconds after starting engine	Approximately 1.2V
65	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.4V
			Engine is running. (Warm-up condition) └ Engine speed is 2,500 rpm.	Approximately 2.1V

*: More than -40.0 kPa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump.

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
66	L	Secondary throttle position sensor	Ignition switch "ON" └ Approximately 3 seconds after ignition switch "ON" and thereafter	Approximately 3.4V	GI
			Ignition switch "ON" └ Disconnect throttle motor harness connector. └ Fully close secondary throttle valve by hand.	Approximately 0.4V	MA
67	Y/B	Engine coolant temperature sensor	Engine is running.	0 - 4.8V Output voltage varies with engine coolant temperature.	EM LC
68	P/L	Vehicle speed sensor	Engine is running. └ Jack up rear wheels and run engine at idle in "D" position.	Approximately 5.2V SEF542T	EC FE AT
69	W/PU	Intake air temperature sensor	Engine is running.	0 - 4.8V Output voltage varies with intake air temperature.	PD FA
70 71	R/L L/W	Intake valve timing control position sensor (right bank) Intake valve timing control position sensor (left bank)	Engine is running. └ Idle speed	Approximately 0V SEF551T	RA BR
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0V SEF552T	ST RS BT HA
72	R/Y	Headlamp switch	Engine is running. └ Headlamp switch is "OFF".	0V	EL
			Engine is running. └ Headlamp switch is "ON".	Battery voltage	IDX

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
73	R	TCS signal	Ignition switch "ON"	Approximately 5V
			Ignition switch "ON" └ Disconnect throttle motor harness connector. └ Fully close secondary throttle valve by hand.	Approximately 0V
74	GY/L	Closed throttle position switch	Ignition switch "ON" (Warm-up condition)* └ Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" (Warm-up condition) └ Accelerator pedal depressed	Approximately 0V
75	W	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
			Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
76	L/R	Ambient air temperature switch	Engine is running. └ Ambient air temperature is more than 23.5°C (74°C)	Approximately 5V
			Engine is running. └ Ambient air temperature is less than 20.5°C (69°F)	0V
78	W	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
79	L/R	Electrical load signal	Engine is running. └ Rear window defogger switch is "OFF". └ Headlamp switch is "OFF".	0V
			Engine is running. └ Rear window defogger switch is "ON". └ Headlamp switch is "ON".	Battery voltage
80	SB	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
81	G/B	Air conditioner pressure switch	Engine is running. └ At idle speed	Approximately 5V
82 83	R W	Front heated oxygen sensor (Right bank) Front heated oxygen sensor (Left bank)	Engine is running. └ After warming up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)
89 90	W Y	Rear heated oxygen sensor (RH) Rear heated oxygen sensor (LH)	Engine is running. └ After warming up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V

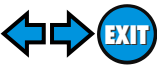
*: More than -40.0 kPa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump.

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
91	R/L	Fuel tank temperature sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with fuel temperature.	GI
92	LG	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V	MA
93	G/R	Fuel pump control module (FPCM) check	When cranking the engine	Approximately 0V	EM
			After starting the engine	Approximately 5V	
98	BR/W	Sensor's power supply	Ignition switch "ON"	Approximately 5V	LC
99	R/L	A/T communication line (LAN)	Engine is running. └ Idle speed	Approximately 2V	EC
100	G	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0 - 1.5V	FE
			Engine is running. └ Steering wheel is not being turned.	BATTERY VOLTAGE (11 - 14V)	AT
101	G/OR	PNP switch	Ignition switch "ON" └ Gear position is "N" or "P".	Approximately 0V	PD
			Ignition switch "ON" └ Except the above gear position	Approximately 5V	FA
105	W	Knock sensor (LH)	Engine is running.	2.0 - 3.0V	RA
108	W	Knock sensor (RH)	└ Idle speed		
106	R	Data link connector	Ignition switch "ON" └ CONSULT-II or GST is disconnected.	6 - 10V	BR
121	B	ECM ground	Engine is running.	Engine ground	ST
122	B		└ Idle speed		
123	W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)	RS
124	W/B	ECM relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V	BT
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)	HA EL
125	B	ECM ground	Engine is running.	Engine ground	IDX
126			└ Idle speed		
127	B	ECM ground	Engine is running.	Engine ground	
128			└ Idle speed		
129	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V	

TROUBLE DIAGNOSIS — General Description



ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
130 131	R/G	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Description

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 DTC (1st trip) 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.

GI

MA

Common I/I Report Situations

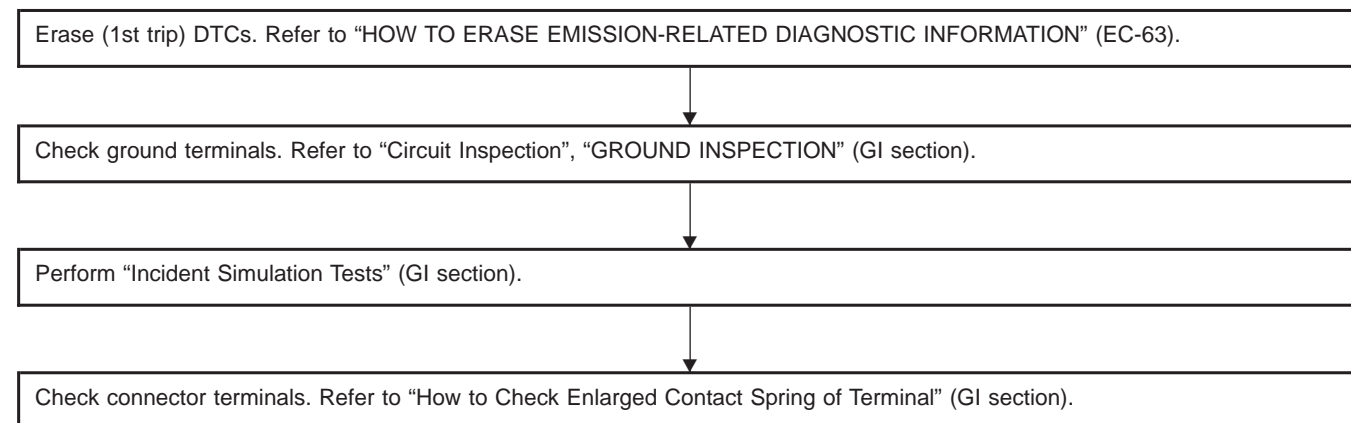
STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "1t".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not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

EM

LC

EC

Diagnostic Procedure



FE

AT

PD

FA

RA

BR

ST

RS

BT

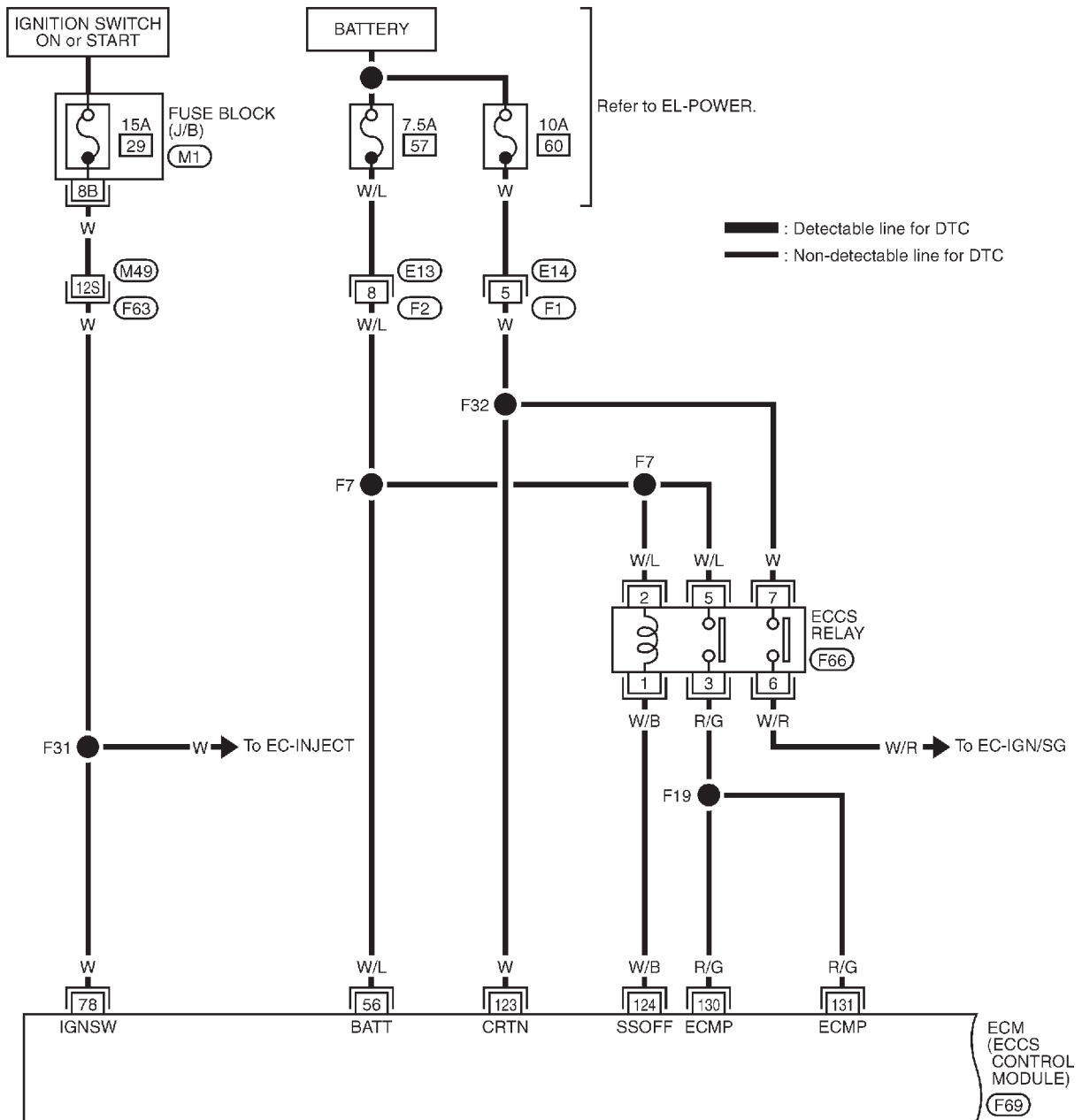
HA

EL

IDX

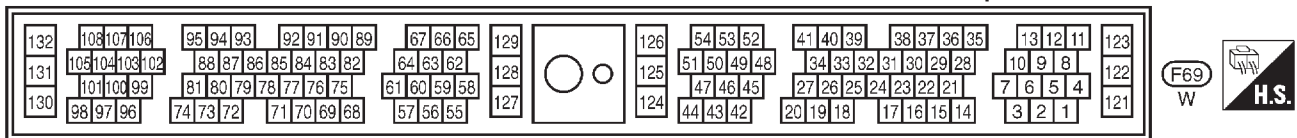
Main Power Supply and Ground Circuit

EC-MAIN-01



Refer to last page (Foldout page).

M49, F63, M1

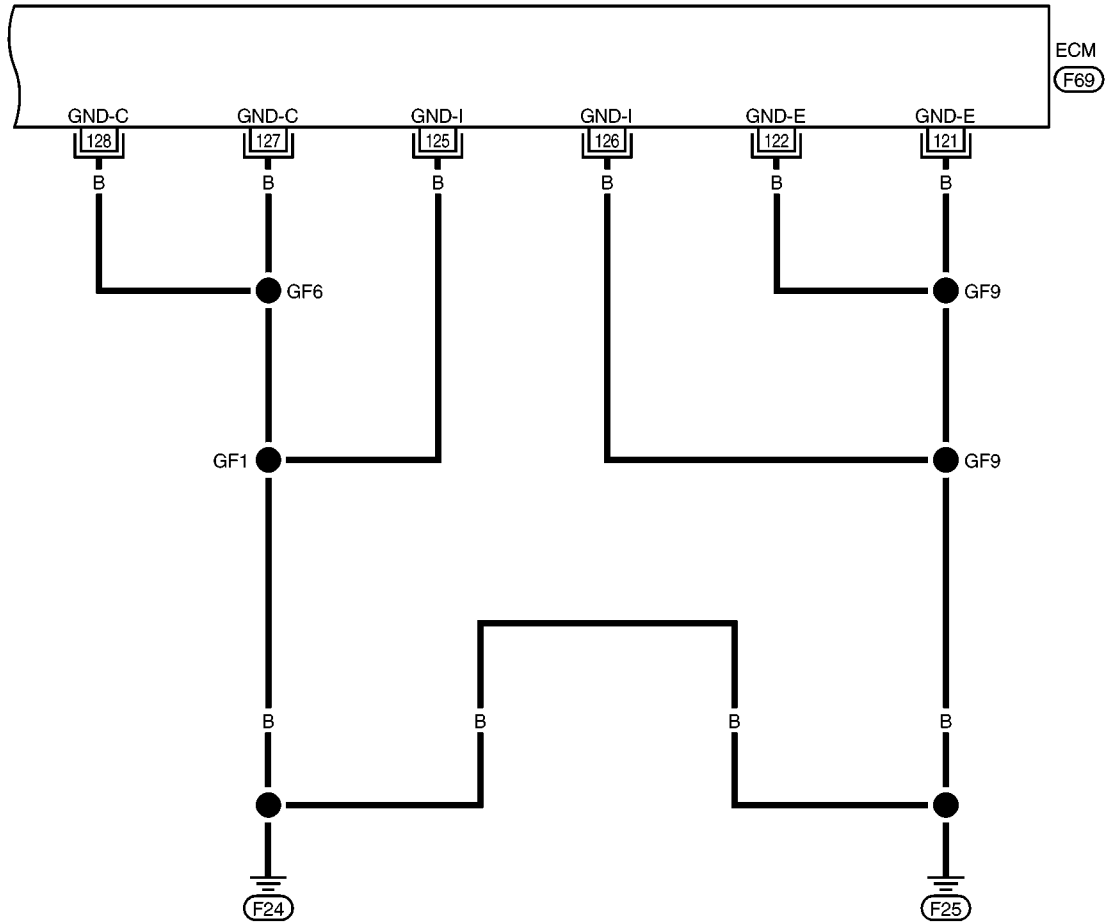


TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02

: Detectable line for DTC
 : Non-detectable line for DTC



- GI
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- EM
- LC
- EC**
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- AT
- PD
- FA
- RA
- BR
- ST
- RS
- BT
- HA
- EL
- IDX

132	108	107	106	95	94	93	92	91	90	89	67	66	65	129	126	54	53	52	41	40	39	38	37	36	35	13	12	11	123		
131	105	104	103	102	88	87	86	85	84	83	82	64	63	62	128	125	51	50	49	48	34	33	32	31	30	29	28	10	9	8	122
130	101	100	99	81	80	79	78	77	76	75	61	60	59	58	127	124	47	46	45	27	26	25	24	23	22	21	7	6	5	4	121
	98	97	96	74	73	72	71	70	69	68	57	56	55			44	43	42	20	19	18	17	16	15	14	3	2	1			



TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
56	W/L	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
121	B	ECM ground	Engine is running. └ Idle speed	Engine ground
122	B	ECM ground	Engine is running. └ Idle speed	Engine ground
123	W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
124	W/B	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
125	B	ECM ground	Engine is running. └ Idle speed	Engine ground
127	B	ECM ground	Engine is running. └ Idle speed	Engine ground
128	B	ECM ground	Engine is running. └ Idle speed	Engine ground
130 131	R/G	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

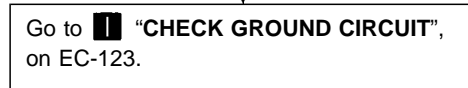
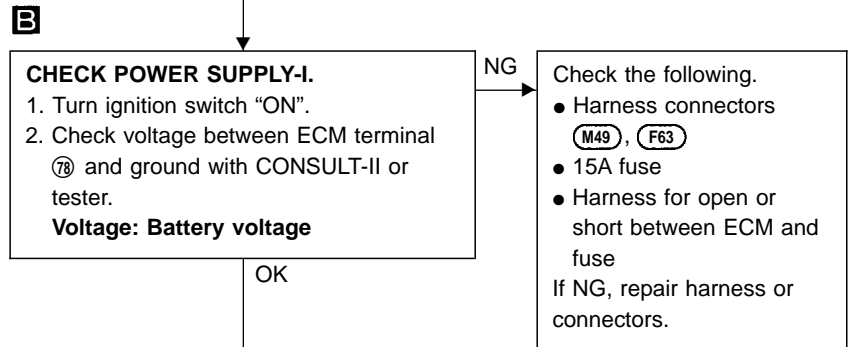
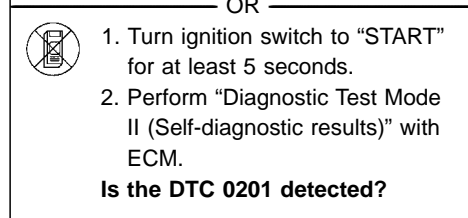
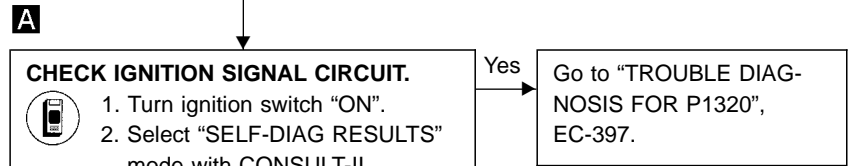
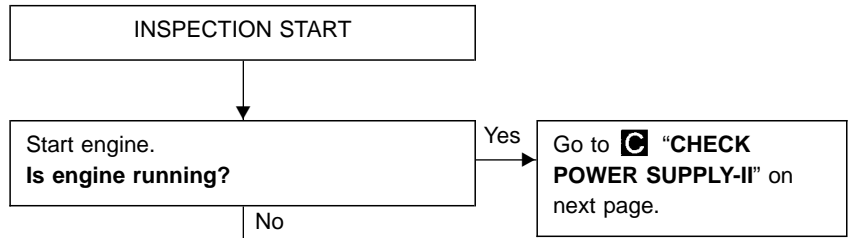
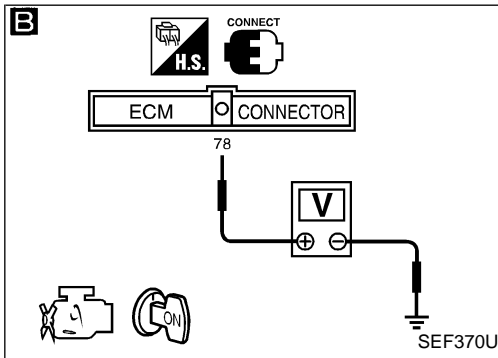
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

A

SELF DIAG RESULTS	
FAILURE DETECTED	TIME
IGN SIGNAL-PRIMARY [P1320]	0

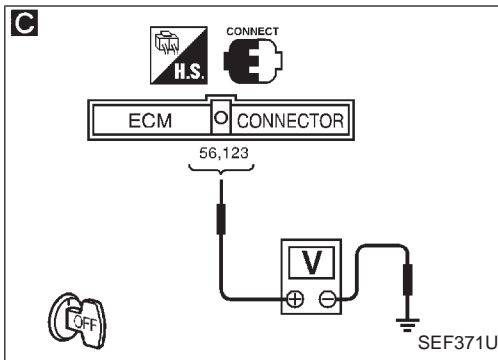
SEF961X



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TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)



C

CHECK POWER SUPPLY-II.

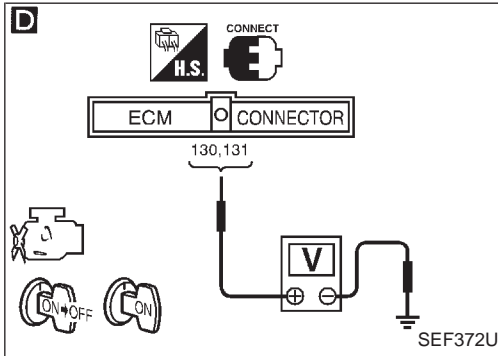
1. Stop engine.
2. Check voltage between ECM terminals ⑤, ⑫③ and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

- Harness connectors ②, ⑬③
- Harness connectors ①, ⑭④
- 7.5A fuse
- 10A fuse
- Harness for open or short between ECM and battery

If NG, repair harness or connectors.



D

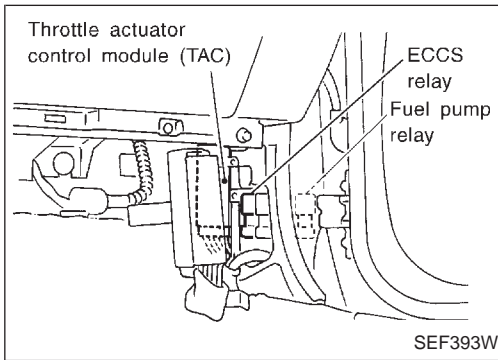
CHECK POWER SUPPLY-III.

1. Turn ignition switch "ON" and then turn "OFF".
2. Check voltage between ECM terminals ⑬⑦, ⑬⑧ and ground with CONSULT-II or tester.

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

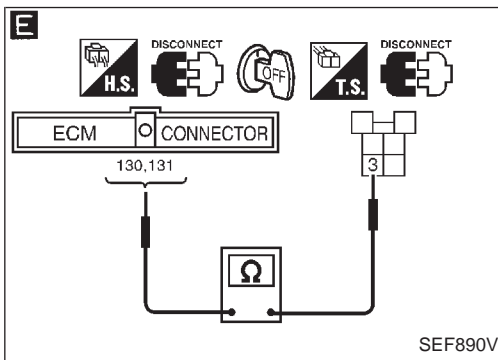
OK → Go to **H** "CHECK ECSS RELAY" on next page.

Case-1: Battery voltage does not exist.
 Case-2: Battery voltage exists for more than a few seconds.



NG → Case-1 → Go to **H** "CHECK ECSS RELAY" on next page.

Case-2 → Go to **H** "CHECK ECSS RELAY" on next page.



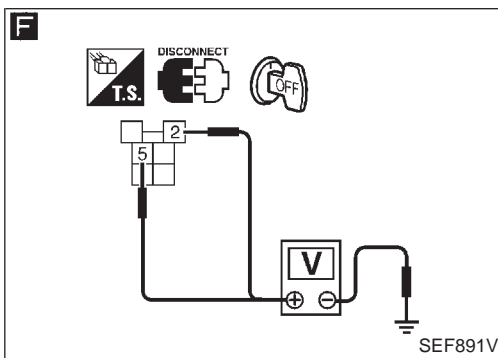
E

CHECK HARNESS CONTINUITY BETWEEN ECSS RELAY AND ECM.

1. Disconnect ECM harness connector.
2. Disconnect ECSS relay.
3. Check harness continuity between ECM terminals ⑬⑦, ⑬⑧ and terminal ③.

Continuity should exist.
 If OK, check harness for short to ground and short to power.

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



F

CHECK VOLTAGE BETWEEN ECSS RELAY AND GROUND.

1. Check voltage between terminals ②, ⑤ and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

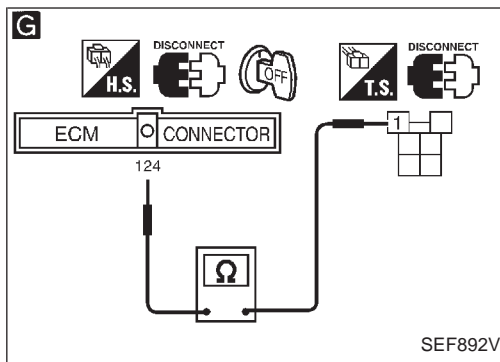
- Harness for open or short between ECSS relay and harness connector ②

If NG, repair harness or connectors.

OK → (A)
 (Go to next page.)

TROUBLE DIAGNOSIS FOR POWER SUPPLY

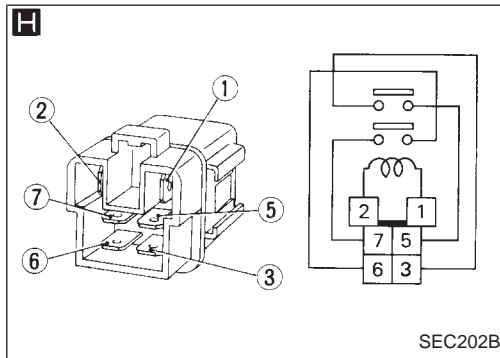
Main Power Supply and Ground Circuit (Cont'd)



G

CHECK OUTPUT SIGNAL CIRCUIT.
 1. Check harness continuity between ECM terminal (124) and relay terminal (1).
Continuity should exist.
 If OK, check harness for short to ground and short to power.

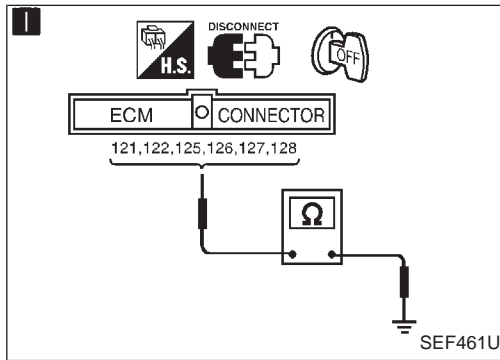
NG → Repair open circuit or short to ground or short to power in harness or connectors.



H

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

NG → Replace ECCS relay.



I

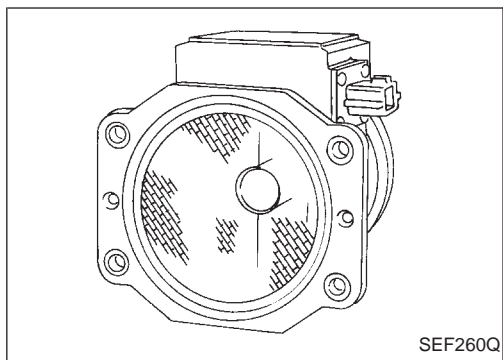
CHECK GROUND CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Loosen and retighten engine ground screws.
 3. Disconnect ECM harness connector.
 4. Check harness continuity between ECM terminals (121), (122), (125), (126), (127), (128) and engine ground.
Continuity should exist.
 If OK, check harness for short to ground and short to power.

NG → Check the following.
 • Harness connectors (F61), (F62)
 • Harness for open or short between engine grounds (F24) and (F25)
 If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK → Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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Mass Air Flow Sensor (MAFS)

COMPONENT DESCRIPTION

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

Therefore, the ECM must supply more electric current to the hot film as air flow increases. This maintains the temperature of the hot film. The ECM detects the air flow by means of this current change.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	1.0 - 1.7V
	2,500 rpm	Approximately 2.1V
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	13.0 - 32%
	2,500 rpm	13.0 - 25.5%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	3.0 - 6.0 g·m/s
	2,500 rpm	12.9 - 25.3 g·m/s

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
65	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.4V
			Engine is running. (Warm-up condition) └ Engine speed is 2,500 rpm.	Approximately 2.1V
62	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V

ON BOARD DIAGNOSTIC LOGIC

Diagnostic Trouble Code 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.*	<ul style="list-style-type: none"> ● 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 conditions.	
	B) An excessively low voltage from the sensor is sent to ECM* when engine is running.	<ul style="list-style-type: none"> ● 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 conditions.	

*: When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up. (Refer to EC-98.)

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
--	---

TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first.

If 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B".

If there is problem in "Procedure for malfunction B", perform "Procedure for malfunction C". If there is no problem on "Procedure for malfunction C", perform "Procedure for malfunction D".

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
INT/A TEMP SE	XXX °C

SEF740X

Procedure for malfunction A

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-129.

OR

Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V

SEF741X

Procedure for malfunction B

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-129.

OR

Follow the procedure "With CONSULT-II" above.

Mass Air Flow Sensor (MAFS) (Cont'd)

Procedure for malfunction C

NOTE:

If the engine will not start or stop soon, wait at least 10 seconds with engine off (ignition switch "ON"), instead of running engine at idle speed.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Wait at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-130.

OR



Follow the procedure "With CONSULT-II" above.

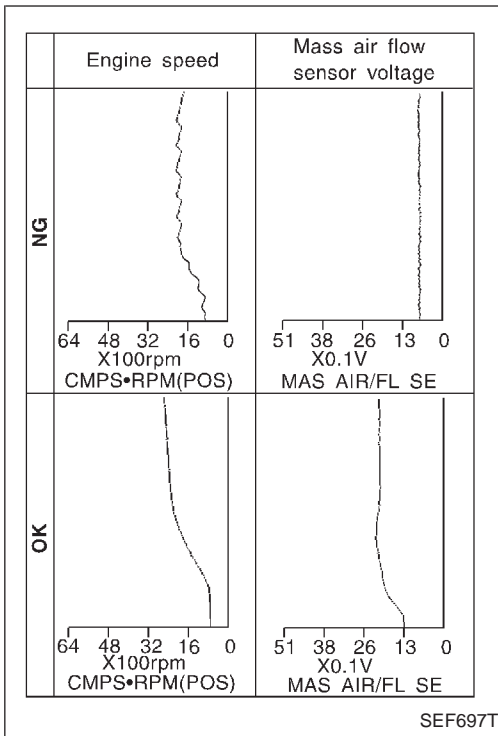
DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

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TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd)

Procedure for malfunction D



- 1) Turn ignition switch "ON".
- 2) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
If engine cannot be started, go to "DIAGNOSTIC PROCEDURE, EC-129."
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 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-129.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.
CMPS•RPM (POS): 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-130.

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CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

OVERALL FUNCTION CHECK

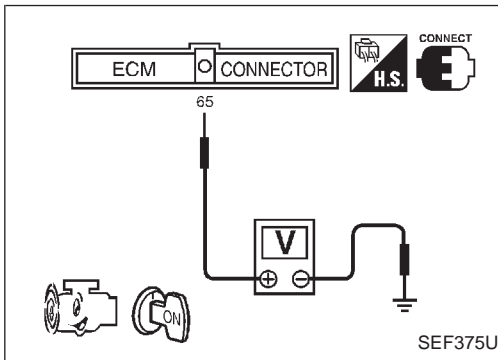
Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Procedure for malfunction D



- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature.
- 3) Select "MODE 1" with GST.
- 4) Check the mass air flow with "MODE 1".
- 5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-130.

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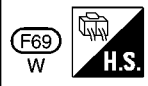
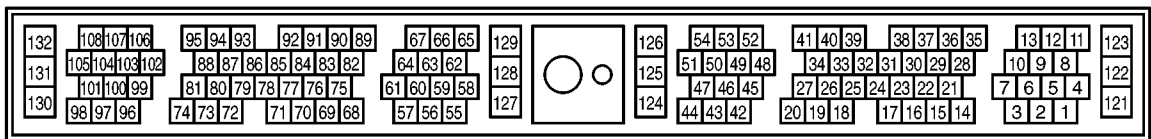
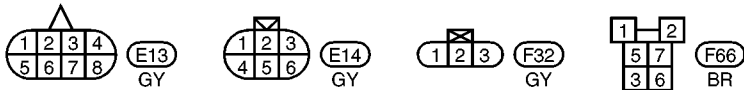
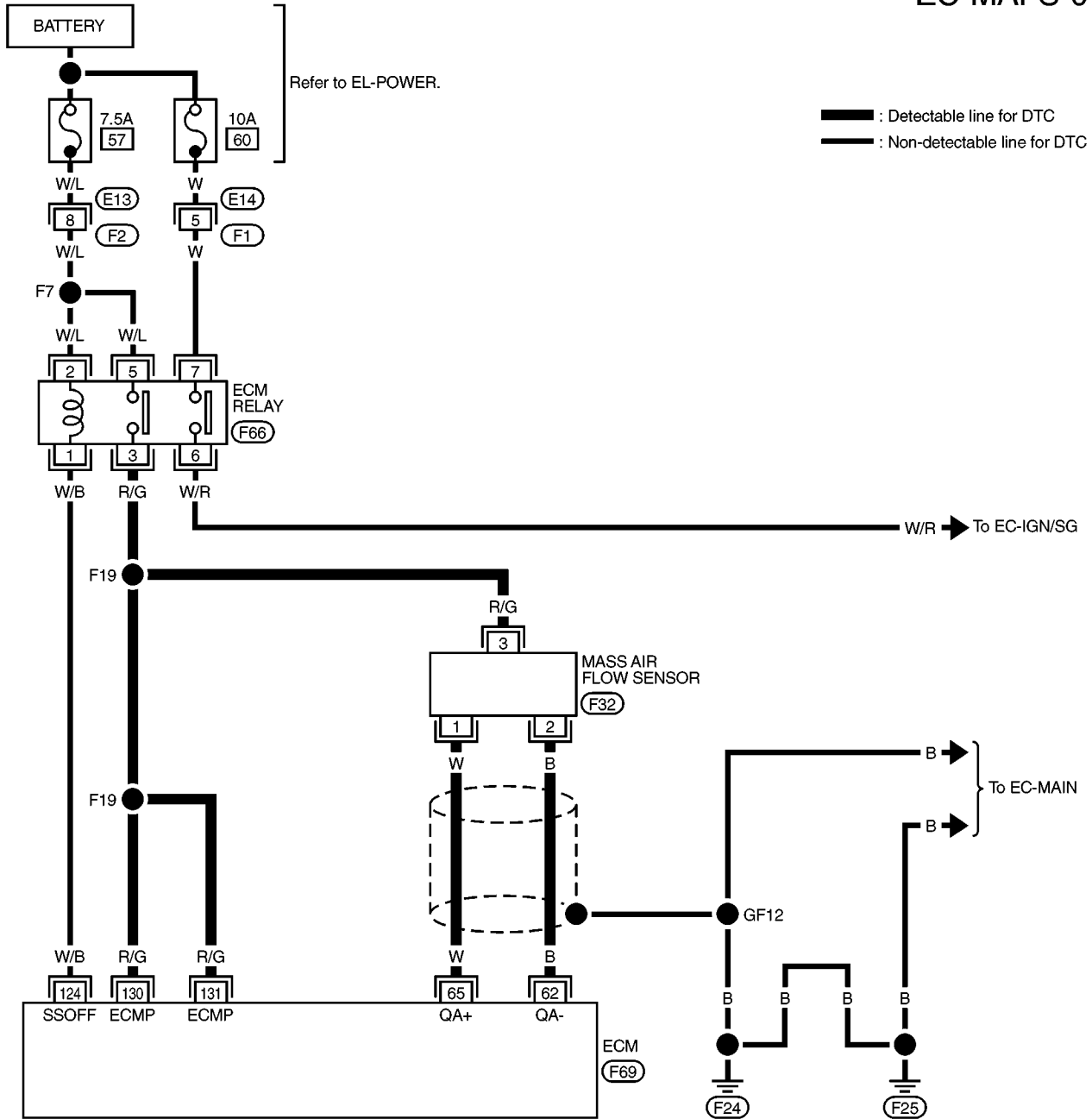
- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature.
- 3) Check the voltage between ECM terminal ⑥5 and ground.
- 4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-130.

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TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd)

EC-MAFS-01



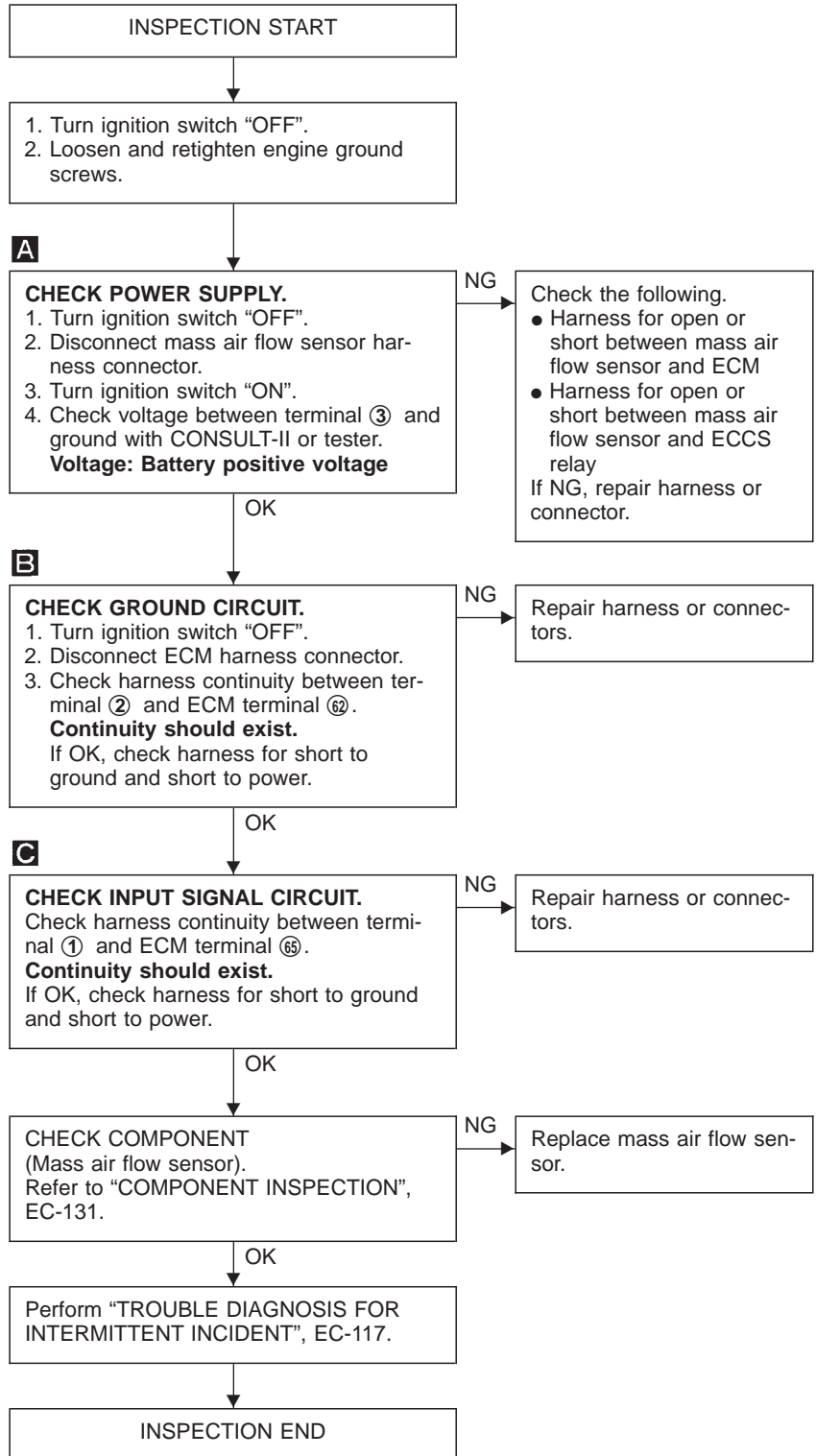
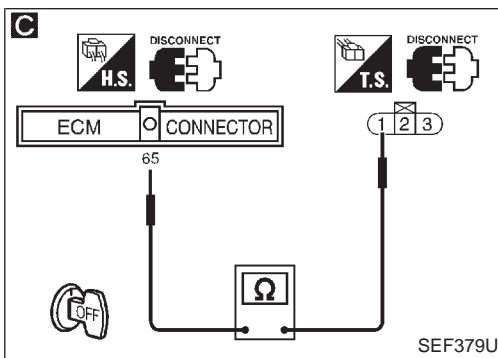
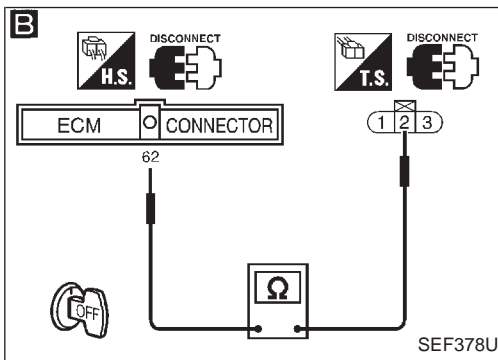
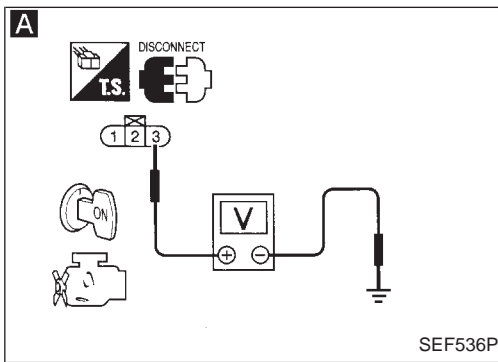
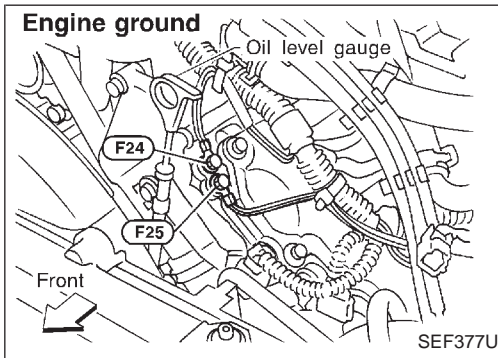
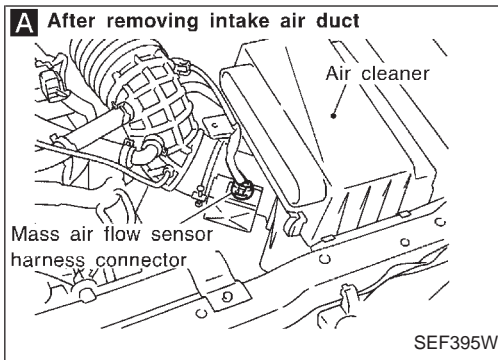
TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd)

DIAGNOSTIC PROCEDURE

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 or D", perform "Procedure B" on next page.

Procedure A

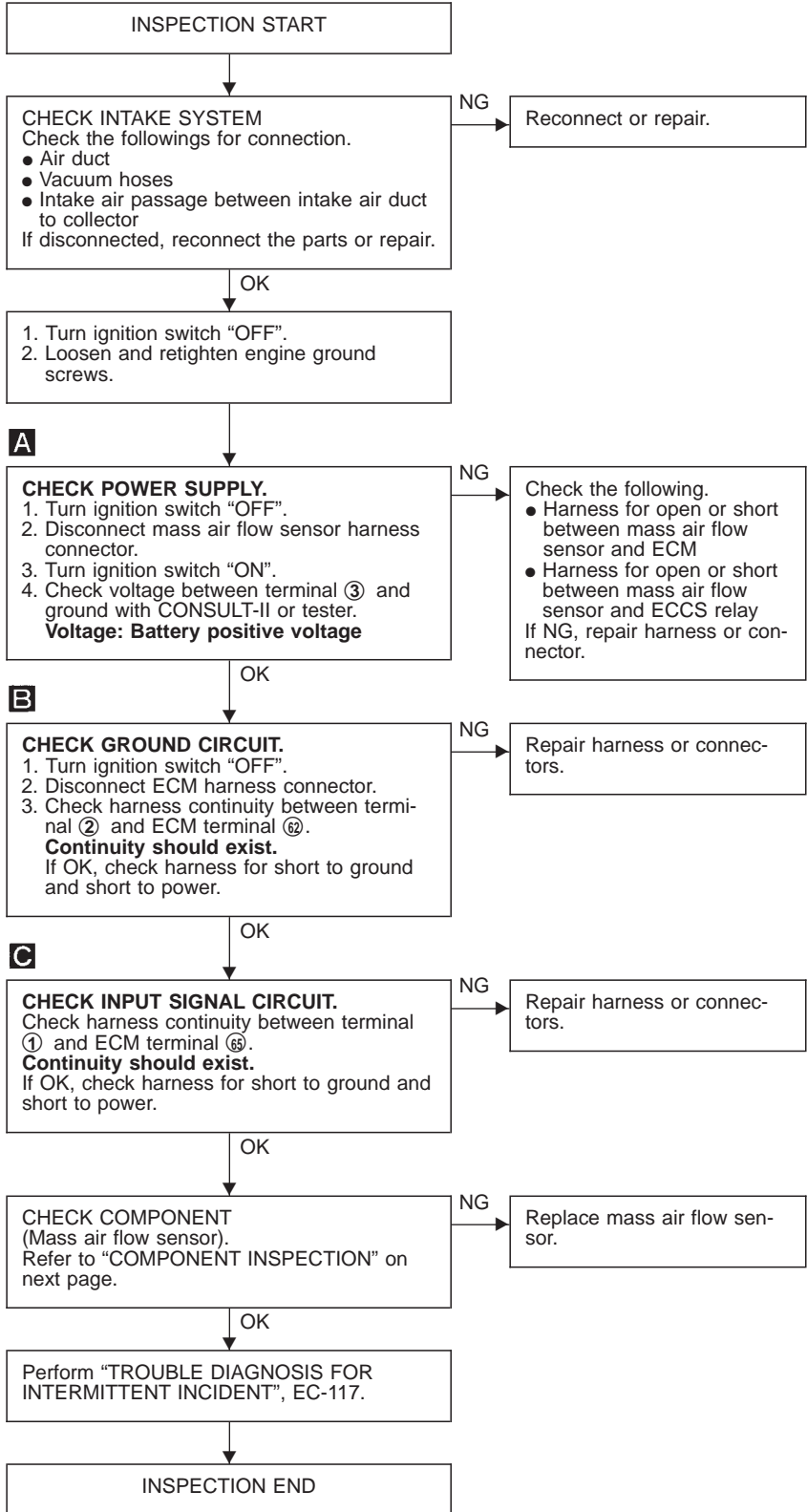
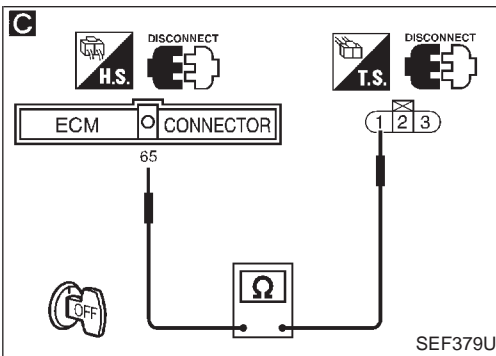
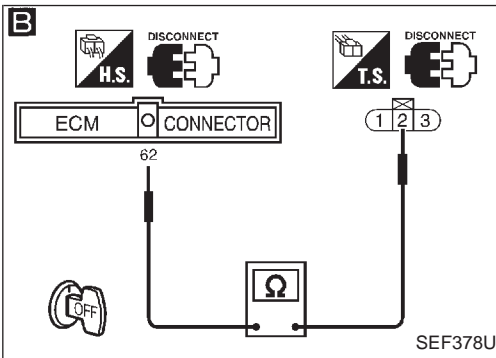
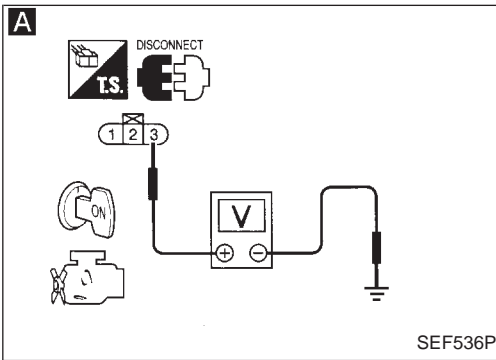
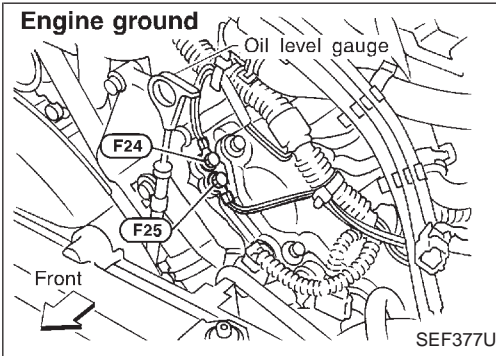
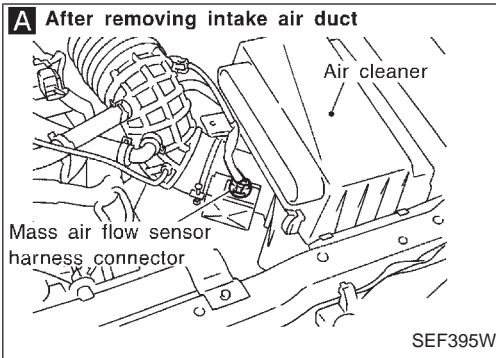


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TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd)

Procedure B

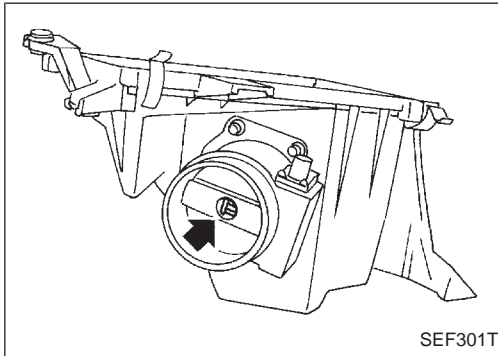
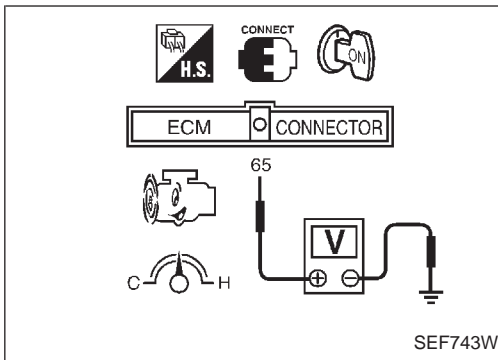


TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (Cont'd) COMPONENT INSPECTION

Mass air flow sensor

1. Turn ignition switch "ON".
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 65 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	Approximately 2.1
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increase 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. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.

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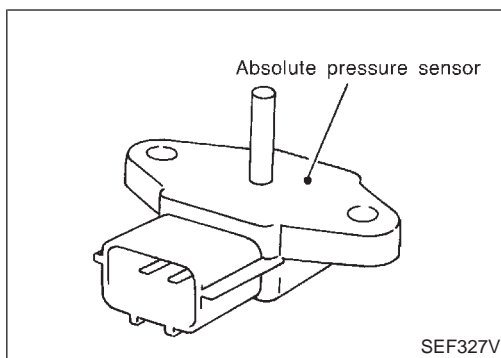
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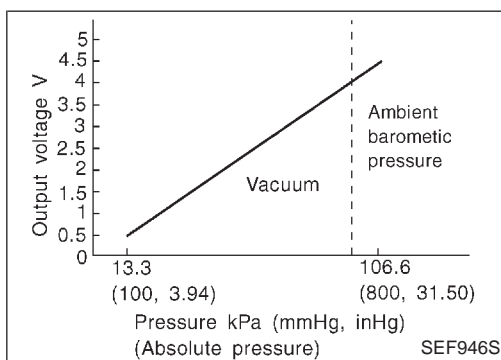
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Absolute Pressure Sensor

COMPONENT DESCRIPTION

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 pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.



ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Absolute pressure sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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 "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

CAUTION:

Always drive vehicle at a safe speed.

Absolute Pressure Sensor (Cont'd)

Procedure for malfunction A

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-136.

Follow the procedure "With CONSULT-II" above.

Procedure for malfunction B

- 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-II.
- 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-138.

Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

SEF736X

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec
ABSOL PRES/SE	XXX V

SEF743X

Procedure for malfunction C

CAUTION:

Always drive vehicle at a safe speed.

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
The voltage of "ABSOL PRES/SE" should be more than 1.74 [V].
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-136. If the check result is OK, go to following step.
- 3) Start engine (TCS switch "OFF") 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-II.
- 7) Drive the vehicle at least 3 consecutive seconds under the following conditions,

B/FUEL SCHDL: More than 5.6 ms

CMPS-RPM (POS): 3,000 - 4,800 rpm

Selector lever: Suitable position

Driving location: Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

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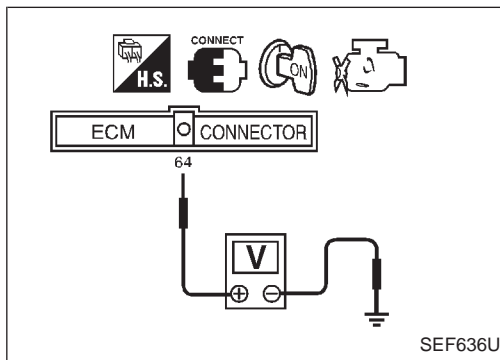
TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

- 8) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-138.

ENGINE SPD	0RPM
COOLANT TEMP	69°C
VEHICLE SPD	0MPH
IGN ADVANCE	3.0°
CALC LOAD	0.0%
MAP	101KPaA
MAF	0.25gm/s
THROTTLE POS	0.0%
INTAKE AIR	27°C
FUEL SYS #1	OL
FUEL SYS #2	UNUSED
SHORT FT #1	0.0%
LONG FT #1	0.0%
O2S B1 S1	0.000V
O2FT B1 S1	0.0%
O2S B1 S2	0.000V

SEF518R



OR

OVERALL FUNCTION CHECK

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.



- 1) Turn ignition switch "ON".
- 2) Select "MAP" in "MODE 1" with GST.
- 3) Make sure that the pressure of "MAP" is more than 46 kPa (0.47 kg/cm², 6.7 psi).
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-138.

OR

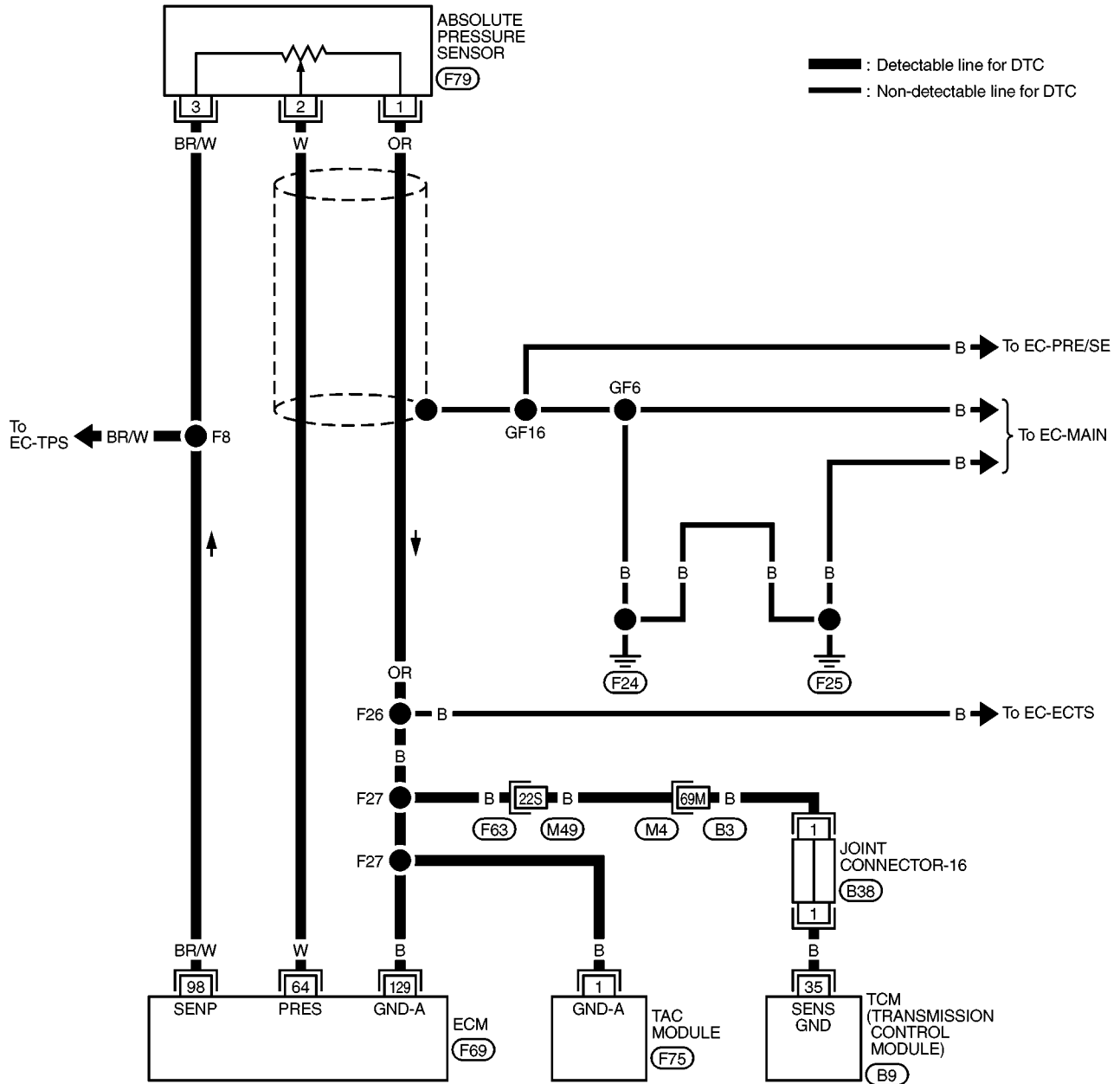


- 1) Turn ignition switch "ON".
- 2) Make sure that the voltage between ECM terminal ⑥4 and engine ground is more than 1.74 [V].
- 3) If NG, go to "DIAGNOSTIC PROCEDURE", EC-138.

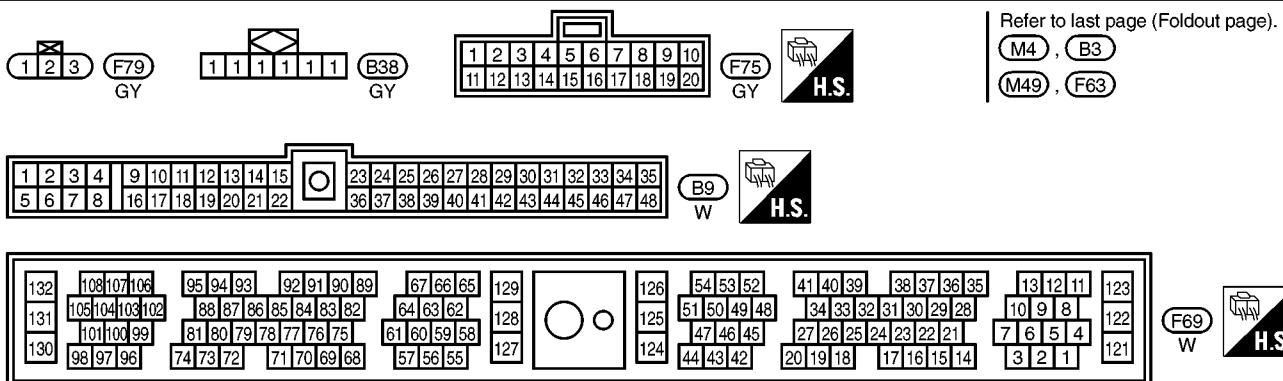
TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

EC-AP/SEN-01



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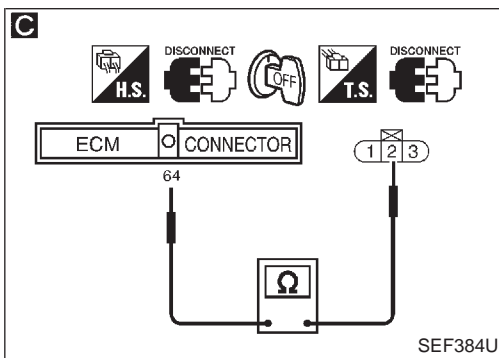
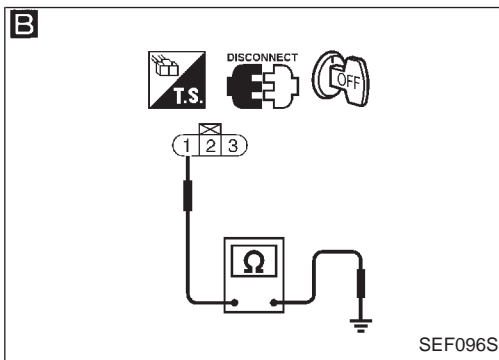
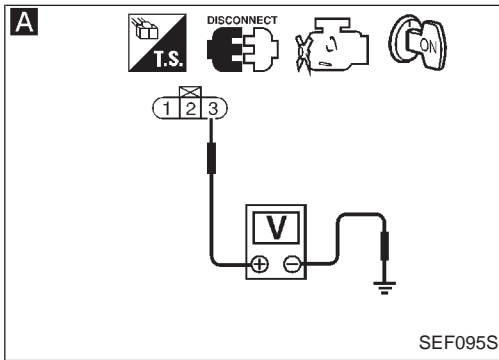
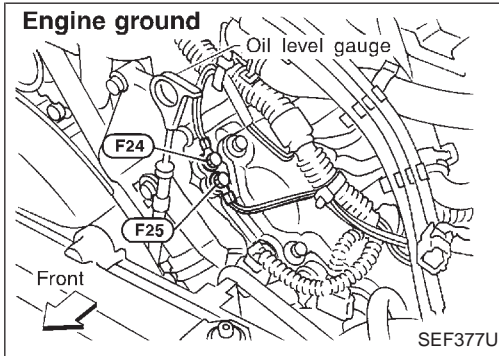
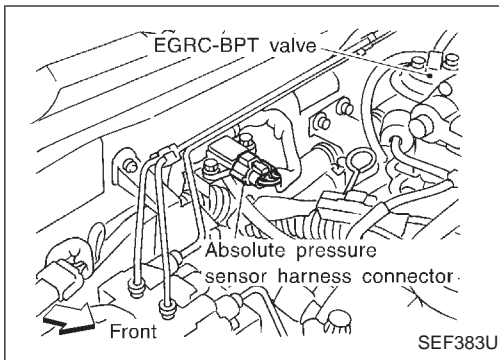
TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

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" on next page.

Procedure A



INSPECTION START

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

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect absolute pressure sensor harness connector.
3. Check sensor connector for water. **Water should not exist.** If OK, go to step 4. If NG, repair or replace harness connector.
4. Turn ignition switch "ON".
5. Check voltage between terminal ③ and engine ground with CONSULT-II or tester. **Voltage: Approximately 5V**

NG

Check the following.

- Harness for open or short between ECM and absolute pressure sensor

If NG, repair or replace harness or connectors.

B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ① and engine ground. **Continuity should exist.** If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F63), (M49)
- Harness connectors (M4), (B3)
- Joint connector-16
- Harness for open or short between ECM and absolute pressure sensor
- Harness for open or short between TCM (Transmission control module) and absolute pressure sensor
- Harness for open or short between absolute pressure sensor and TAC module

If NG, repair open circuit or short to ground or short to power in harness or connectors.

C

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ④ and terminal ②. **Continuity should exist.** If OK, check harness for short to ground and short to power.

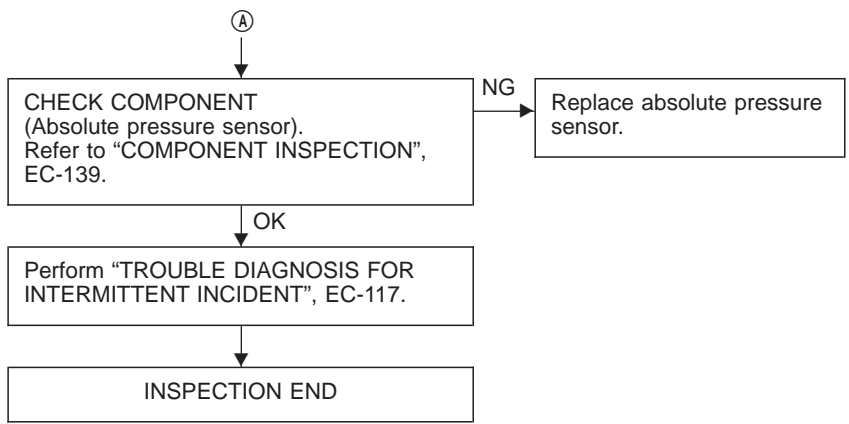
NG

Repair harness or connectors.

OK

(Go to next page.)

Absolute Pressure Sensor (Cont'd)



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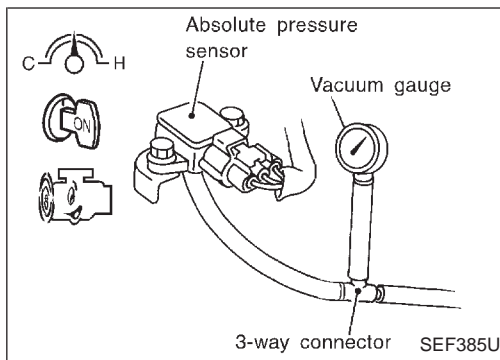
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TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)

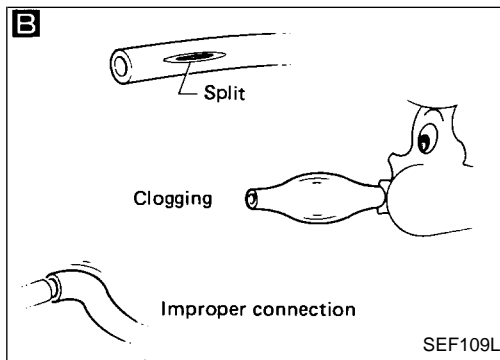
Procedure B



A

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF761X



INSPECTION START

A

CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR.

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Connect MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has vacuum gauge.
4. Turn ignition switch "ON".
5. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
6. Start engine and let it idle.
7. Touch "MAP" and "BARO" alternately and check for vacuum.

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

OR

4. Turn ignition switch "ON".
5. Start engine and check for vacuum.
For 5 seconds after starting engine:
Vacuum should not exist.
6. More than 5 seconds after starting engine.
Vacuum should exist.

NG → CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks, disconnection or improper connection.
If NG, repair or replace the hose.

OK → Check vacuum port for clogging.
If NG, clean it.

OK → CHECK COMPONENT (MAP/BARO switch solenoid valve).
Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P1105", EC-356.

OK →

NG → Replace MAP/BARO switch solenoid valve.

CHECK INTAKE SYSTEM.
Check intake system for air leaks.

B

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

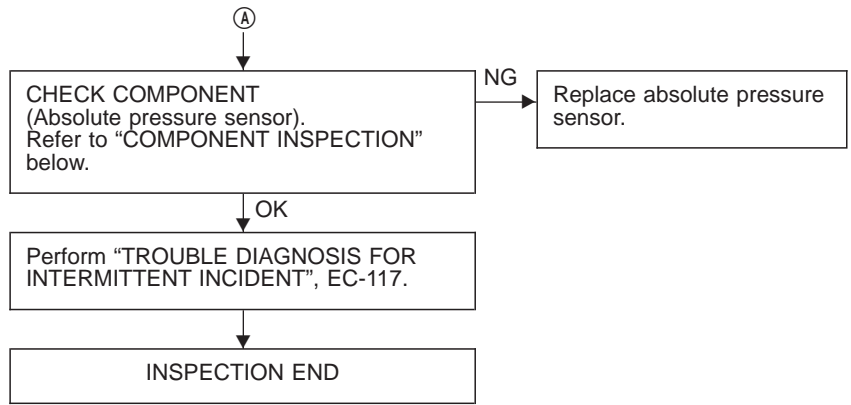
1. Turn ignition switch "OFF".
2. Check hose for clogging, cracks, disconnection or improper connection.

NG → Repair or reconnect hose.

OK → (Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0105

Absolute Pressure Sensor (Cont'd)



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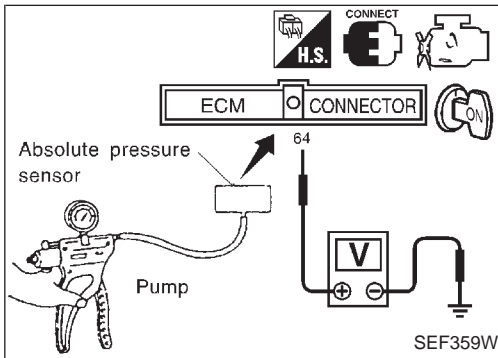
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COMPONENT INSPECTION

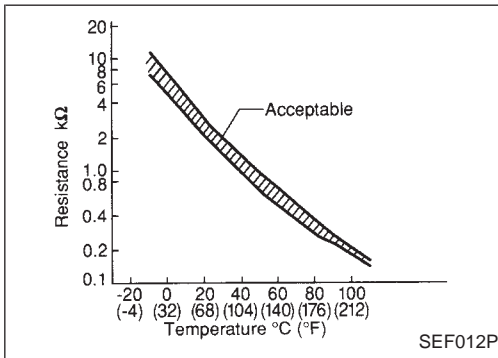
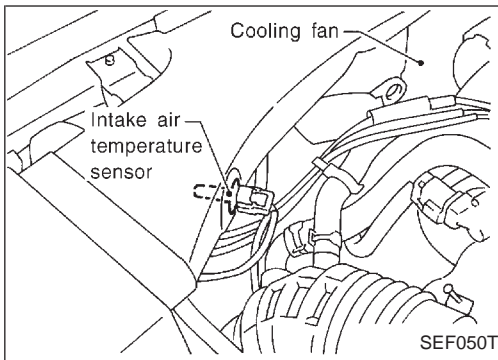
Absolute pressure sensor

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 terminal 64 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.

TROUBLE DIAGNOSIS FOR DTC P0110



Intake Air Temperature Sensor

COMPONENT DESCRIPTION

The intake air temperature sensor is mounted to the intake air duct. 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 ⑥ (Intake air temperature sensor) and ECM terminal ⑫ (ECM ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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. B) Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor

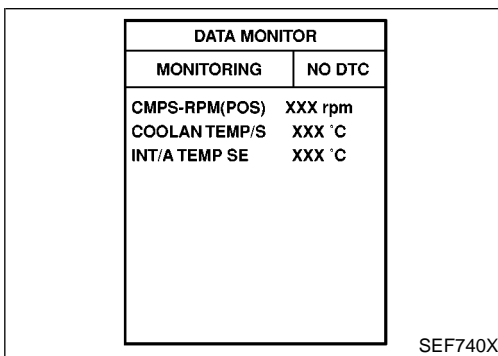
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first.

If 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-143.

OR
 Follow the procedure "With CONSULT-II" above.

TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

Procedure for malfunction B

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.

DATA MONITOR	
MONITORING	NO FAIL
COOLANT TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PEF233U

FUEL SYS #1	OPEN
FUEL SYS #2	OPEN
CALC LOAD	0%
COOLANT TEMP	31°C
SHORT FT #1	0%
LONG FT #1	0%
SHORT FT #2	0%
LONG FT #2	0%
ENGINE SPD	0RPM
VEHICLE SPD	0MPH
IGN ADVANCE	1.0°
INTAKE AIR	25°C

SEF549P



- 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-II.
 - (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-II.
- 4) Start engine and turn TCS switch "OFF".
- 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-143.

OR



Follow the procedure "With CONSULT-II" above.

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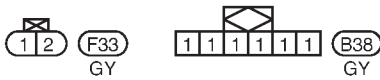
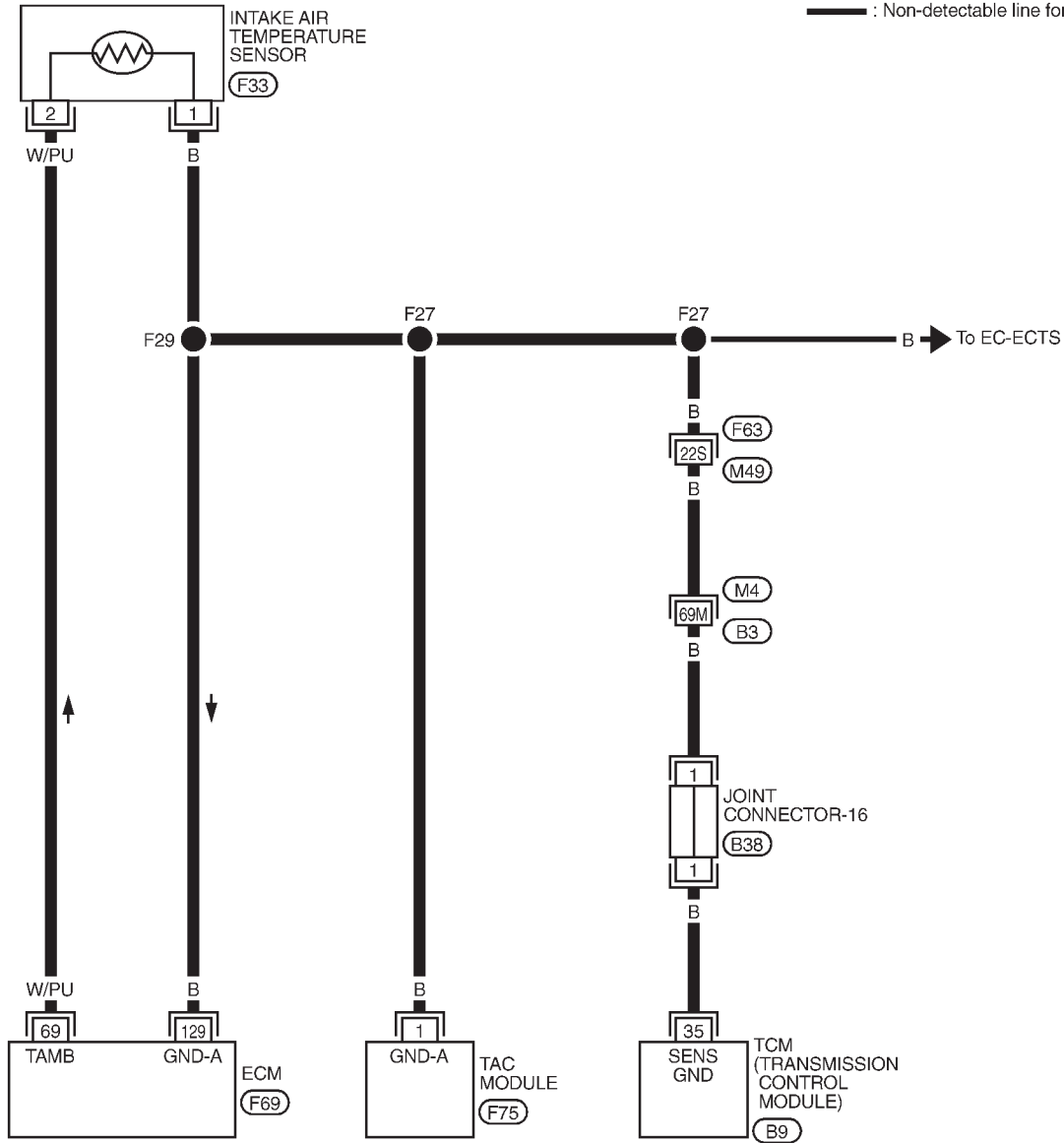
IDX

TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

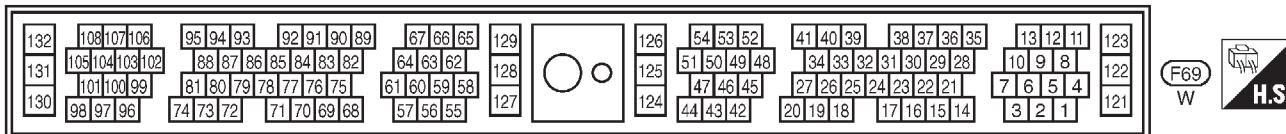
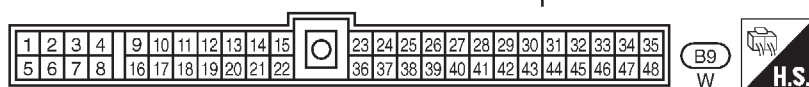
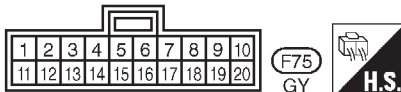
EC-IATS-01

—— : Detectable line for DTC
—— : Non-detectable line for DTC



Refer to last page (Foldout page).

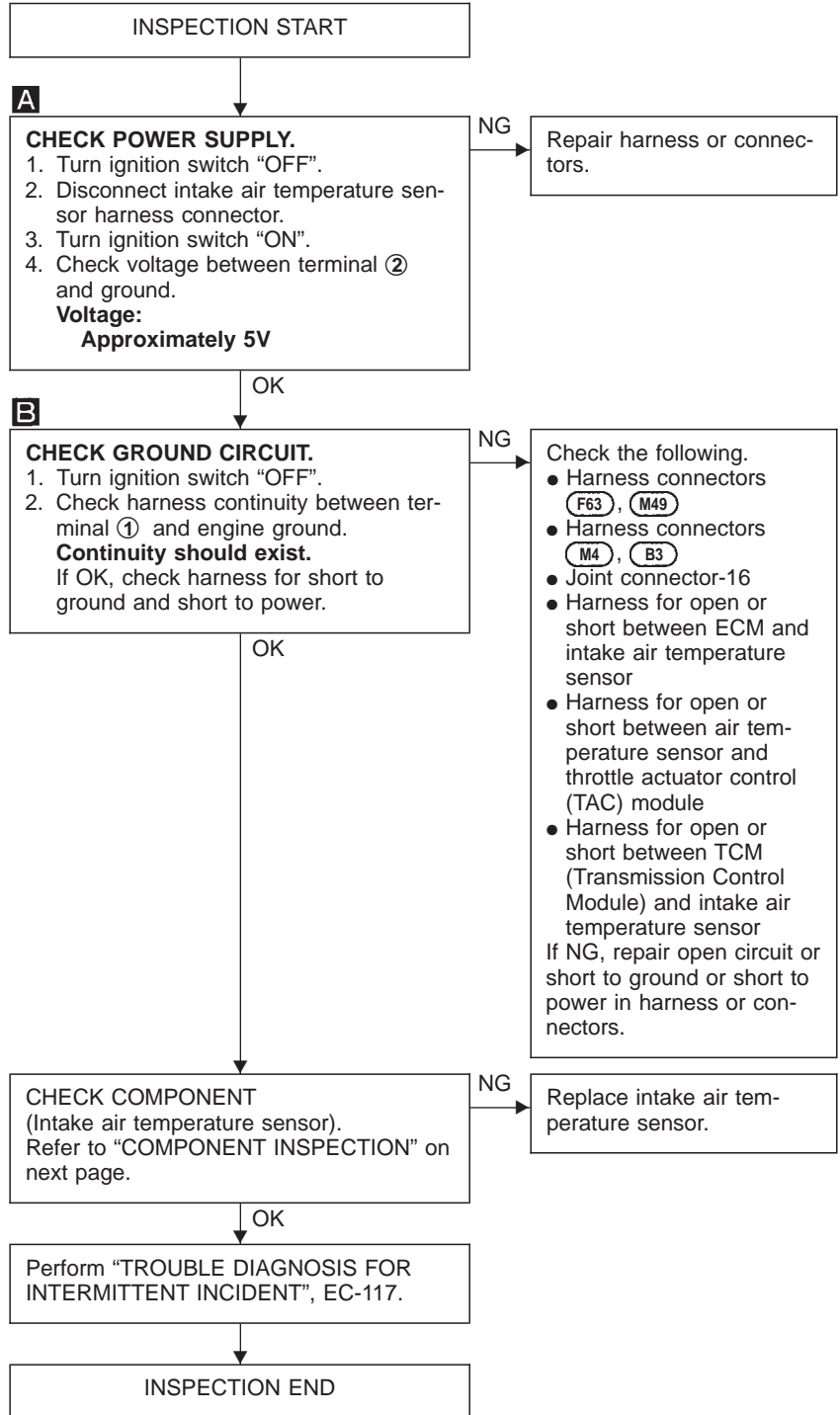
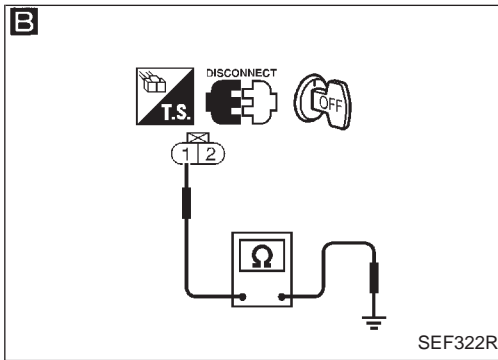
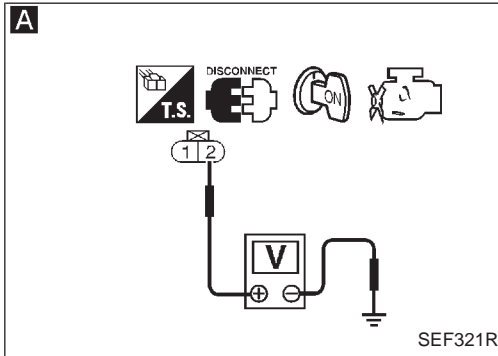
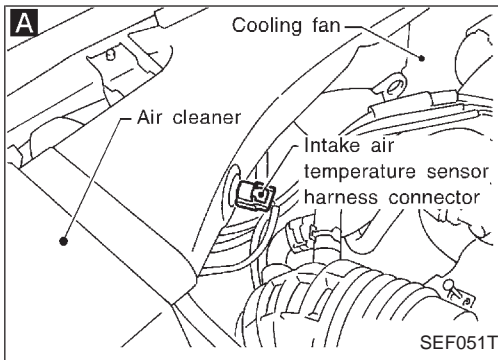
M4 , B3
 M49 , F63



TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



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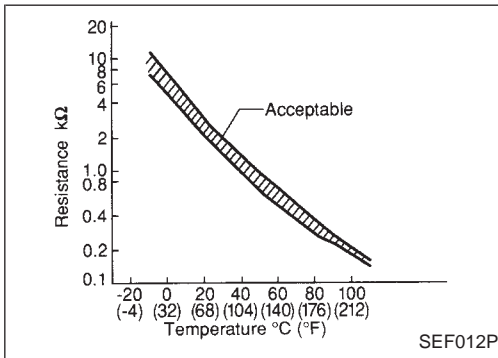
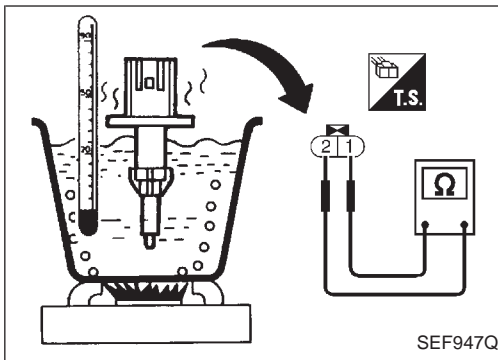
TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (Cont'd)

COMPONENT INSPECTION

Intake air temperature sensor

Check resistance as shown in the figure.

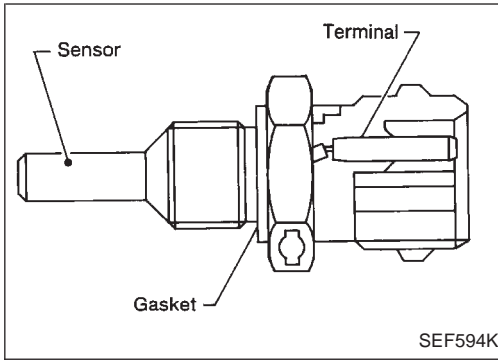


<Reference data>

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.

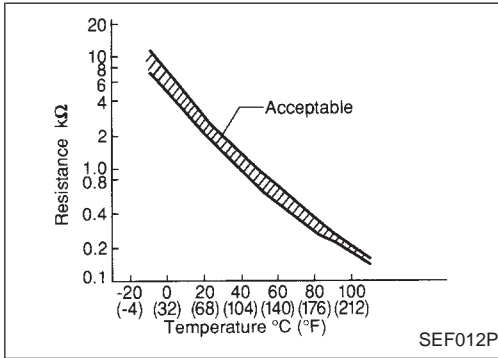
TROUBLE DIAGNOSIS FOR DTC P0115



Engine Coolant Temperature Sensor (ECTS)

COMPONENT DESCRIPTION

The engine coolant temperature sensor is located near the No. 2 injector. The 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)	1.0	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 67 (Engine coolant temperature sensor) and ECM terminal 128 (ECM ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115 0103	<ul style="list-style-type: none"> An excessively high or low voltage from the sensor is sent to ECM.* 	<ul style="list-style-type: none"> 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.

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

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DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
INT/A TEMP SE	XXX °C

SEF740X

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-148.

OR

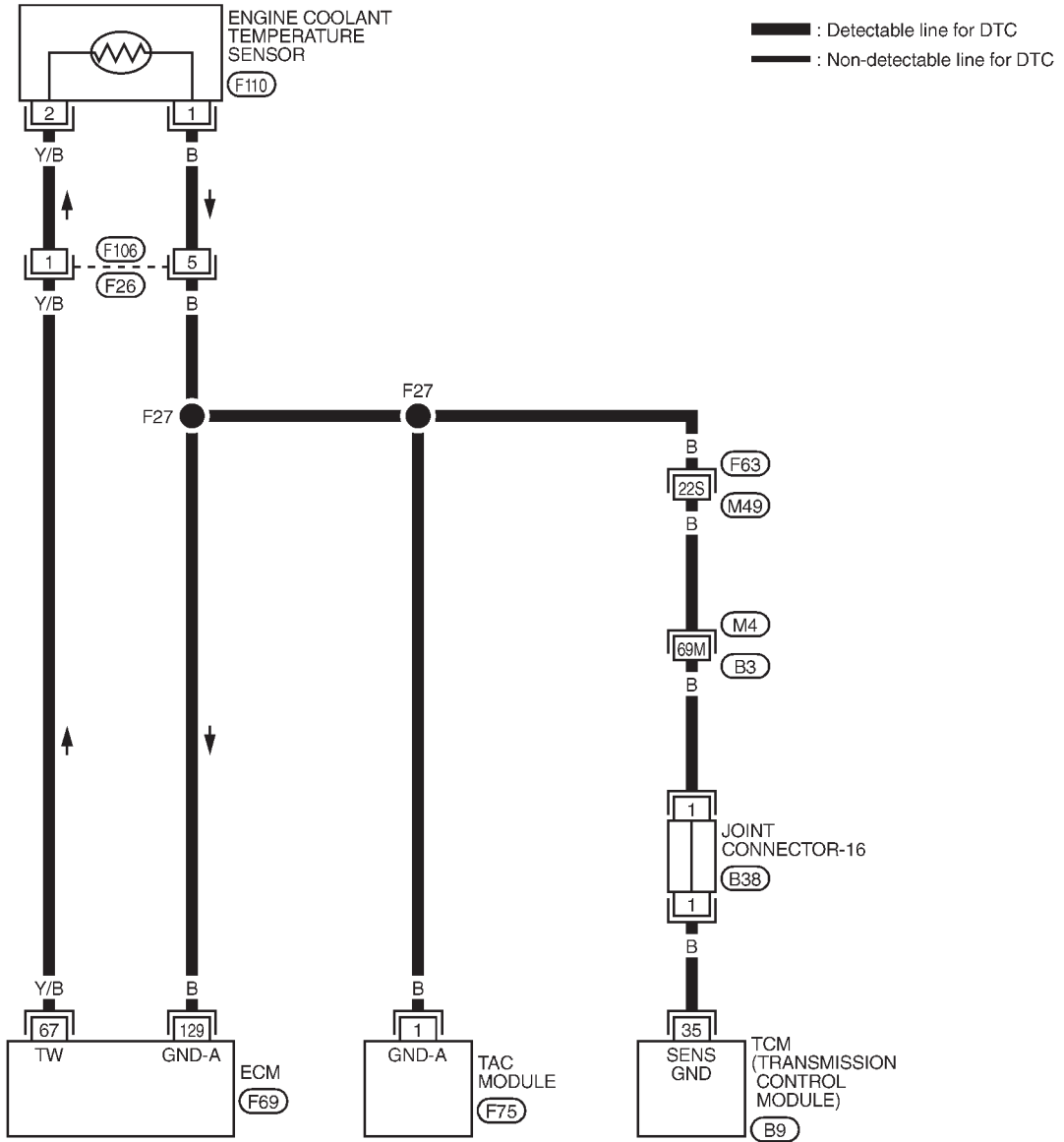


Follow the procedure "With CONSULT-II" above.

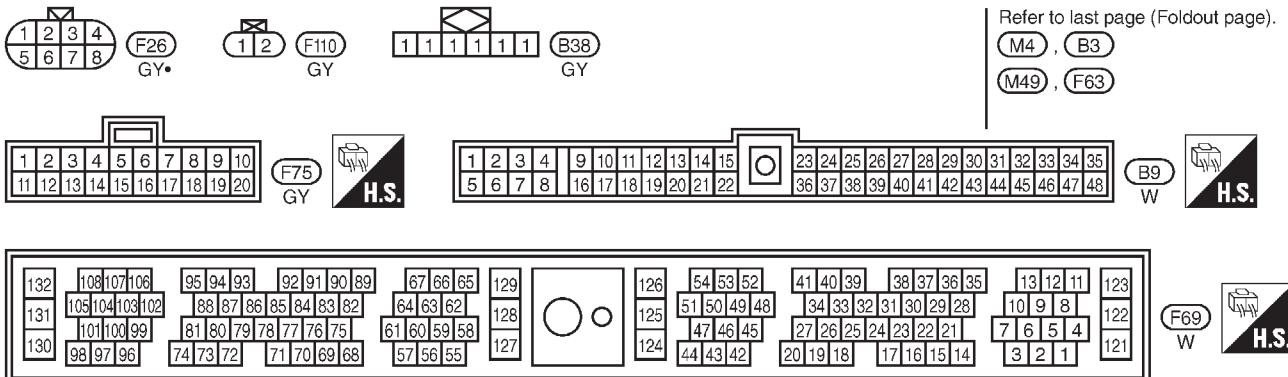
TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

EC-ECTS-01



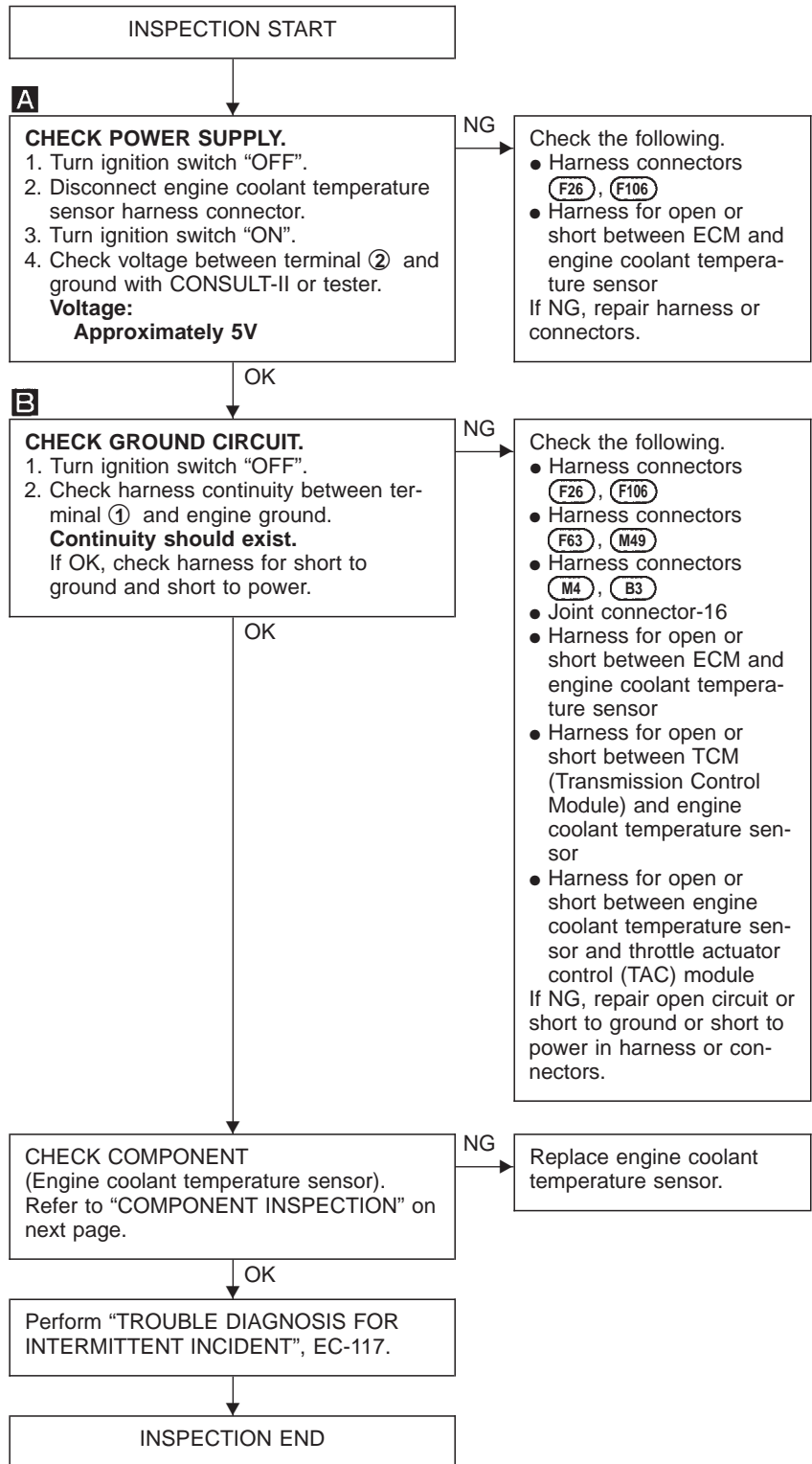
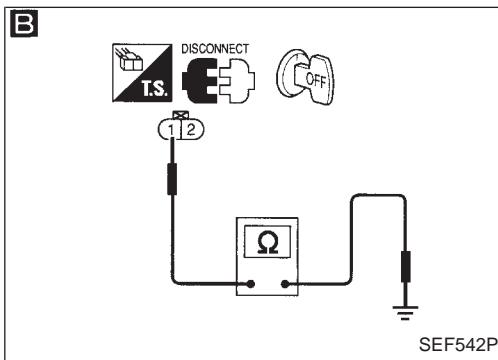
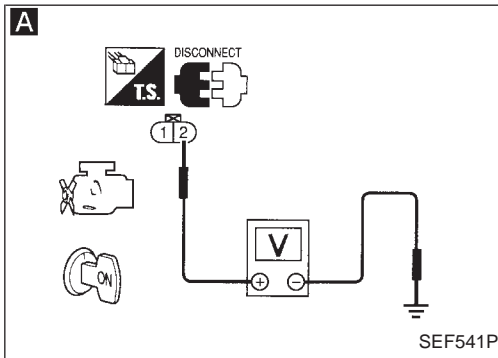
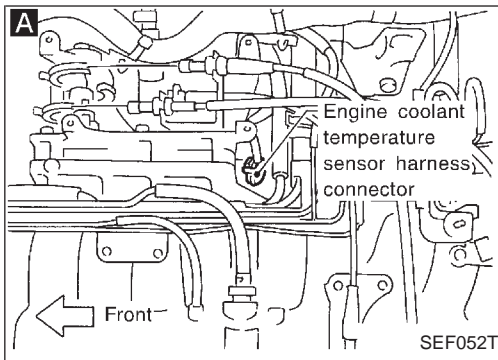
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TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

DIAGNOSTIC PROCEDURE



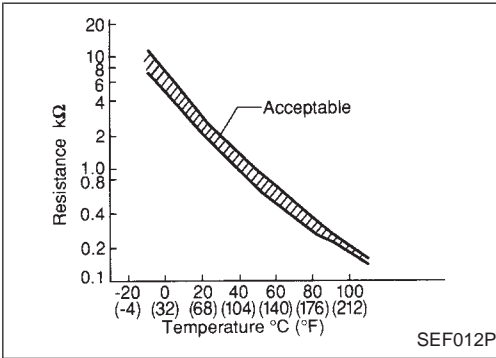
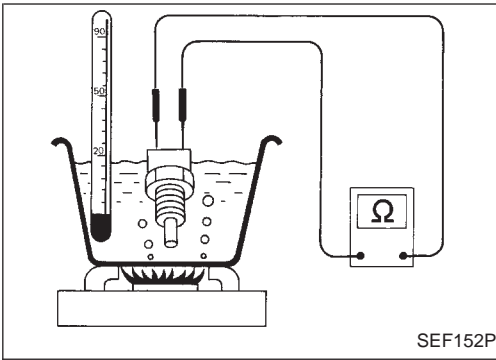
TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

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.

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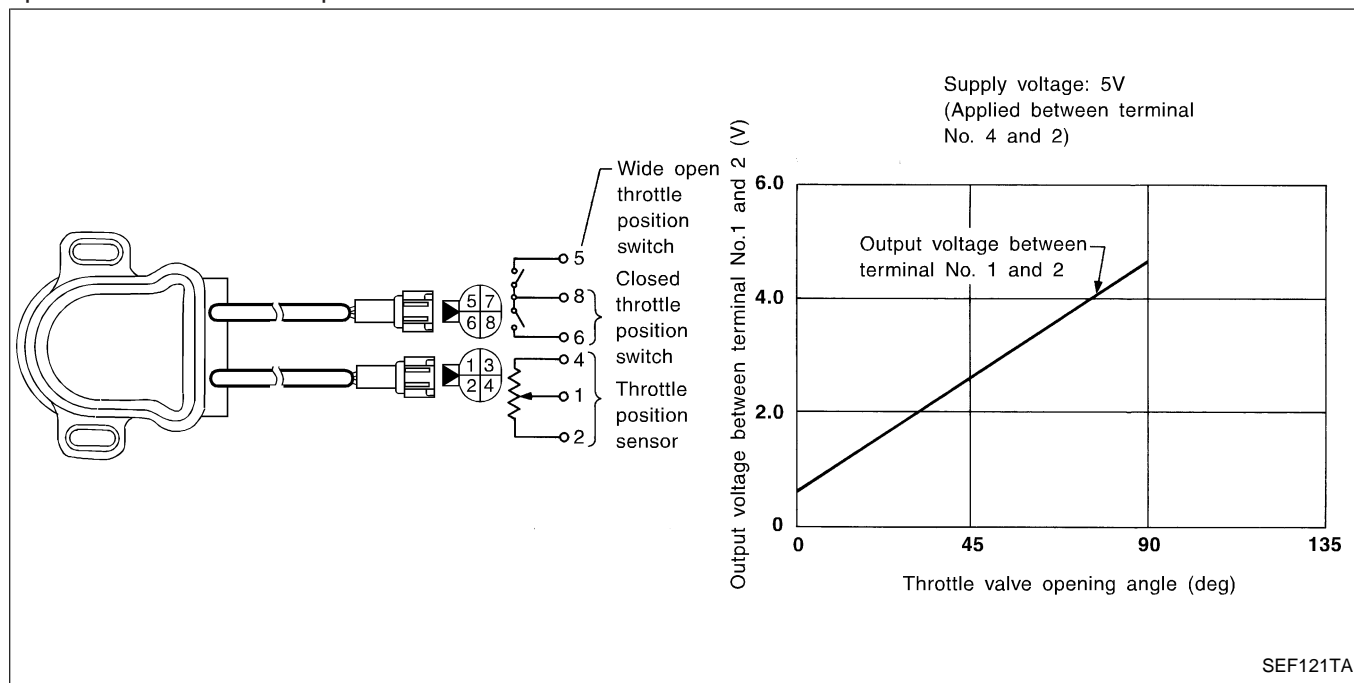
Throttle Position Sensor

NOTE: If DTC P0510 (0203) is displayed with DTC P0120, perform TROUBLE DIAGNOSIS FOR DTC P0510 first (See EC-344.).

COMPONENT DESCRIPTION

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 one controls engine operation such as fuel cut. The throttle position sensor unit has a built-in "Wide open and closed throttle position switch".



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL POS SEN	<ul style="list-style-type: none"> Engine: After warming up 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 valve: fully closed	0.15 - 0.85V
	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH-P/S	<ul style="list-style-type: none"> Engine: After warming up 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 valve fully closed	0.0%
	Throttle valve fully opened	Approx. 88%

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
63	G	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition)* └ Accelerator pedal fully released	0.15 - 0.85V
			Ignition switch "ON" └ Accelerator pedal fully depressed	3.5 - 4.7V
98	BR/W	Sensor's power supply	Ignition switch "ON"	Approximately 5V
129	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V

*: More than -40.0 kPa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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.*	<ul style="list-style-type: none"> ● 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 condition.	<ul style="list-style-type: none"> ● 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 condition.	<ul style="list-style-type: none"> ● 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.

Engine operating condition in fail-safe mode	Condition	Driving condition
Throttle position will be determined based on the amount of mass air flow and the engine speed. Therefore, acceleration will be poor.	When engine is idling	Normal
	When accelerating	Poor acceleration

Perform "Procedure for malfunction A" first. If the DTC cannot be confirmed, perform "Procedure for malfunction B". If there is no problem on "Procedure for malfunction B", perform "Procedure for malfunction C".

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

Procedure for malfunction A

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.



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

VHCL SPEED SE: 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-155.

OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF744X

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

Procedure for malfunction B



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds. If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 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-156.

OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO FAIL
THRTL POS SEN	XXX V
ABSOL TH-P/S	XXX %

PEF024P

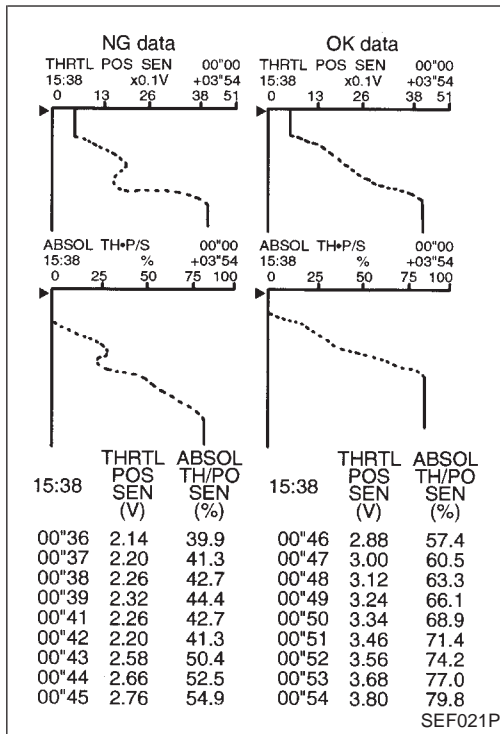
Procedure for malfunction C



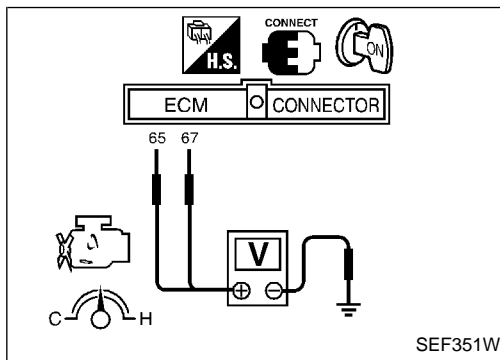
- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
- 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)



DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C



- 6) Press RECORD on CONSULT-II 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-155.
 If OK, go to following step.
- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.
 - CMPS-RPM (POS): More than 2,000 rpm**
 - MAS AIR/FL SE: More than 3V**
 - COOLAN TEMP/S: More than 70°C (158°F)**
 - 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-158.

OR



- 1) 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 65 and 128 (ECM ground):**
 - More than 3V**
 - COOLAN TEMP/S: More than 70°C (158°F)**
- 2) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-158.

OR



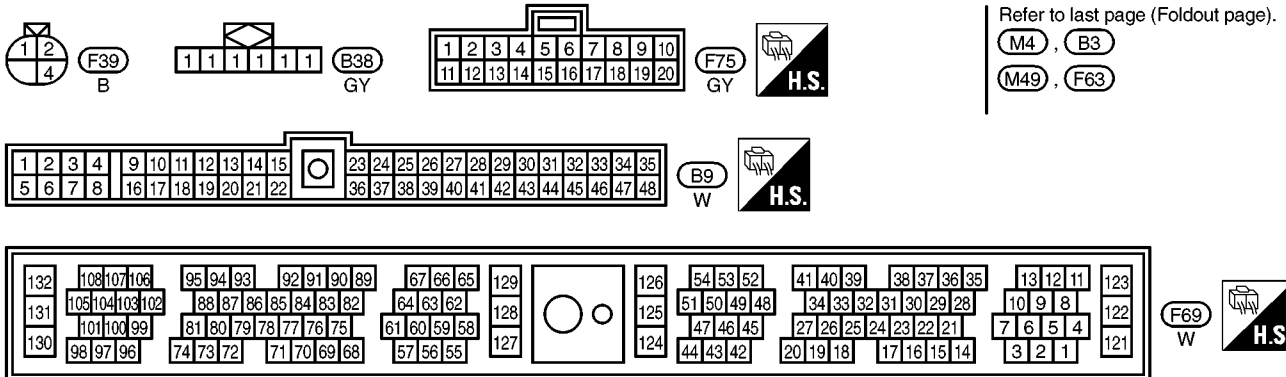
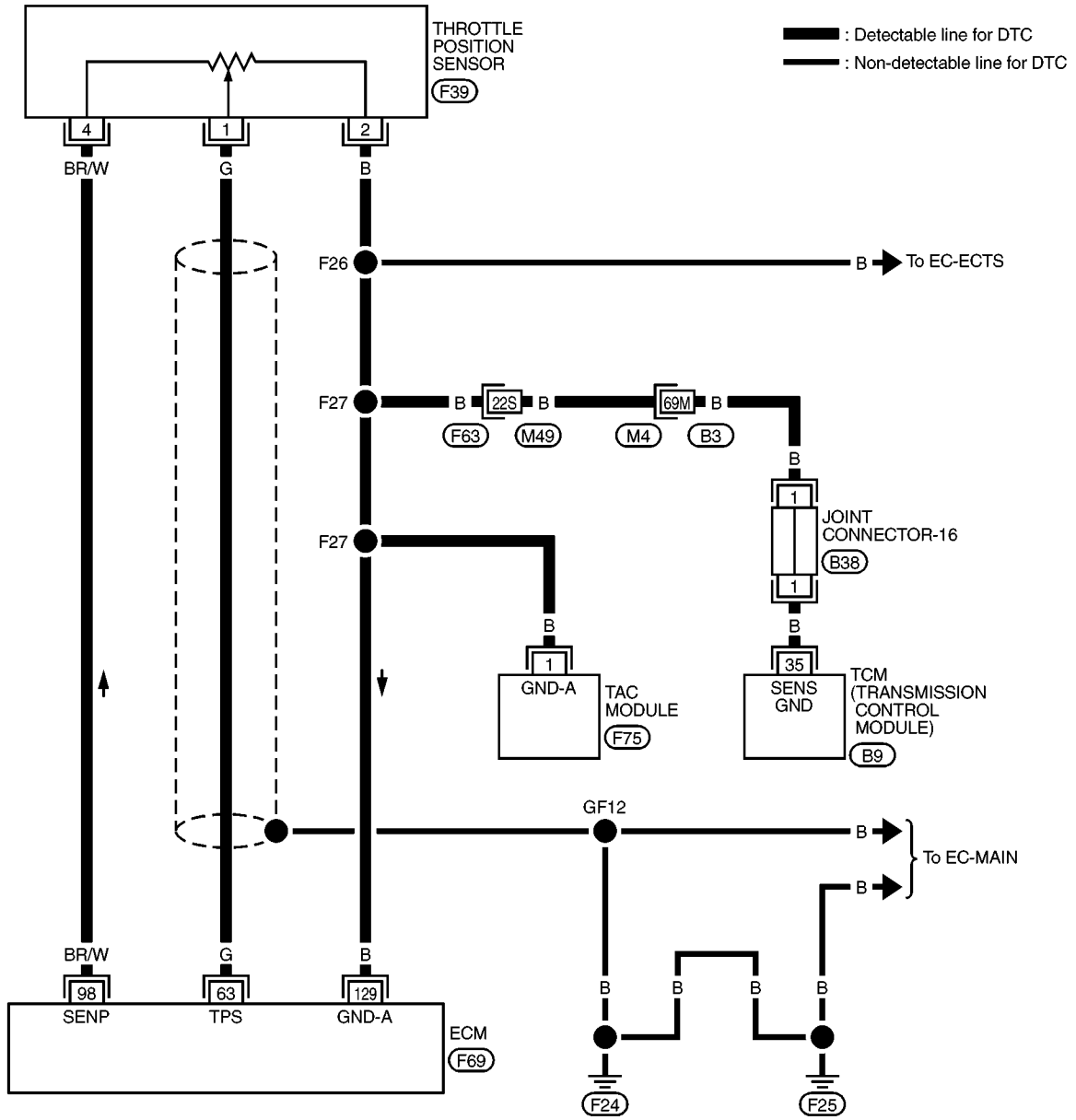
- 1) Maintain the following conditions for at least 10 consecutive seconds.
 - Gear position: Suitable position**
 - Engine speed: More than 2,000 rpm**
 - Voltage between ECM terminal 65 and 128 (ECM ground):**
 - More than 3V**
 - Voltage between ECM terminal 67 and 128 (ECM ground):**
 - Less than 1.5V**
- 2) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "DIAGNOSTIC TEST MODE (Self-diagnostic results)" with ECM.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-158.

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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

EC-TPS-01



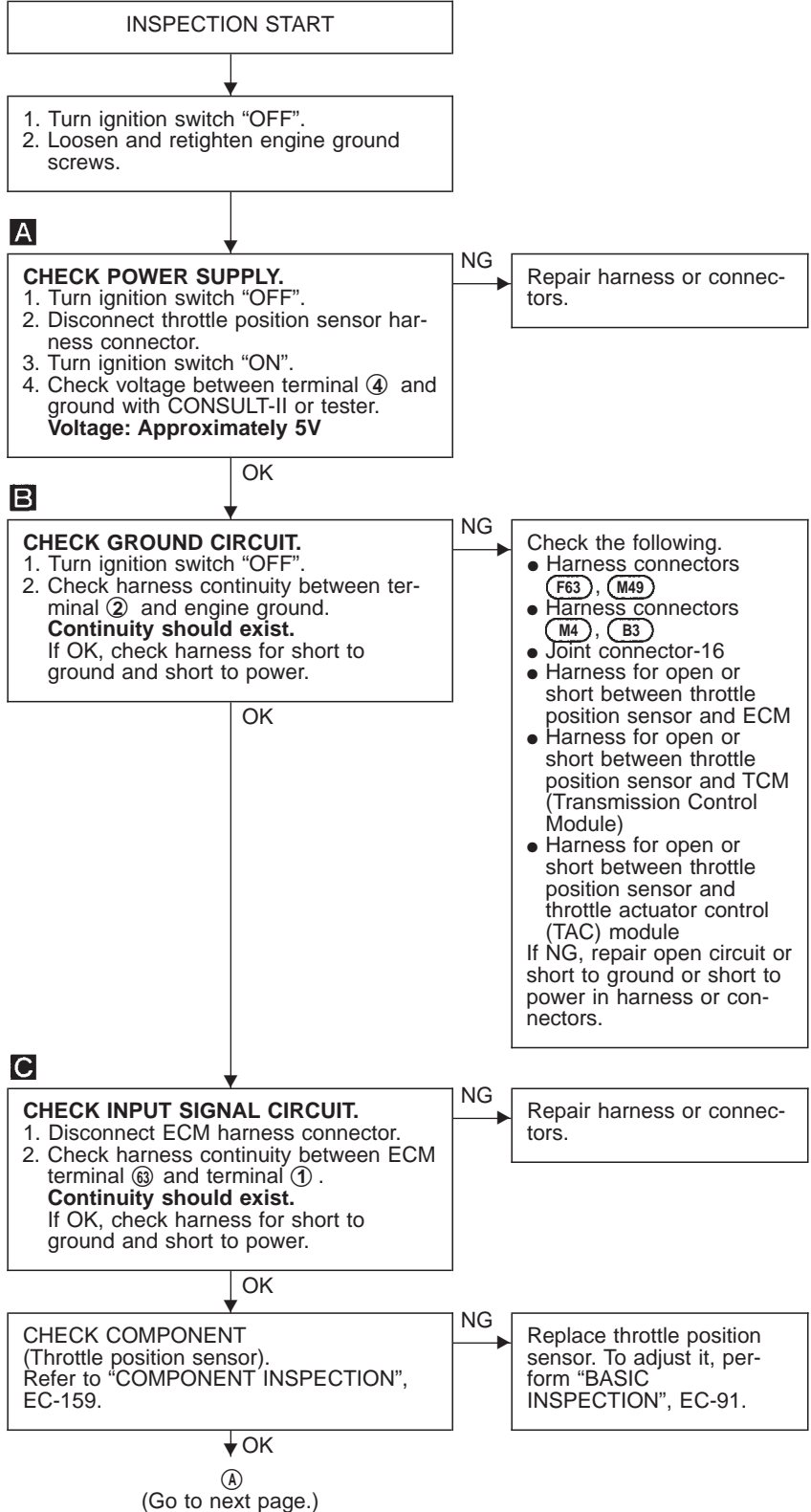
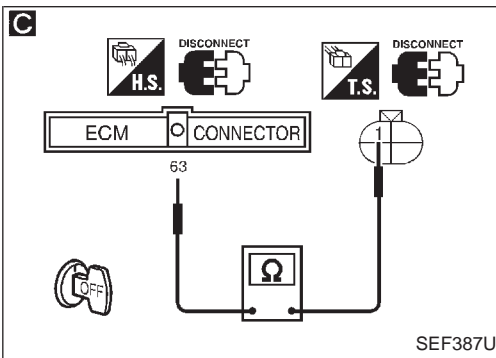
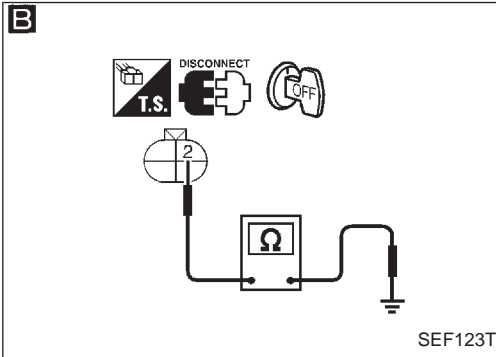
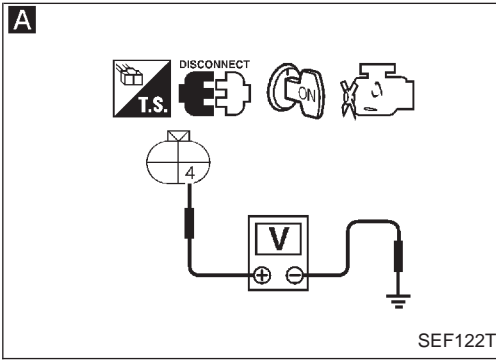
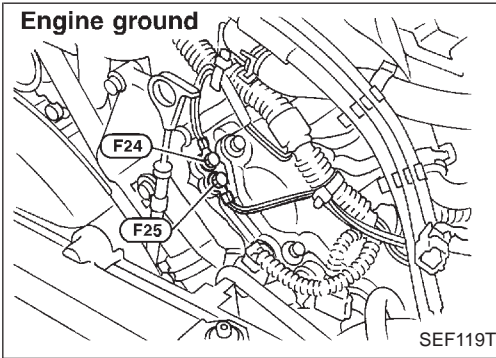
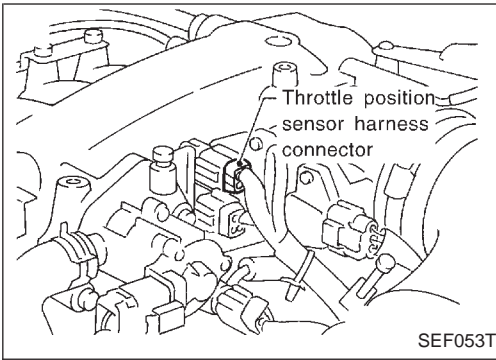
TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

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 the next page. If the trouble is duplicated after "Procedure for malfunction C", perform "Procedure C" on EC-158.

Procedure A



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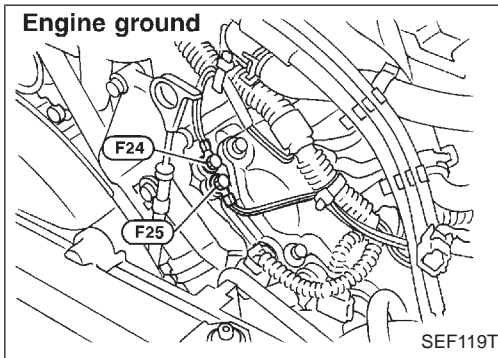
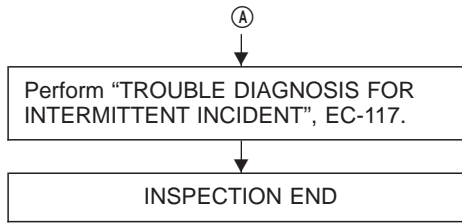
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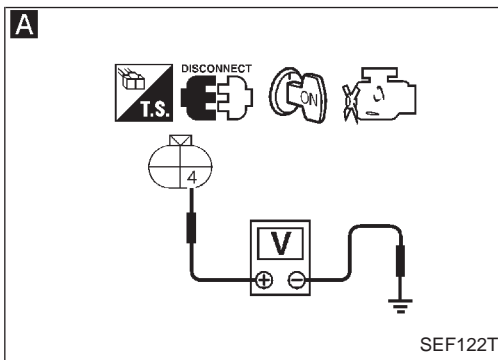
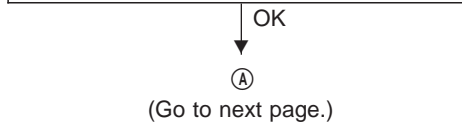
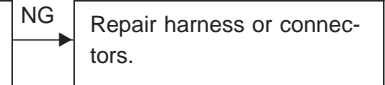
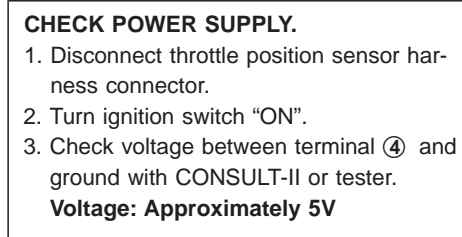
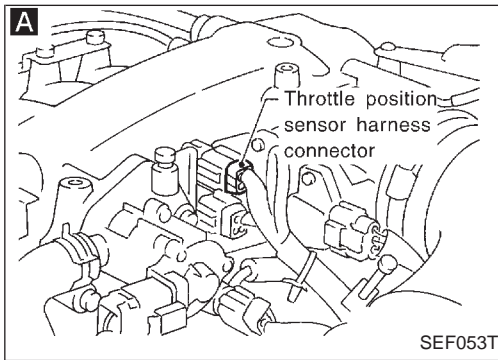
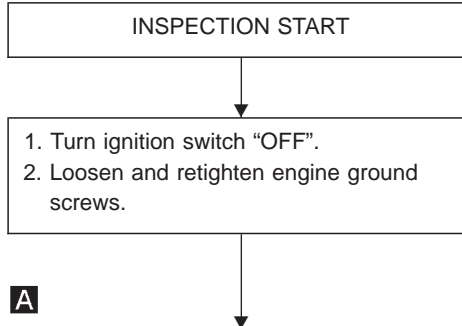
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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

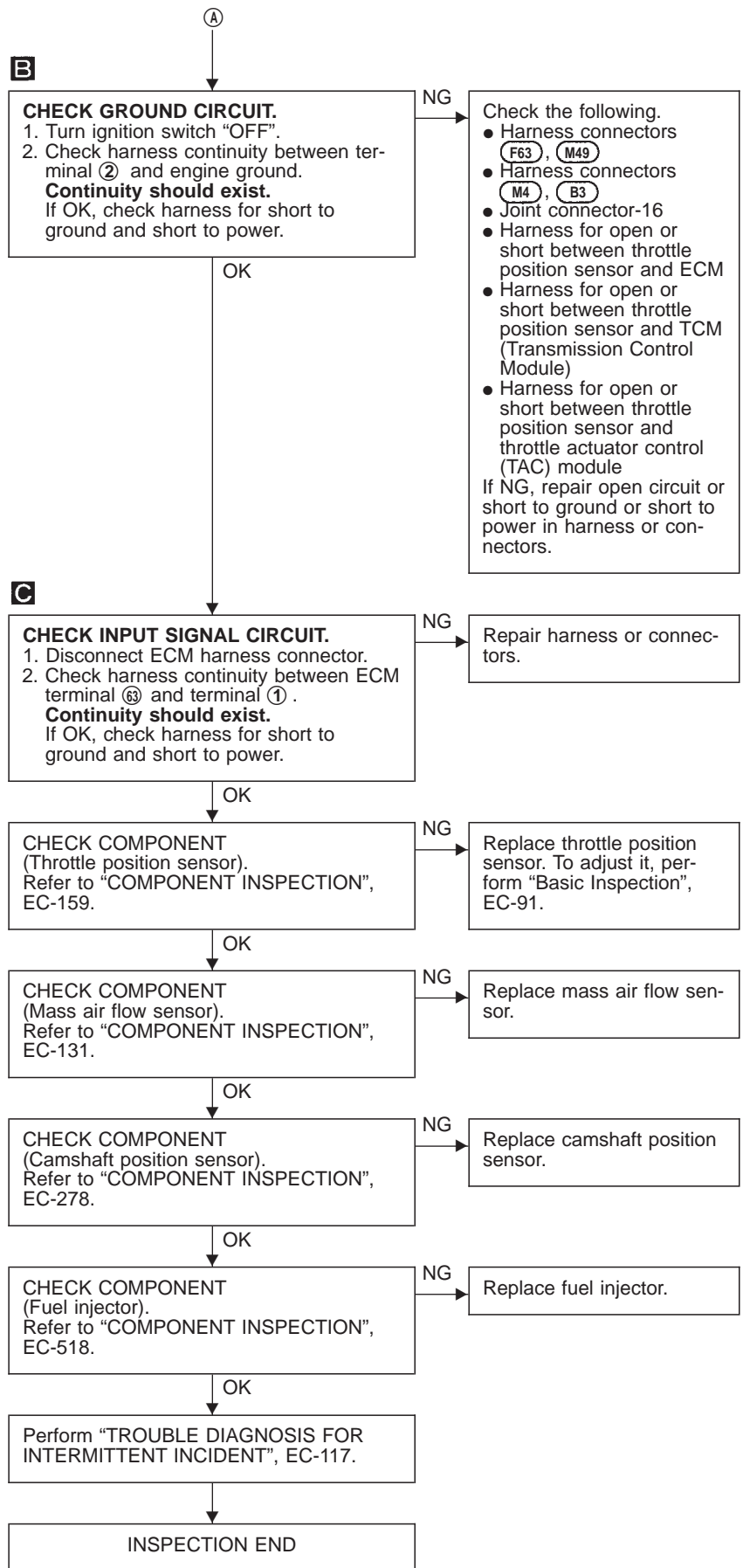
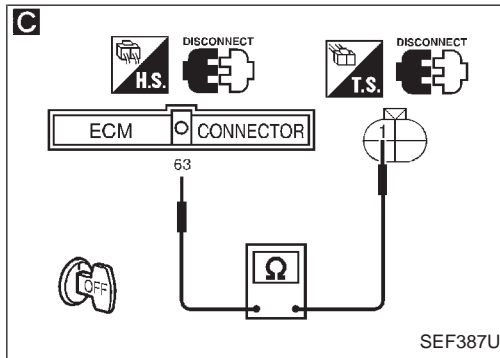
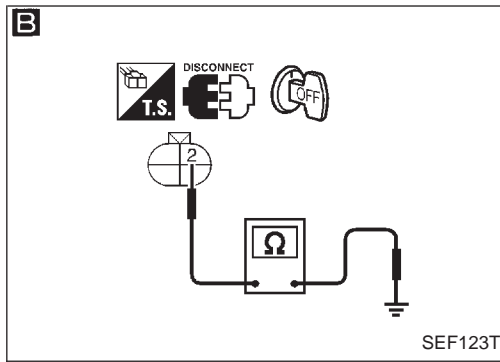


Procedure B



TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)



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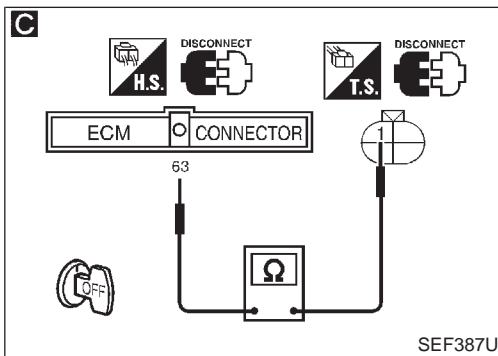
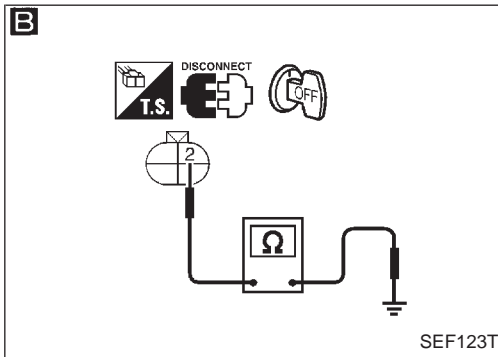
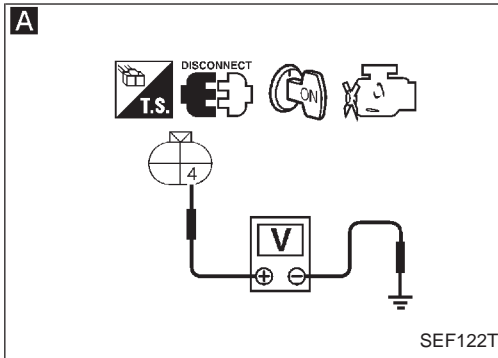
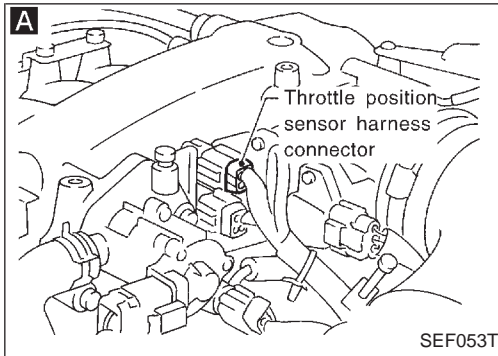
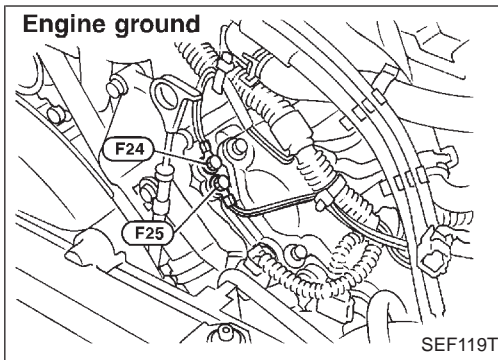
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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)

Procedure C

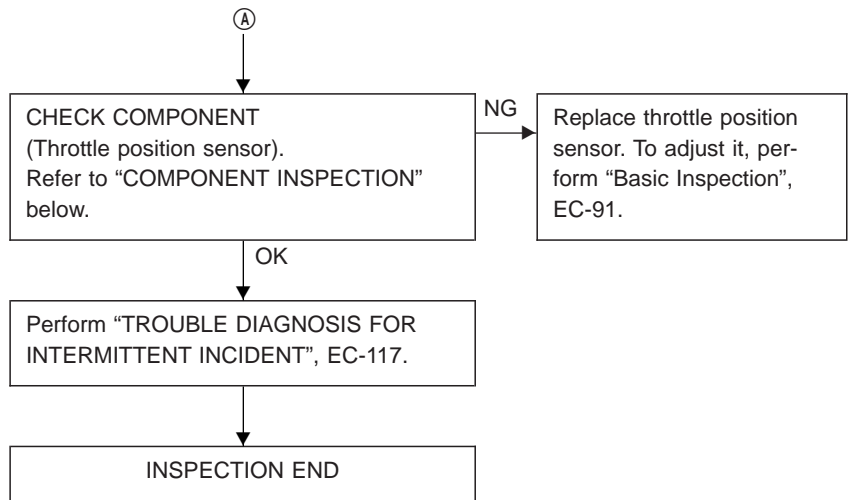


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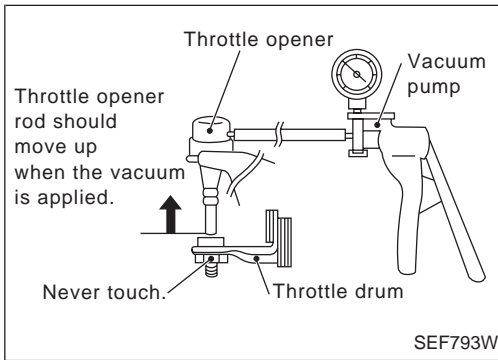
    graph TD
      Start[INSPECTION START] --> Adjust[ADJUST THROTTLE POSITION SENSOR.  
Perform "Basic Inspection", EC-91.]
      Adjust -- OK --> CheckIntake[CHECK INTAKE SYSTEM.  
Check the followings for connection.  
• Air duct  
• Vacuum hoses  
• Intake air passage between air duct to collector  
If disconnected, reconnect the parts.]
      CheckIntake -- NG --> Reconnect[Reconnect the parts.]
      CheckIntake -- OK --> Steps[1. Turn ignition switch "OFF".  
2. Loosen and retighten engine ground screws.]
      Steps --> CheckPower[CHECK POWER SUPPLY.  
1. Disconnect throttle position sensor harness connector.  
2. Turn ignition switch "ON".  
3. Check voltage between terminal ④ and ground with CONSULT-II or tester.  
Voltage: Approximately 5V]
      CheckPower -- NG --> RepairHarness[Repair harness or connectors.]
      CheckPower -- OK --> CheckGround[CHECK GROUND CIRCUIT.  
1. Turn ignition switch "OFF".  
2. Check harness continuity between terminal ② and engine ground.  
Continuity should exist.  
If OK, check harness for short to ground and short to power.]
      CheckGround -- NG --> CheckList[Check the following.  
• Harness connectors  
• F63, M49  
• Harness connectors  
• M4, B3  
• Joint connector-16  
• Harness for open or short between throttle position sensor and ECM  
• Harness for open or short between throttle position sensor and TCM (Transmission Control Module)  
• Harness for open or short between throttle position sensor and throttle actuator control (TAC) module  
If NG, repair open circuit or short to ground or short to power in harness or connectors.]
      CheckGround -- OK --> CheckInput[CHECK INPUT SIGNAL CIRCUIT.  
1. Disconnect ECM harness connector.  
2. Check harness continuity between ECM terminal ⑥ and terminal ①.  
Continuity should exist.  
If OK, check harness for short to ground and short to power.]
      CheckInput -- NG --> RepairHarness2[Repair harness or connectors.]
      CheckInput -- OK --> NextA((A))
      NextA --> NextPage[Go to next page.]
  
```

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)



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COMPONENT INSPECTION

Throttle position sensor

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-II.
8. Check voltage of "THRTL POS SEN".

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Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V
CLSD THL POS	OFF

SEF745X

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

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If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-91.

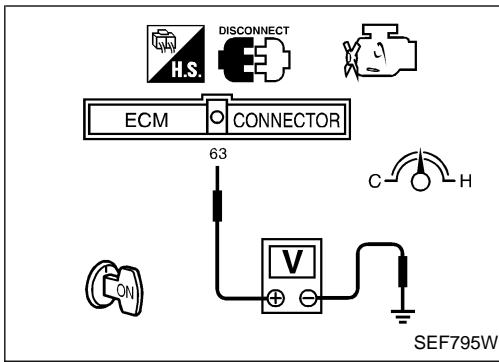
9. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

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TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (Cont'd)



7. Check voltage between ECM terminal ⑥③ (Throttle position sensor signal) and ground.

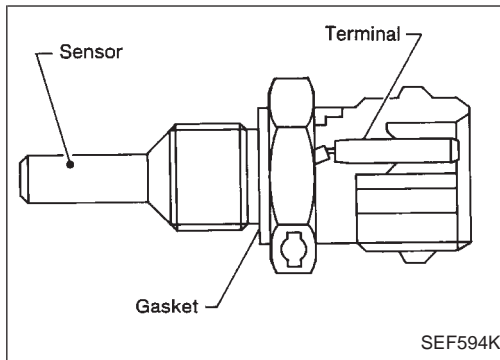
Voltage measurement must be made with throttle position sensor installed in vehicle.

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

If NG, adjust closed throttle position switch. Refer to “Basic Inspection”, EC-91.

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

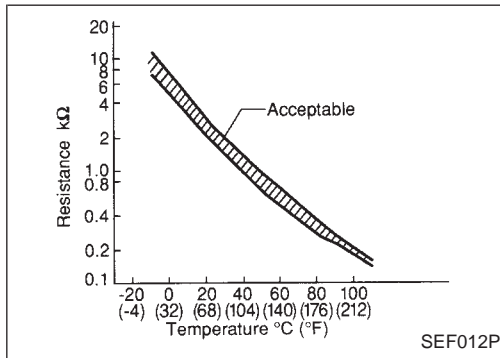
TROUBLE DIAGNOSIS FOR DTC P0125



Engine Coolant Temperature (ECT) Sensor

COMPONENT DESCRIPTION

The engine coolant temperature sensor is located near the No. 2 injector. The 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)	1.0	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal ⑥7 (Engine coolant temperature sensor) and ECM terminal ⑫8 (ECM ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125 0908	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

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TROUBLE DIAGNOSIS FOR DTC P0125

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
INT/A TEMP SE	XXX °C

SEF740X

Engine Coolant Temperature (ECT) Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Do not overheat engine.

NOTE:

- If DTC P0115 (0103) is displayed with P0125 (0908), first perform TROUBLE DIAGNOSIS FOR DTC P0115, EC-145.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch “ON”.
- 2) Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
- 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.
If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5) If 1st DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-164.

OR

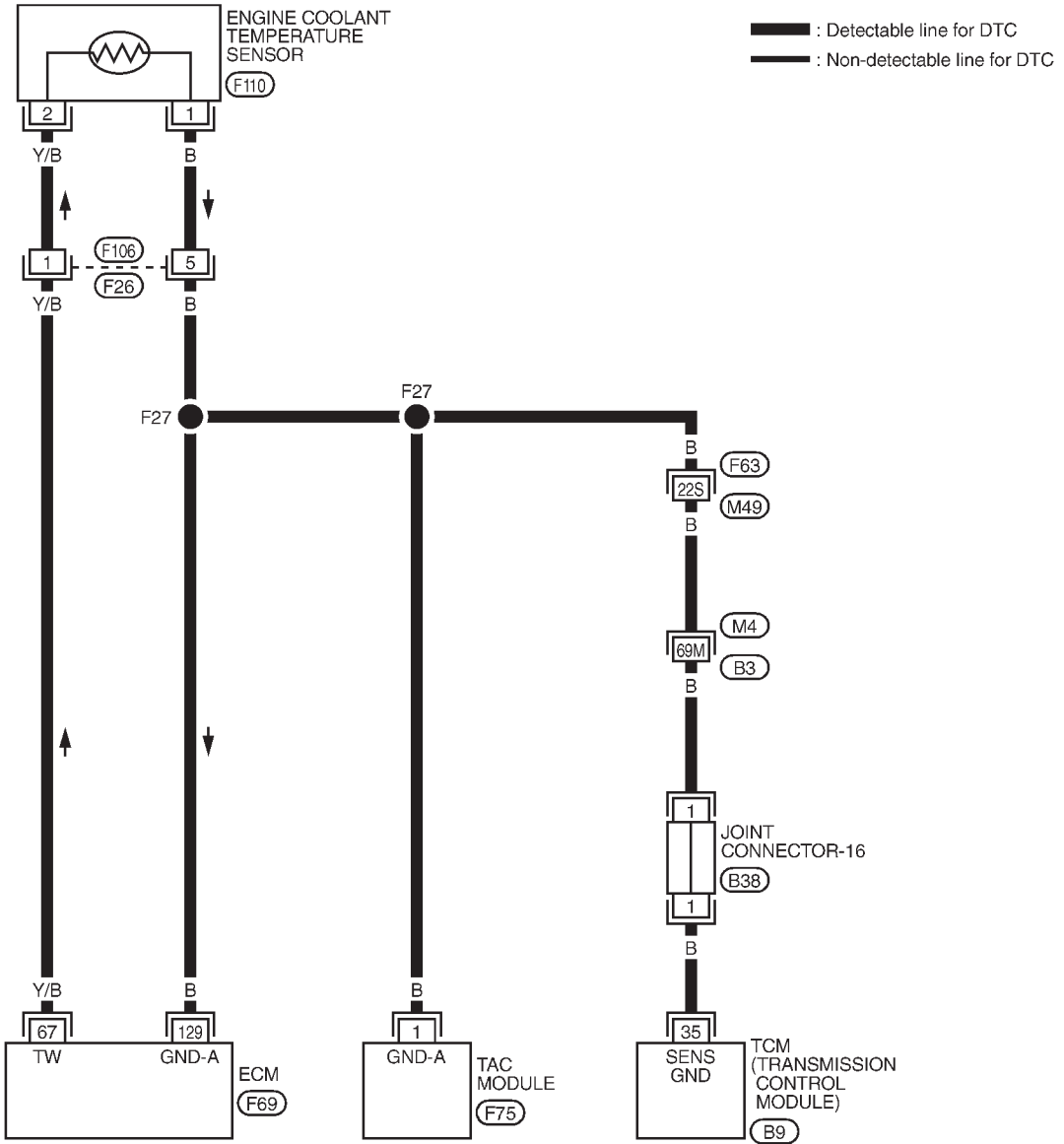


Follow the procedure “With CONSULT-II” above.

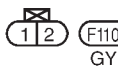
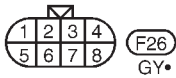
TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (Cont'd)

EC-ECTS-01

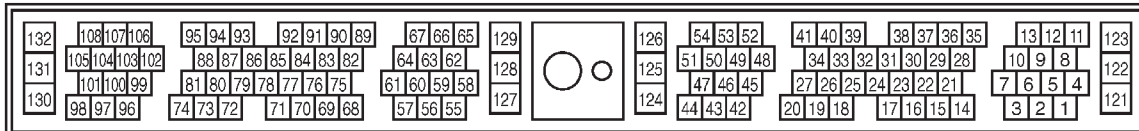
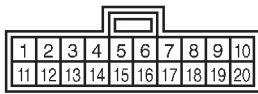


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Refer to last page (Foldout page).

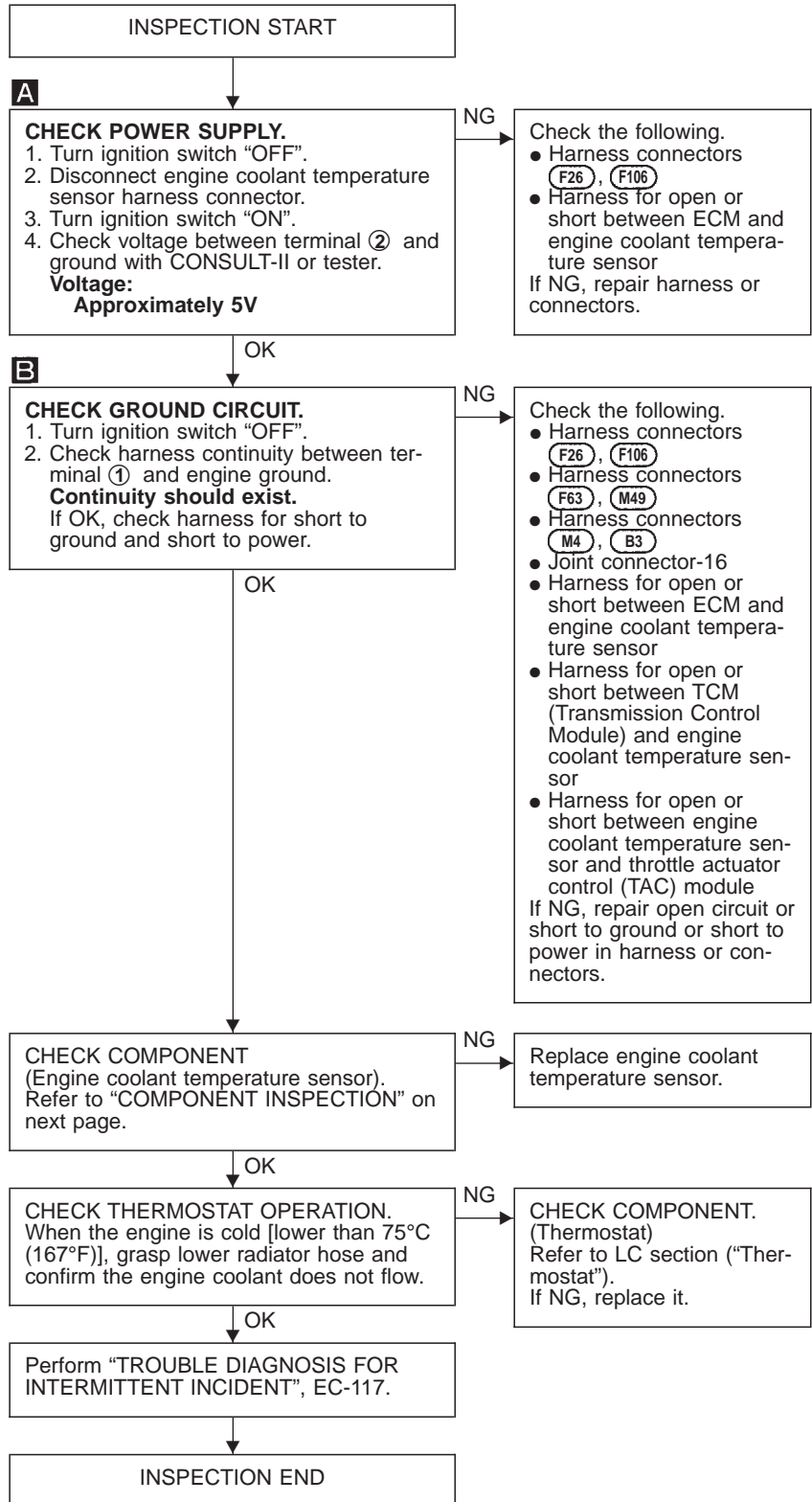
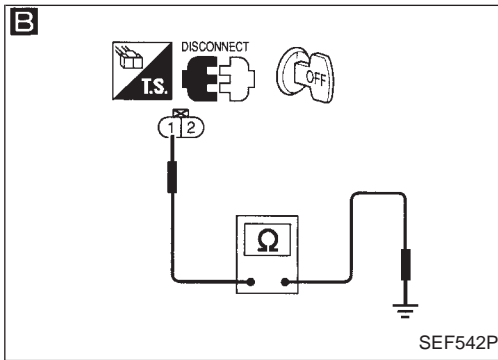
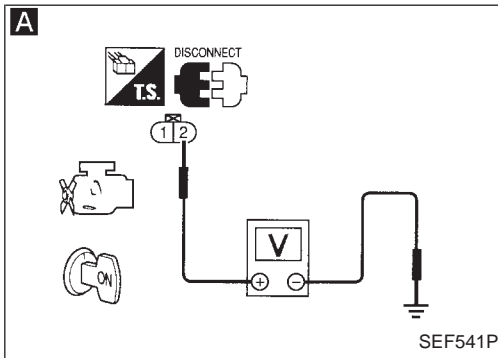
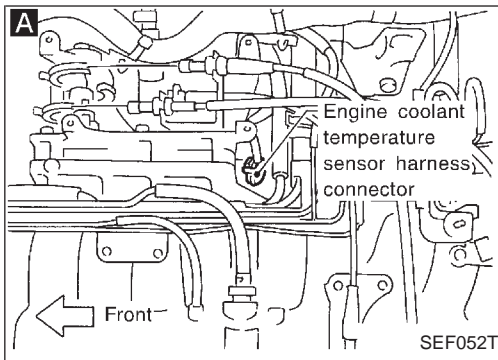
M4, B3
 M49, F63



TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



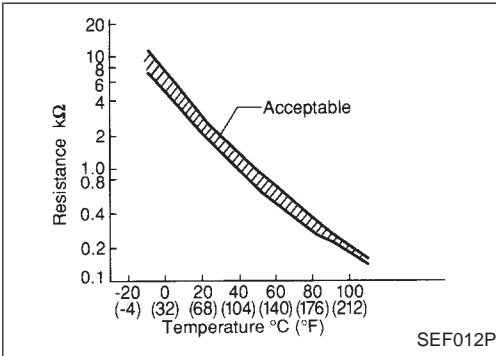
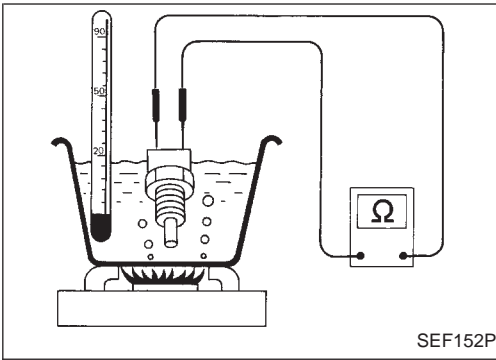
TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.



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.

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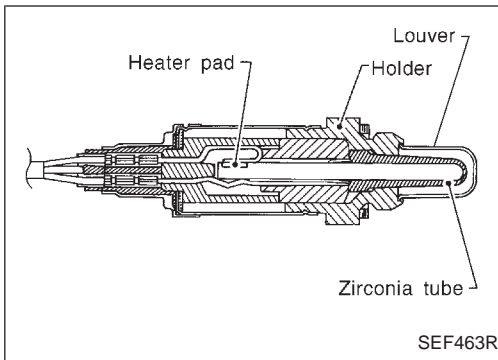
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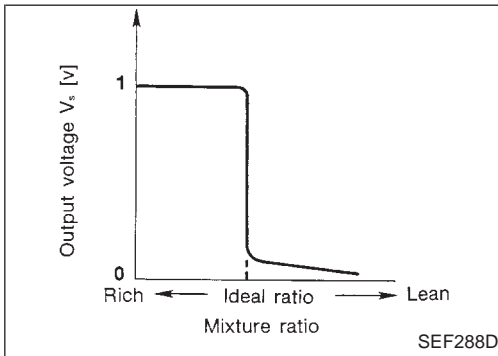
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Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor is placed into the exhaust manifold. 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-II REFERENCE VALUE IN DATA MONITOR MODE

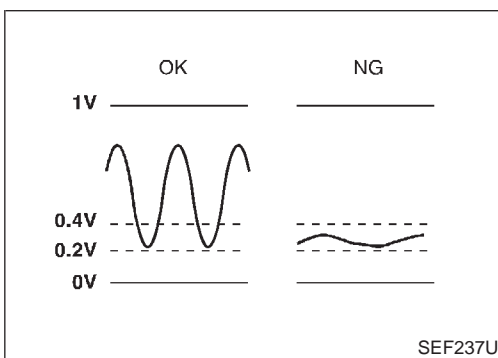
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
82 (RH)	R	Front heated oxygen sensors	Engine is running.	0 - Approximately 1.0V (periodically change)
83 (LH)	W		After warming up to normal operating temperature and engine speed is 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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.

TROUBLE DIAGNOSIS FOR DTC P0130 (-B1), P0150 (-B2)

Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130, 0303 (Left bank)	<ul style="list-style-type: none"> The voltage from the sensor is constantly approx. 0.3V. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Front heated oxygen sensor
P0150, 0503 (Right bank)		

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FR O2 SEN-B1 P0130	
OUT OF CONDITION	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF772X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DIAGNOSTIC TROUBLE CODE 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 drive vehicle at temperature of more than -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0130 (P0150)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine (TCS switch "OFF") and let it idle for at least 3 minutes.

NOTE:

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

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

CMPS-RPM (POS): 1,600 - 2,200 rpm

Vehicle speed: 70 - 100 km/h (43 - 62 MPH)

B/FUEL SCHDL: 1.4 - 5 msec

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2).

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-171.

During this test, P1148 may be stored in ECM.

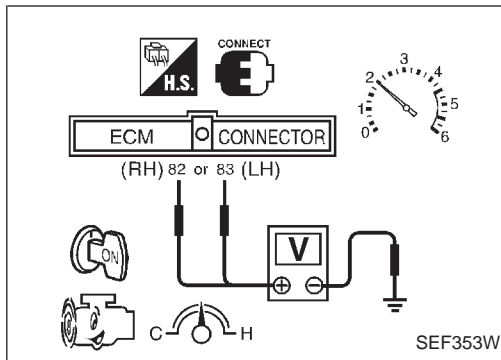
FR O2 SEN-B1 P0130	
TESTING	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

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FR O2 SEN-B1 P0130	
COMPLETED	
SELF-DIAG RESULTS	

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Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)



OR

OVERALL FUNCTION CHECK

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.



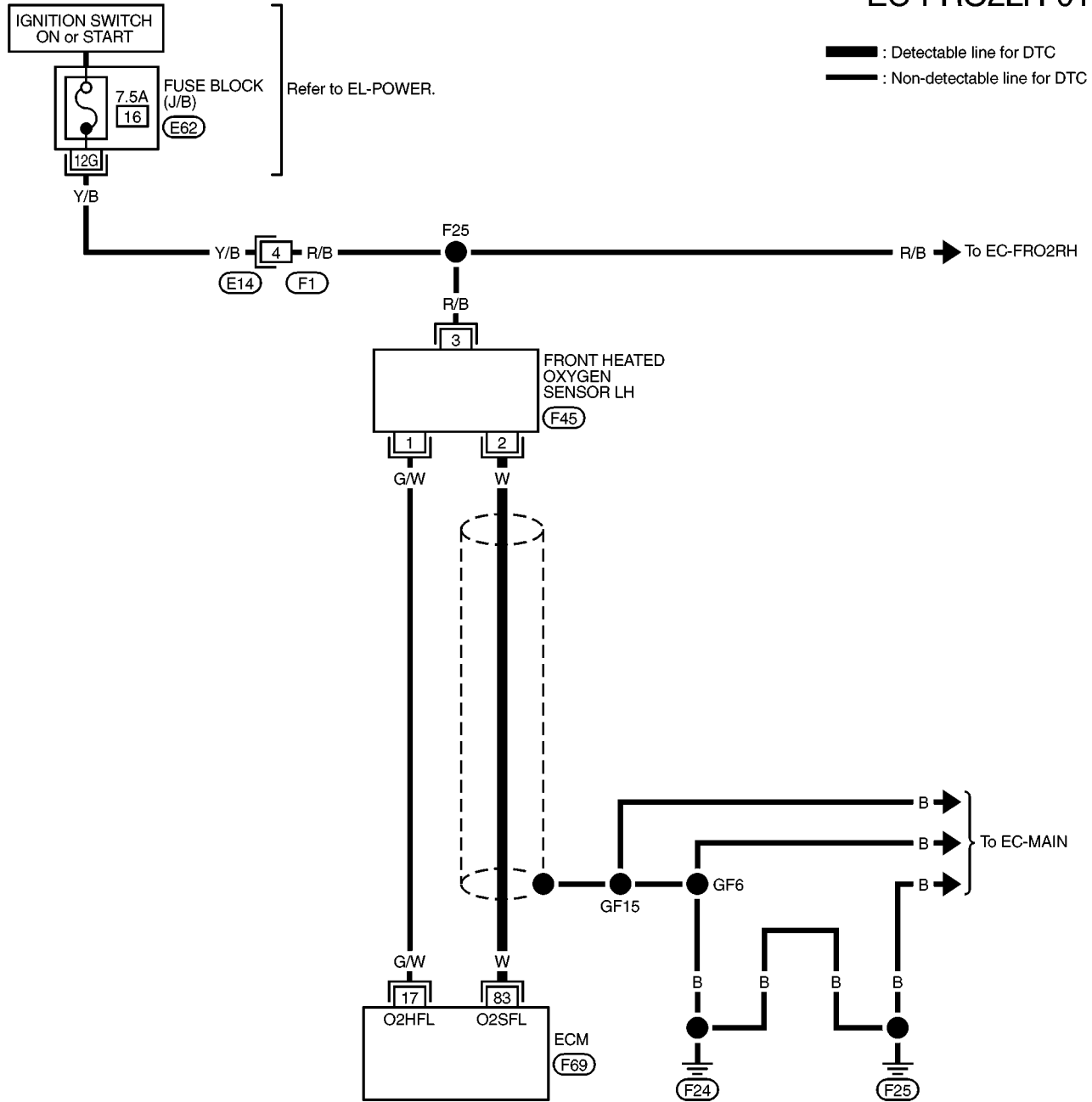
- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 82 (RH), 83 (LH) (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-171.

TROUBLE DIAGNOSIS FOR DTC P0130 (-B1), P0150 (-B2)

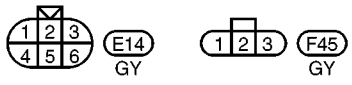
Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)

LEFT BANK

EC-FRO2LH-01

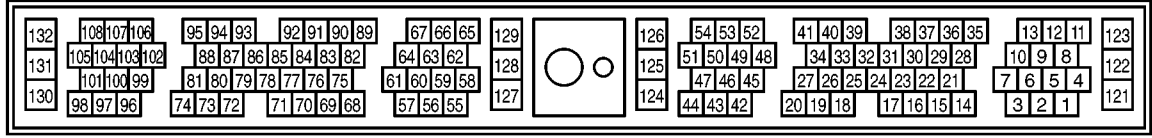


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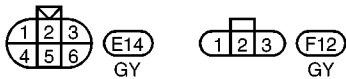
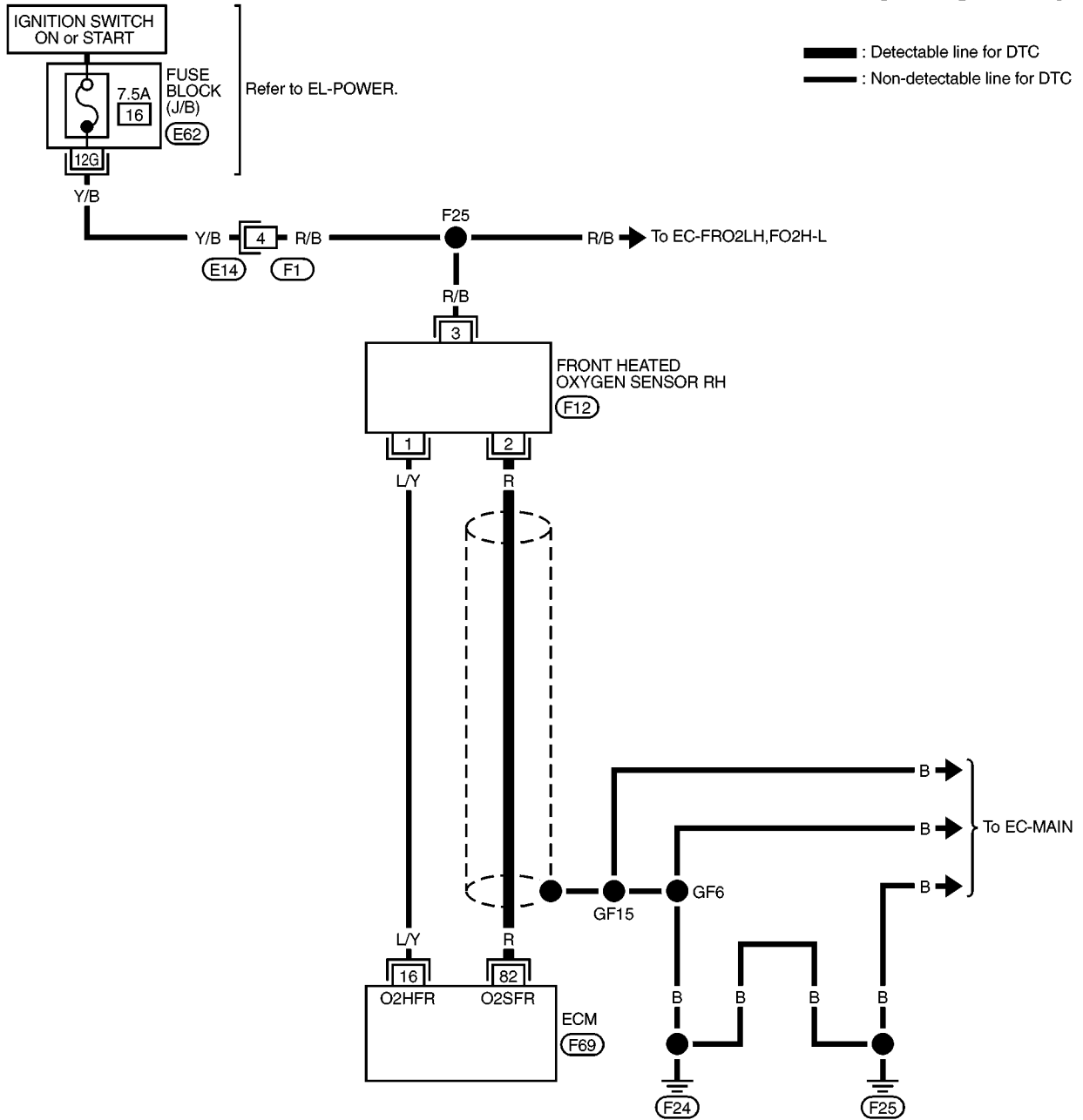


TROUBLE DIAGNOSIS FOR DTC P0130 (-B1), P0150 (-B2)

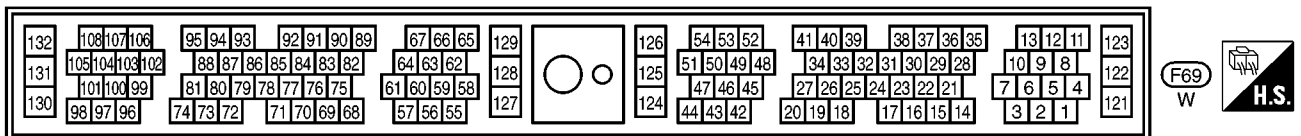
Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)

RIGHT BANK

EC-FRO2RH-01



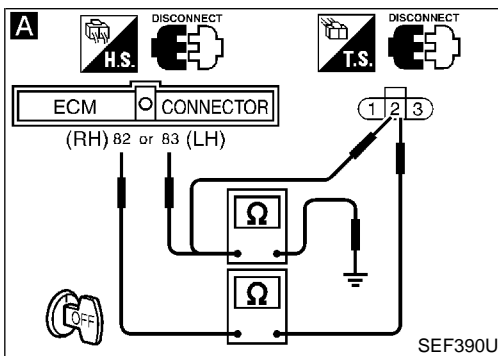
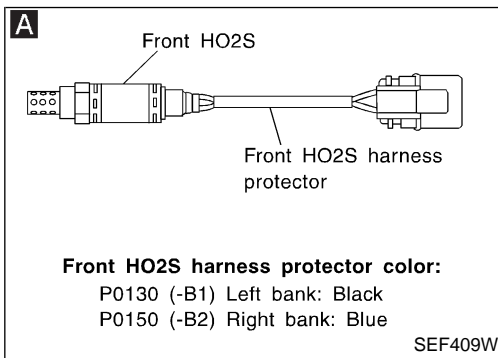
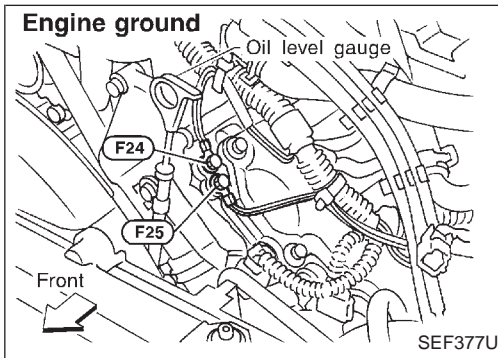
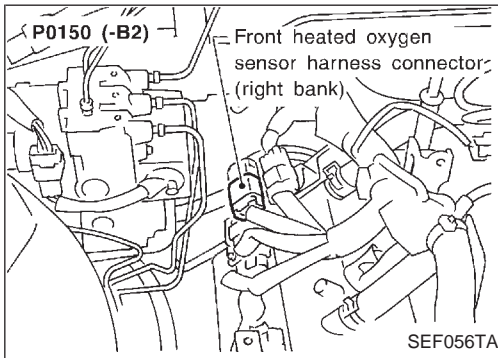
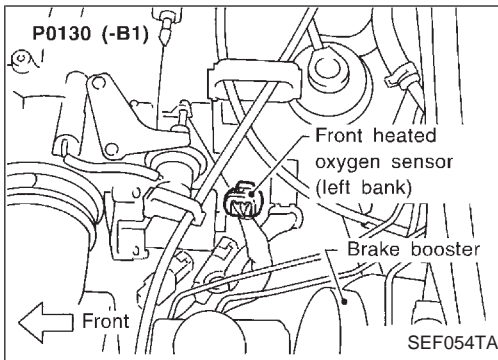
Refer to last page (Foldout page).
 (E62)



TROUBLE DIAGNOSIS FOR DTC P0130 (-B1), P0150 (-B2)

Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect corresponding front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM and sensor terminals.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0130	83	2	LH (Black)
P0150	82	2	RH (Blue)

Continuity should exist.

4. Check harness continuity between ECM and sensor or ground.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0130	83 or 2	Ground	LH (Black)
P0150	82 or 2	Ground	RH (Blue)

Continuity should not exist.
If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Front heated oxygen sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → **REPLACE FRONT HO2S.**

1. Check front HO2S harness protector color.
Black: Left bank (-B1)
Blue: Right bank (-B2)
2. Replace malfunctioning front HO2S.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)

COMPONENT INSPECTION

Front heated oxygen sensor



- 1) Start engine and warm it up to normal operating temperature.
 - 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, 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-II 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 below:

cycle | 1 | 2 | 3 | 4 | 5 |
FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

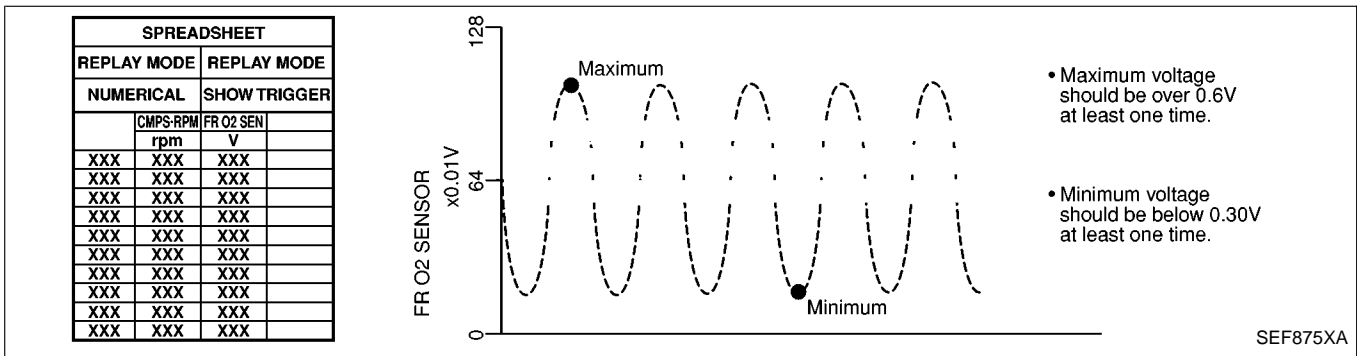
- R = "FR O2 MNTR-B1 (-B2)", "RICH"
L = "FR O2 MNTR-B1 (-B2)", "LEAN"
- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
 - "FR O2 SEN-B1 (-B2)" voltage goes below 0.30V at least once.
 - "FR O2 SEN-B1 (-B2)" voltage never exceeds 1.0V.

CAUTION:

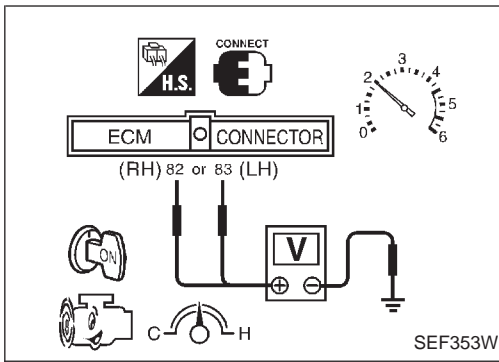
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
A/F ALPHA-B1	XXX %

SEF746X



Front Heated Oxygen Sensors (Front HO2S) (Circuit) (P0130: Left bank), (P0150: Right bank) (Cont'd)



OR



- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 82 RH, 83 LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR, EC-68).
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.30V at least one time.
 - The voltage never exceeds 1.0V.

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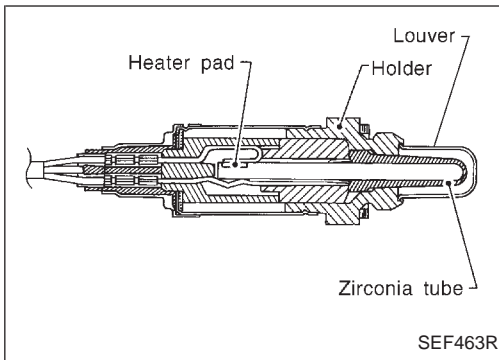
RS

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HA

EL

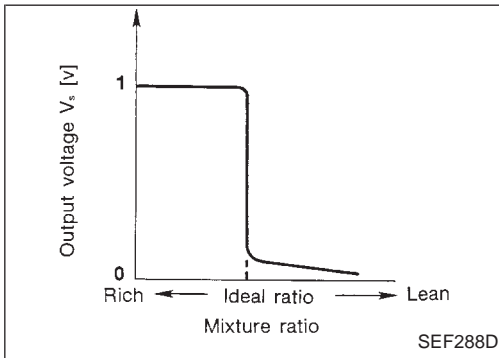
IDX



Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor is placed into the exhaust manifold. 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-II REFERENCE VALUE IN DATA MONITOR MODE

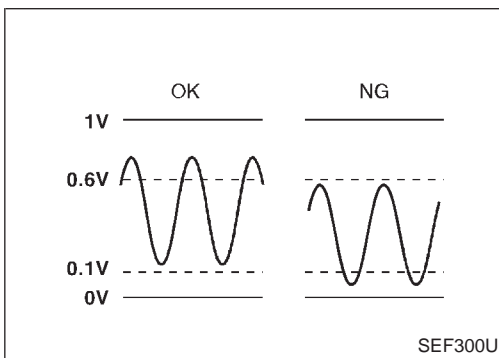
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
82 (RH)	R	Front heated oxygen sensor	Engine is running.	0 - Approximately 1.0V (periodically change)
83 (LH)	W		After warming up to normal operating temperature and engine speed is 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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.

TROUBLE DIAGNOSIS FOR DTC P0131 (-B1), P0151 (-B2)

Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131 0411 (Left bank)	<ul style="list-style-type: none"> The maximum voltage from the sensor is not reached to the specified voltage. 	<ul style="list-style-type: none"> Front heated oxygen sensor Front heated oxygen sensor heater Fuel pressure Injectors Intake air leaks
P0151 0415 (Right bank)		

FR O2 SEN-B1 P0131	
OUT OF CONDITION	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF775X

FR O2 SEN-B1 P0131	
TESTING	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF776X

FR O2 SEN-B1 P0131	
COMPLETED	
SELF-DIAG RESULTS	

SEF777X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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.



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0131 (P0151)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine (TCS switch "OFF") and let it idle for at least 3 minutes.

NOTE:

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

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

CMPS-RPM (POS): 1,200 - 2,200 rpm

Vehicle speed: 50 - 100 km/h (31 - 62 MPH)

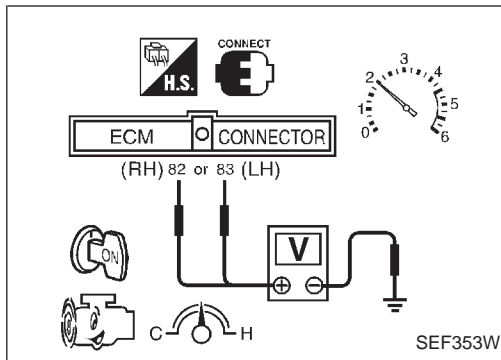
B/FUEL SCHDL: 1.4 - 5.0 ms

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2).

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-177.

Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank) (Cont'd)



OR

OVERALL FUNCTION CHECK

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.

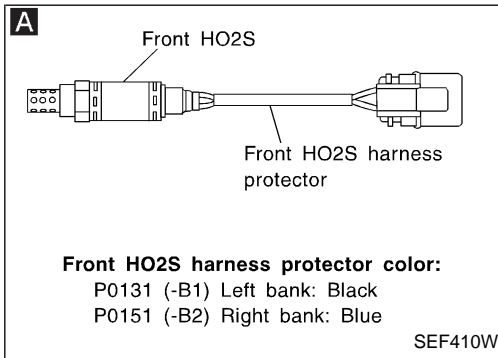
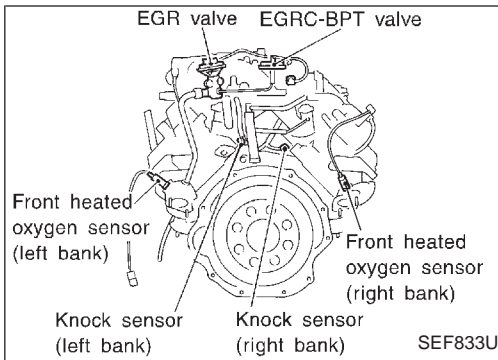


- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal ⑧③ LH, ⑧② RH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.1V at least one time.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-177.

TROUBLE DIAGNOSIS FOR DTC P0131 (-B1), P0151 (-B2)

Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank) (Cont'd)

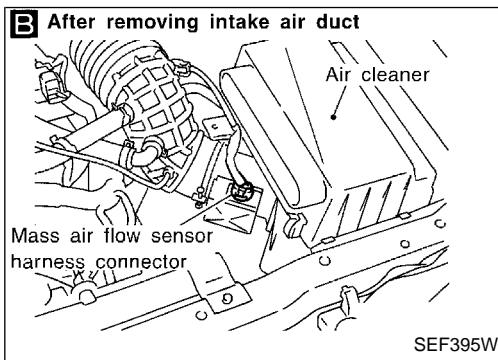
DIAGNOSTIC PROCEDURE



B

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 %
	B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X



INSPECTION START

A

Loosen and retighten front heated oxygen sensor.
Tightening torque:
 40 - 50 N·m
 (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

B

CLEAR THE SELF-LEARNING DATA

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs P0171, P0174 detected? Is it difficult to start engine?

Yes

Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0174", EC-243.

OR

- Turn ignition switch "OFF".
- Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
- Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
- Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs 0115, 0210 detected? Is it difficult to start engine?

No

CHECK COMPONENT
 (Front heated oxygen sensor heaters). Refer to "COMPONENT INSPECTION" on next page.

NG

REPLACE FRONT HO2S.
 1. Check front HO2S harness protector color.
Black: Left bank (-B1)
Blue: Right bank (-B2)
 2. Replace malfunctioning front HO2S.

OK

CHECK COMPONENT
 (Front heated oxygen sensors). Refer to "COMPONENT INSPECTION" on next page.

NG

Replace corresponding heated oxygen sensor.

OK

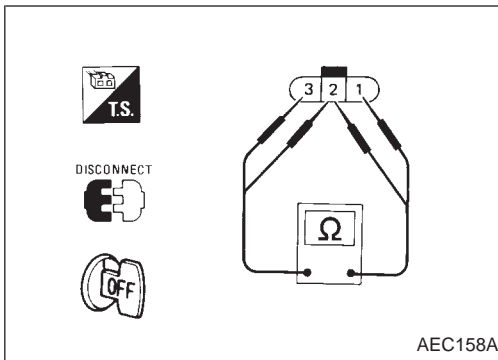
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117. Refer to "TROUBLE DIAGNOSIS FOR DTC P0130 (-B1), P0150 (-B2)" for circuit, EC-166.

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0131 (-B1), P0151 (-B2)

Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank) (Cont'd)



COMPONENT INSPECTION

Front heated oxygen sensor heater

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.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
A/F ALPHA-B1	XXX %

SEF746X

Front heated oxygen sensor



- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, 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-II 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 below:

cycle | 1 | 2 | 3 | 4 | 5 |

FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

R = "FR O2 MNTR-B1 (-B2)", "RICH"

L = "FR O2 MNTR-B1 (-B2)", "LEAN"

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.30V at least once.
- 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.

Front Heated Oxygen Sensor (Lean shift monitoring) (Front HO2S) (P0131: Left bank), (P0151: Right bank) (Cont'd)

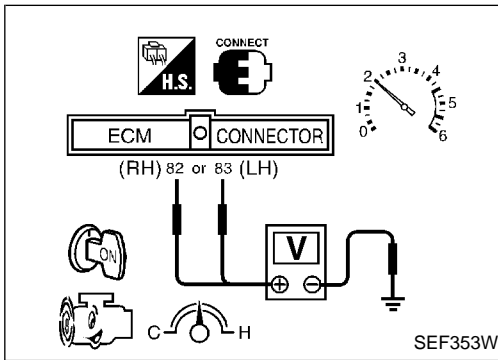
SPREADSHEET		
REPLAY MODE	REPLAY MODE	
NUMERICAL	SHOW TRIGGER	
	CMPS-RPM	FR O2 SEN
	rpm	v
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
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XXX	XXX	XXX
XXX	XXX	XXX
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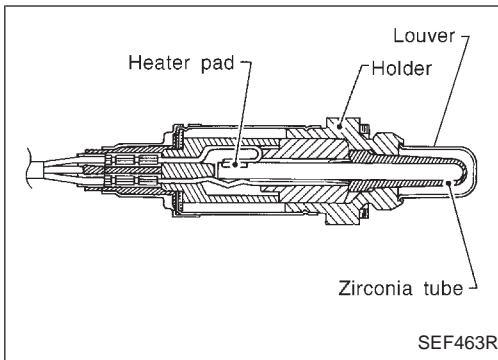


OR



- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal ⑧2 RH, ⑧3 LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR). See EC-68.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.30V at least one time.
 - The voltage never exceeds 1.0V.

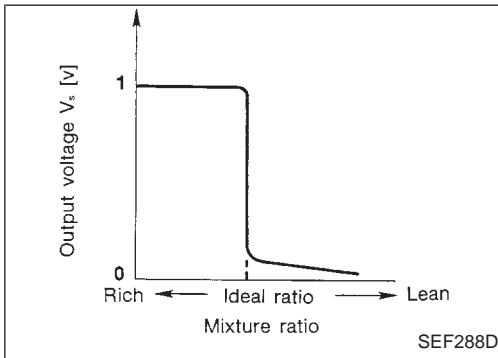
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Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor is placed into the exhaust manifold. 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-II REFERENCE VALUE IN DATA MONITOR MODE

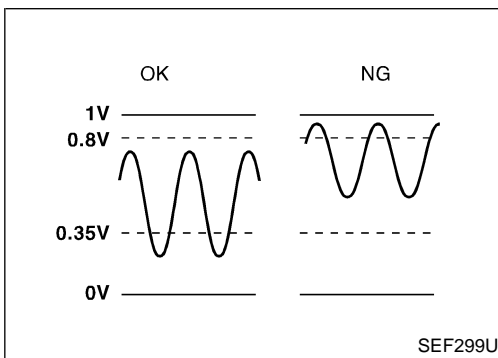
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
82 (RH)	R	Front heated oxygen sensors	Engine is running.	0 - Approximately 1.0V (periodically change)
83 (LH)	W		After warming up to normal operating temperature and engine speed is 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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.

TROUBLE DIAGNOSIS FOR DTC P0132 (-B1), P0152 (-B2)

Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 0410 (Left bank)	<ul style="list-style-type: none"> The maximum and minimum voltages from the sensor are not around the specified voltages. 	<ul style="list-style-type: none"> Front heated oxygen sensor Front heated oxygen sensor heater Fuel pressure Injectors
P0152 0414 (Right bank)		

FR O2 SEN-B1 P0132	
OUT OF CONDITION	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF802X

FR O2 SEN-B1 P0132	
TESTING	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF803X

FR O2 SEN-B1 P0132	
COMPLETED	
SELF-DIAG RESULTS	

SEF804X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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.



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0132 (P0152)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine (TCS switch "OFF") and let it idle for at least 3 minutes.

NOTE:

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

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

CMPS-RPM (POS): 1,200 - 2,200 rpm

Vehicle speed: 50 - 100 km/h (31 - 62 MPH)

B/FUEL SCHDL: 1.4 - 5.0 ms

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2).

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-183.

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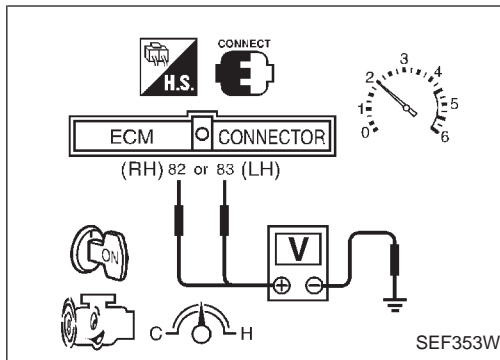
BT

HA

EL

IDX

Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank) (Cont'd)



OR

OVERALL FUNCTION CHECK

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.

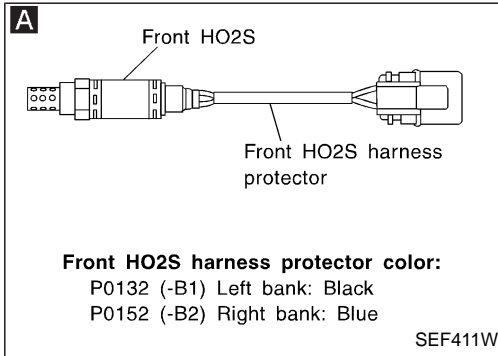
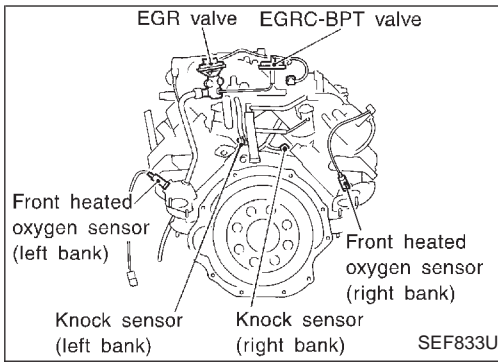


- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 82 RH, 83 LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-183.

TROUBLE DIAGNOSIS FOR DTC P0132 (-B1), P0152 (-B2)

Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank) (Cont'd)

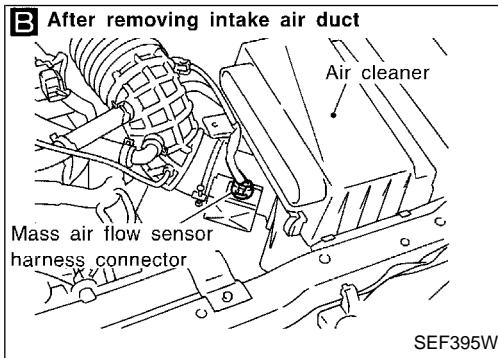
DIAGNOSTIC PROCEDURE



B

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 %
	B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X



INSPECTION START

A

Loosen and retighten front heated oxygen sensor.
Tightening torque:
40 - 50 N·m (4.1 - 5.1 kg·m, 30 - 37 ft·lb)

B

CLEAR THE SELF-LEARNING DATA

- Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs P0172, P0175 detected? Is it difficult to start engine?

OR

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0172, P0175", EC-249.

2. Turn ignition switch "OFF".

3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.

4. Stop engine and reconnect mass air flow sensor harness connector.

5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.

6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.

7. Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs 0114, 0209 detected? Is it difficult to start engine?

No

A

(Go to next page.)

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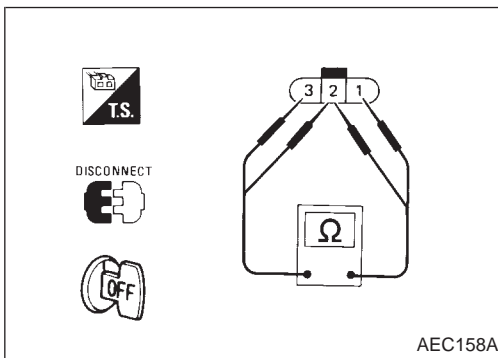
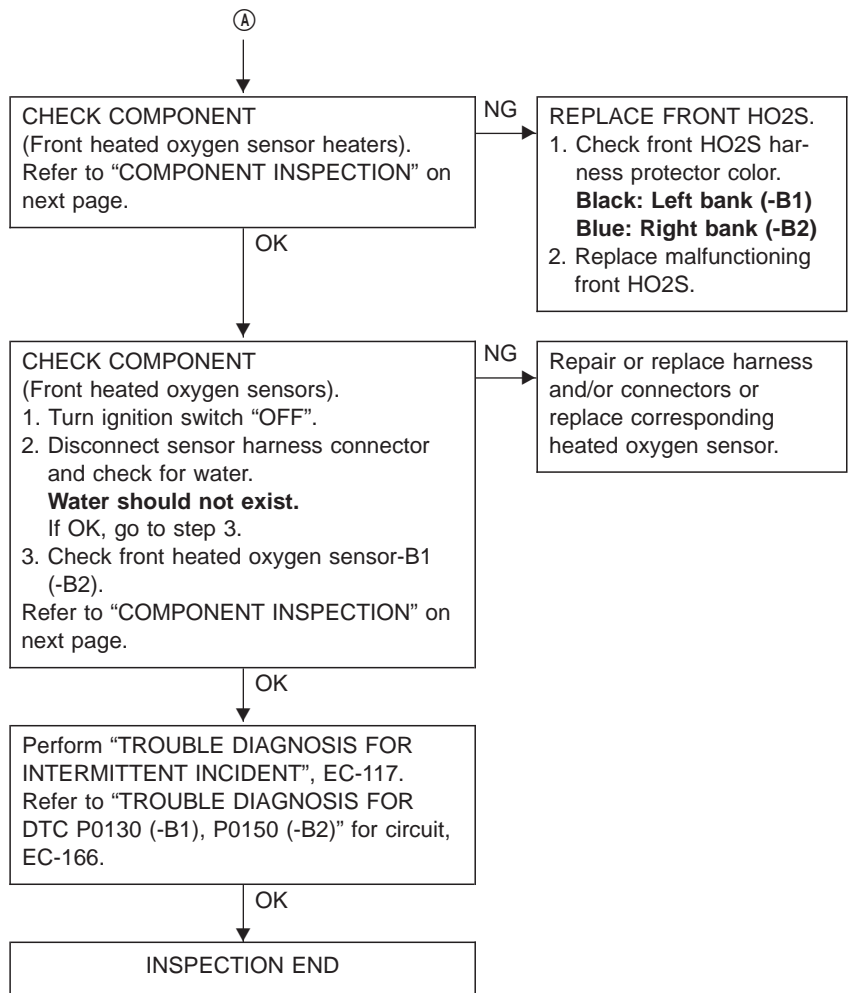
BT

HA

EL

IDX

Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank) (Cont'd)



COMPONENT INSPECTION

Front heated oxygen sensor heater

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.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
A/F ALPHA-B1	XXX %

SEF746X

Front Heated Oxygen Sensor (Rich shift monitoring) (Front HO2S) (P0132: Left bank), (P0152: Right bank) (Cont'd)

Front heated oxygen sensor

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, 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-II 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 below:

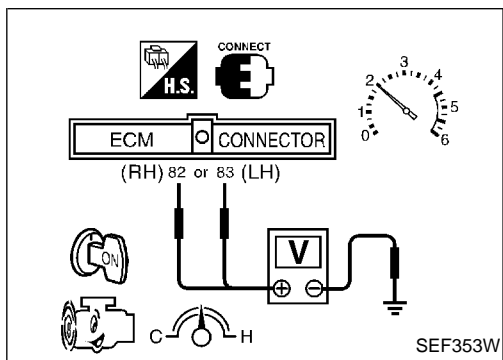
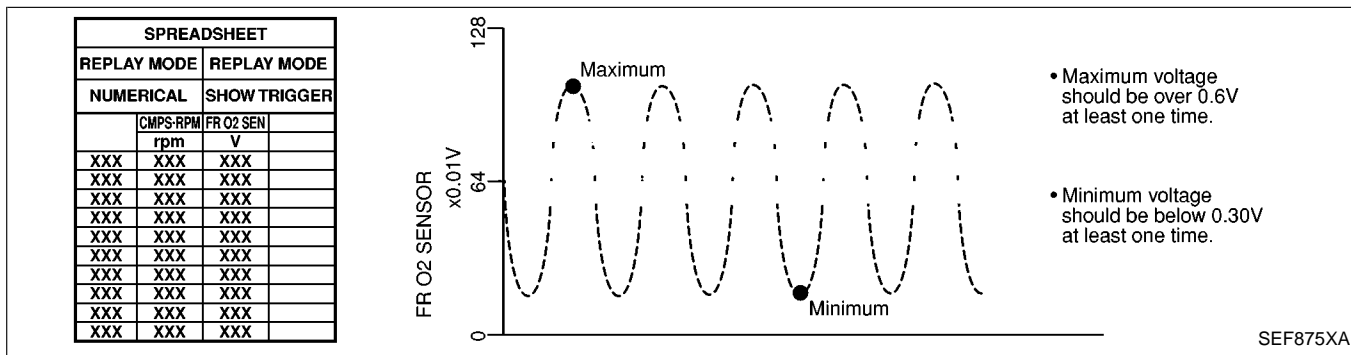
cycle | 1 | 2 | 3 | 4 | 5 |
FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

R = "FR O2 MNTR-B1 (-B2)", "RICH"
L = "FR O2 MNTR-B1 (-B2)", "LEAN"

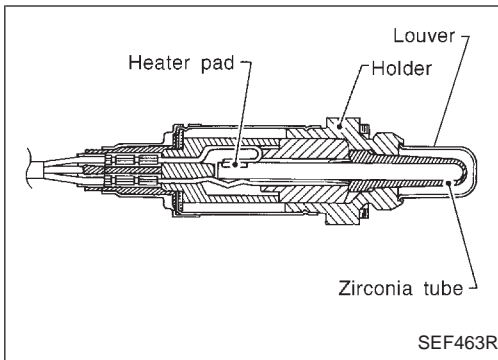
- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.30V at least once.
- The voltage never exceeds 1.0V.

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.



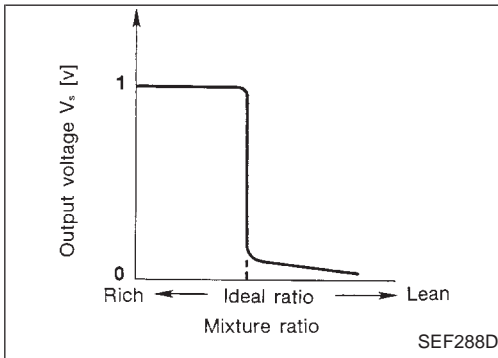
- OR
- 1) Start engine and warm it up to normal operating temperature.
 - 2) Set voltmeter probes between ECM terminal 82 RH, 83 LH (sensor signal) and ground.
 - 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR). See EC-68.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.30V at least one time.
 - The voltage never exceeds 1.0V.



Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor is placed into the exhaust manifold. 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-II REFERENCE VALUE IN DATA MONITOR MODE

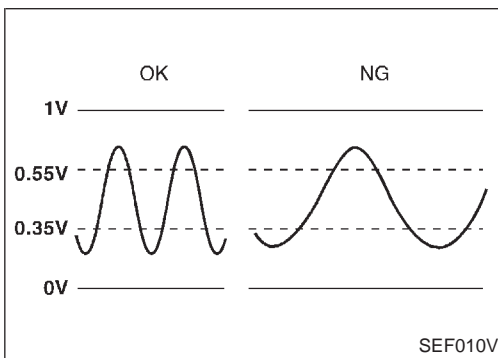
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
82 (RH)	R	Front heated oxygen sensor	Engine is running.	0 - Approximately 1.0V (periodically change)
83 (LH)	W		After warming up to normal operating temperature and engine speed is 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

To judge the malfunction of front heated oxygen sensor, this diagnosis measures response time of the front heated oxygen sensor signal. 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.

TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 0409 (Left bank)	<ul style="list-style-type: none"> The response of the voltage signal from the sensor takes more than the specified time. 	<ul style="list-style-type: none"> 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 Mass air flow sensor
P0153 0413 (Right bank)		

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FR O2 SEN-B1 P0133	
OUT OF CONDITION	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF778X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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 of above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch "ON" and select "FR O2 SEN-B1 (-B2) P0133 (P0153)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine (TCS switch "OFF") and let it idle for at least 3 minutes.

NOTE:

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

- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

Engine speed: 1,700 - 2,500 rpm

Vehicle speed: 50 - 120 km/h (31 - 75 MPH)

B/FUEL SCHDL: 1.4 - 5.0 msec

Selector lever: Suitable position

FR O2 SEN-B1 P0133	
TESTING	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

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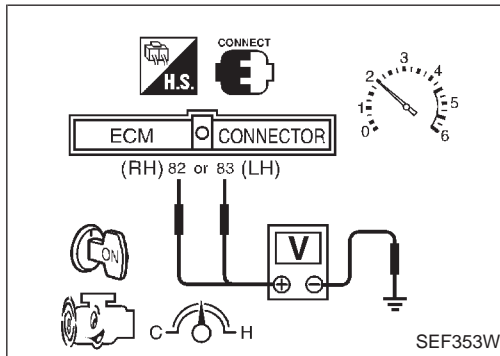
FR O2 SEN-B1 P0133	
COMPLETED	
SELF-DIAG RESULTS	

SEF780X

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

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-191.



OR

OVERALL FUNCTION CHECK

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.



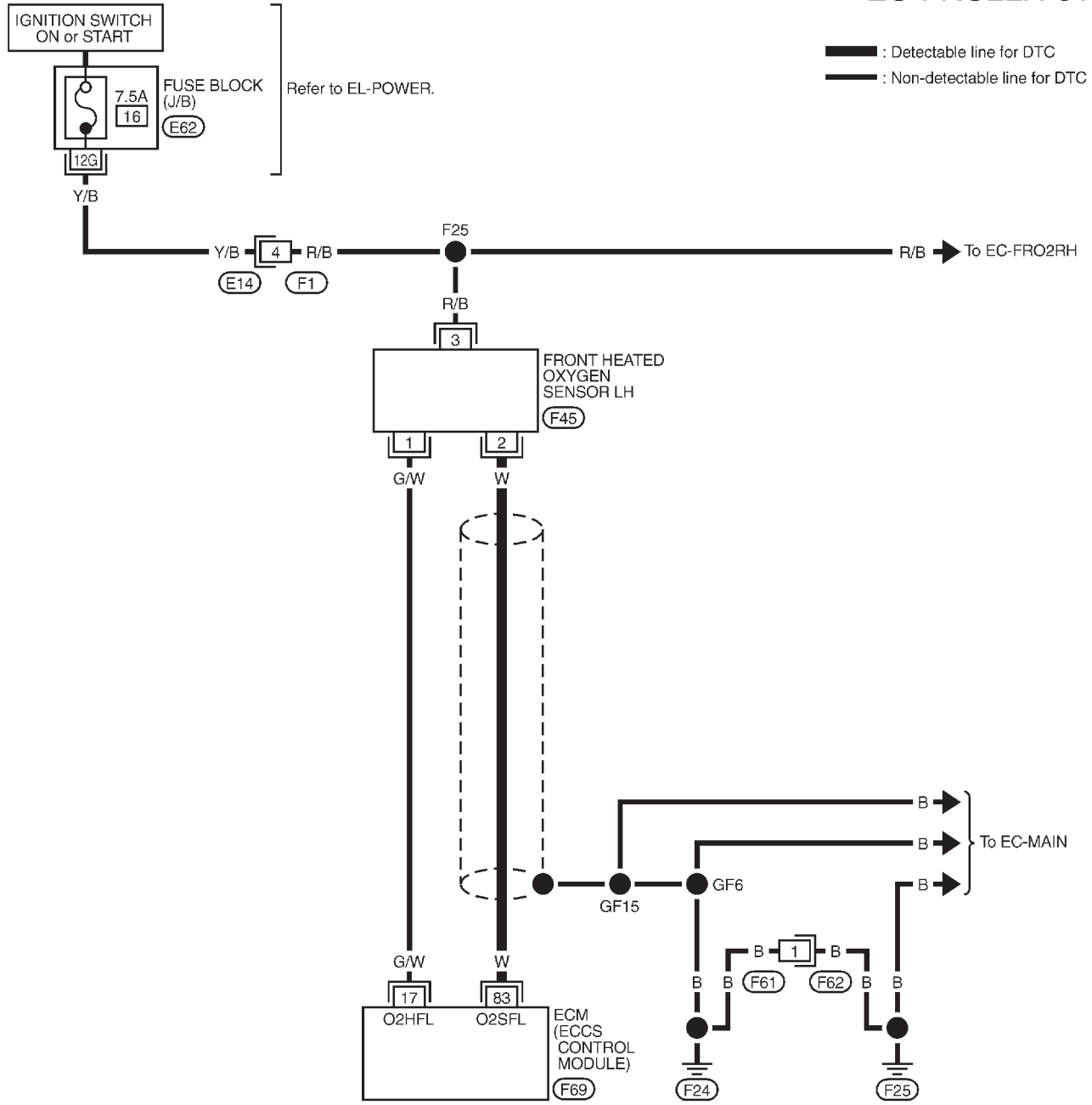
- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal ⑧② RH, ⑧③ LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR). See EC-68.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-191.

TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

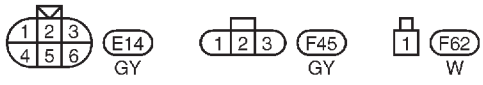
Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

LEFT BANK

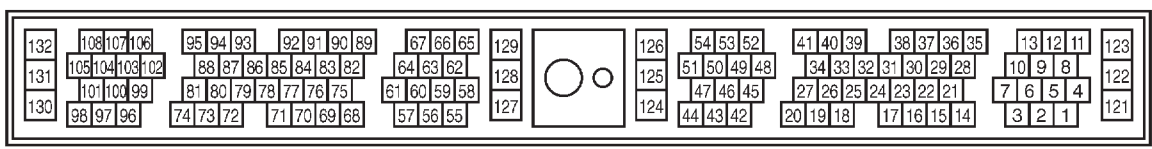
EC-FRO2LH-01



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- BT
- HA
- EL
- IDX



Refer to last page (Foldout page).

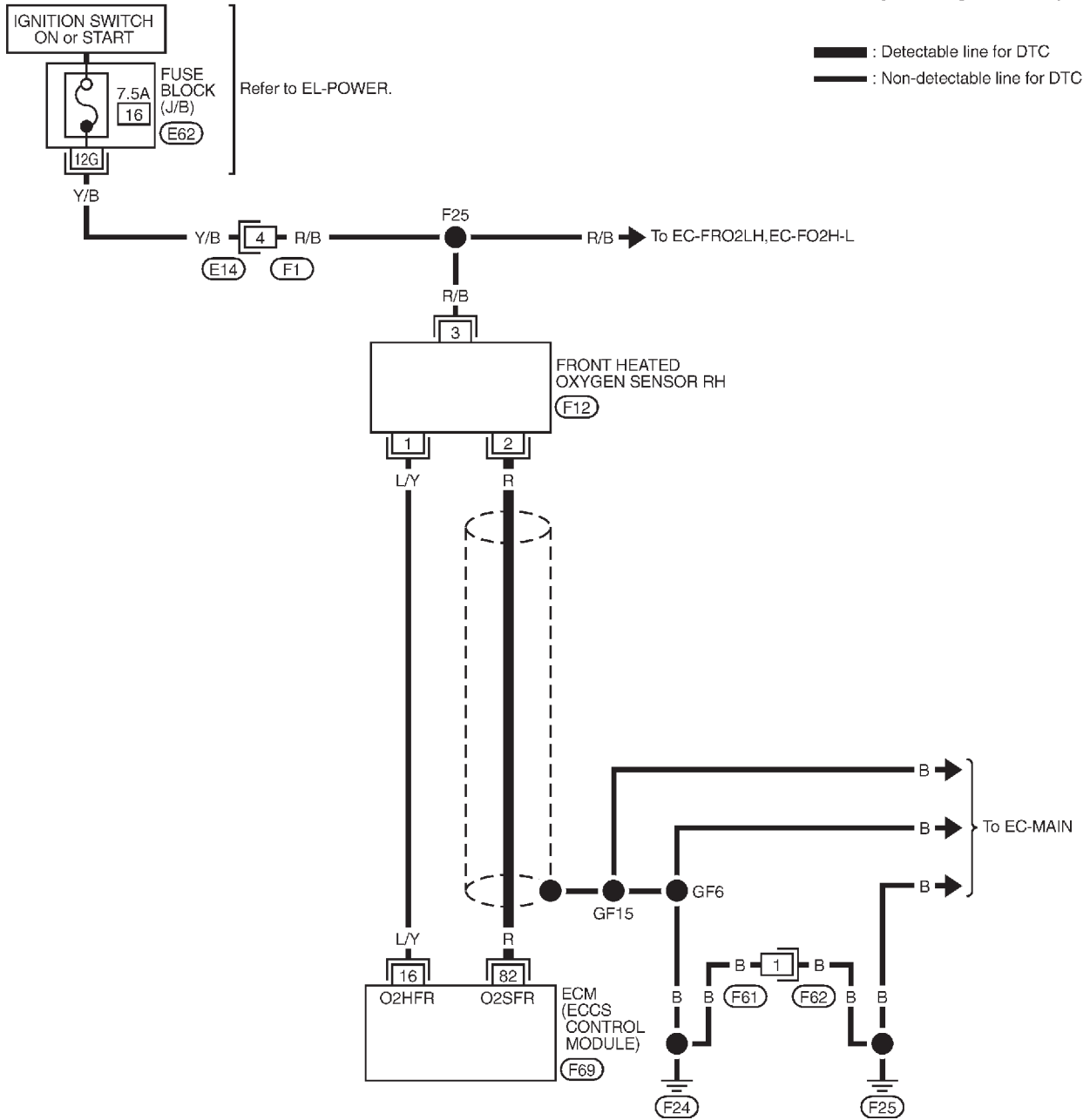


TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

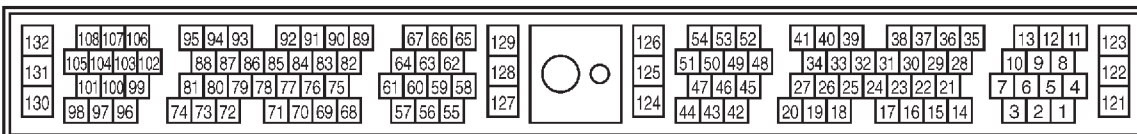
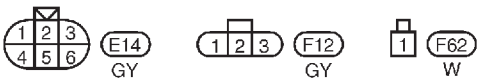
Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

RIGHT BANK

EC-FRO2RH-01



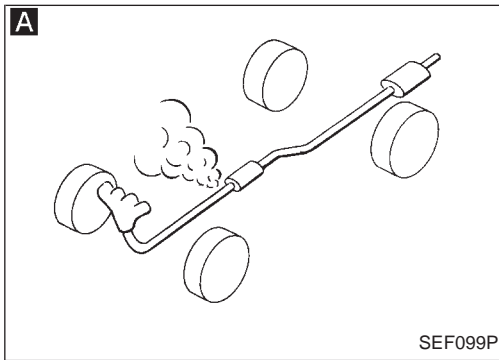
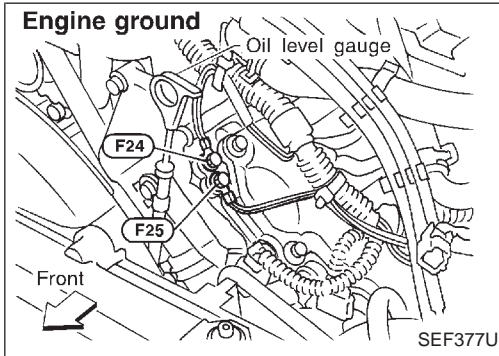
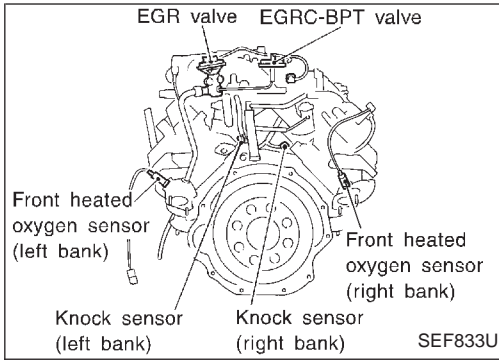
Refer to last page (Foldout page).
 (E62)



TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

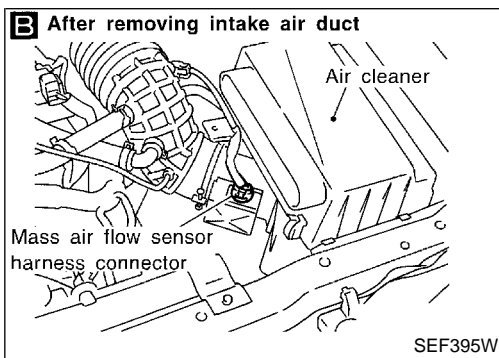
DIAGNOSTIC PROCEDURE



B

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 % B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X



INSPECTION START

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

Loosen and retighten front heated oxygen sensor.
Tightening torque:
 40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

A
CHECK EXHAUST AIR LEAK.
 Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.

NG → Repair or replace.

OK
CHECK FOR INTAKE AIR LEAK.
 Start engine and run it at idle. Listen for an intake air leak between the mass air flow sensor and the intake manifold.

NG → Repair or replace.

OK
B
CLEAR THE SELF-LEARNING DATA
 1. Start engine and warm it up to normal operating temperature.
 2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
 3. Clear the self-learning control coefficient by touching "CLEAR".
 4. Run engine for at least 10 minutes at idle speed.
Are the 1st trip DTCs P0171, P0174 or P0172, P0175 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", P0174, P0175, EC-243, 249.

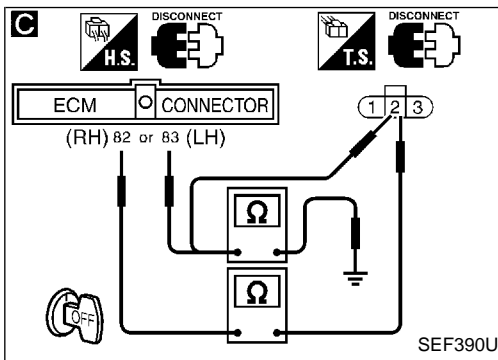
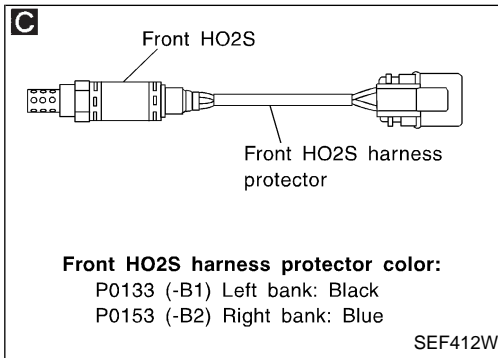
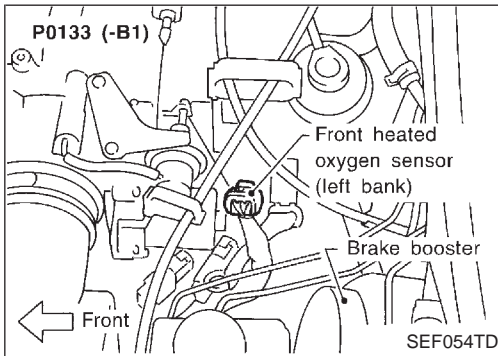
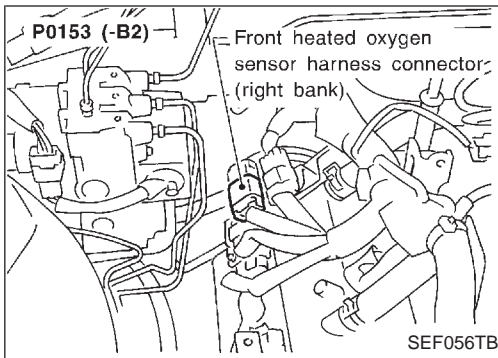
OR
 2. Turn ignition switch "OFF".
 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
 4. Stop engine and reconnect mass air flow sensor harness connector.
 5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
 6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
 7. Run engine for at least 10 minutes at idle speed.
Are the 1st trip DTCs 0115, 0210 or D114, 0209 detected? Is it difficult to start engine?

No
 A
 (Go to next page.)

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TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)



C

CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect corresponding front heated oxygen sensor harness connector and ECM harness connector.
 3. Check harness continuity between ECM and sensor terminals.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0133	83	2	LH (Black)
P0153	82	2	RH (Blue)

Continuity should exist.
 4. Check harness continuity between ECM and sensor or ground.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0133	83 or 2	Ground	LH (Black)
P0153	82 or 2	Ground	RH (Blue)

Continuity should not exist.
 If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
 (Front heated oxygen sensor heaters). Refer to "COMPONENT INSPECTION" on next page.

NG → **REPLACE FRONT HO2S.**
 1. Check front HO2S harness protector color.
Black: Left bank (-B1)
Blue: Right bank (-B2)
 2. Replace malfunctioning front HO2S.

OK

CHECK COMPONENT
 (Front heated oxygen sensors). Refer to "COMPONENT INSPECTION" on next page.

NG → **REPLACE FRONT HO2S.**
 1. Check front HO2S harness protector color.
Black: Left bank (-B1)
Blue: Right bank (-B2)
 2. Replace malfunctioning front HO2S.

OK

CHECK COMPONENT
 (Mass air flow sensor). Refer to "COMPONENT INSPECTION", EC-131.

NG → Replace mass air flow sensor.

OK

CHECK COMPONENT
 (PCV valve). Refer to "COMPONENT INSPECTION", EC-36.

NG → Repair or replace PCV valve.

OK

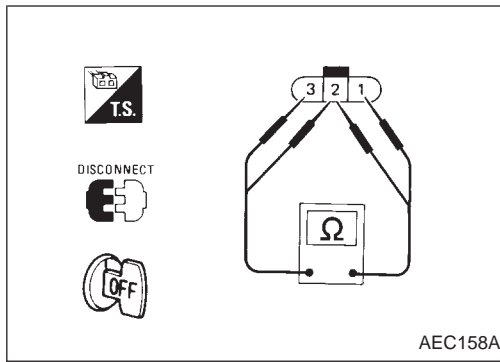
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

OK

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2)

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)



COMPONENT INSPECTION

Front heated oxygen sensor heater

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.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
A/F ALPHA-B1	XXX %

SEF746X

Front heated oxygen sensor



- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, 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-II 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 below:

cycle | 1 | 2 | 3 | 4 | 5 |
 FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

R = "FR O2 MNTR-B1 (-B2)", "RICH"

L = "FR O2 MNTR-B1 (-B2)", "LEAN"

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.30V at least once.
- 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.

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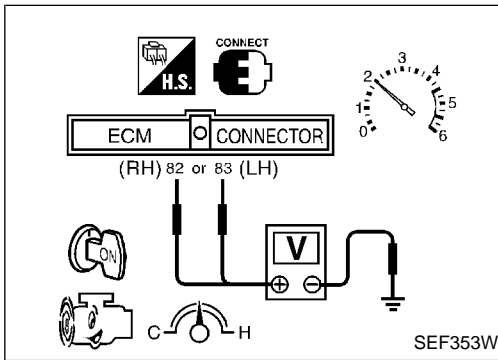
IDX

Front Heated Oxygen Sensor (Response monitoring) (Front HO2S) (P0133: Left bank), (P0153: Right bank) (Cont'd)

SPREADSHEET		
REPLAY MODE	REPLAY MODE	
NUMERICAL	SHOW TRIGGER	
	CMPS-RPM	FR O2 SEN
	rpm	v
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX

- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

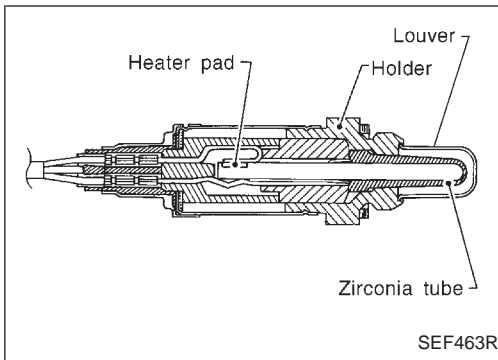
SEF875XA



OR



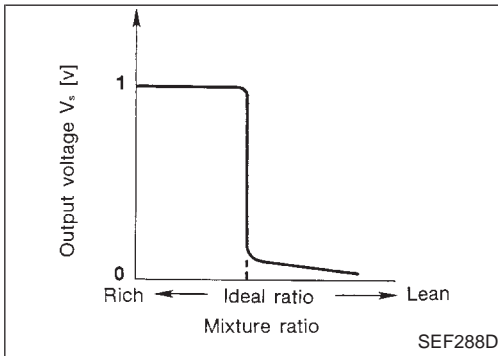
- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal ⑧2 RH, ⑧3 LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR). See EC-68.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.30V at least one time.
 - The voltage never exceeds 1.0V.



Front Heated Oxygen Sensor (High voltage) (Front HO2S) (P0134: Left bank), (P0154: Right bank)

COMPONENT DESCRIPTION

The front heated oxygen sensor is placed into the exhaust manifold. 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-II REFERENCE VALUE IN DATA MONITOR MODE

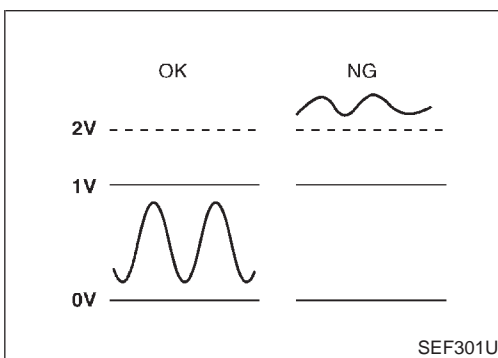
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	<ul style="list-style-type: none"> Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
82 (RH)	R	Front heated oxygen sensor	Engine is running.	0 - Approximately 1.0V (periodically change)
83 (LH)	W		After warming up to normal operating temperature and engine speed is 2,000 rpm.	



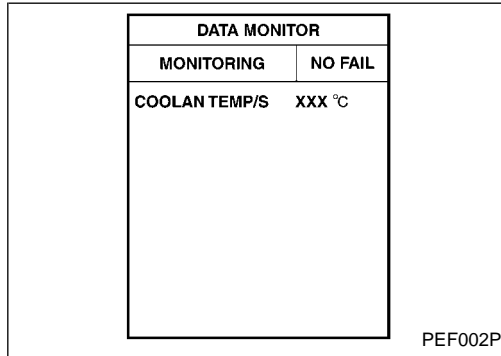
ON BOARD DIAGNOSIS LOGIC

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

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**Front Heated Oxygen Sensor (High voltage)
(Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)**

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 0142 (Left bank)	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Front heated oxygen sensor
P0154 0509 (Right bank)		



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 32 seconds.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-199.

OR



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 32 seconds.
- 4) Turn ignition switch "OFF" and wait at least 5 seconds.
- 5) Restart engine and let it idle for 32 seconds.
- 6) Select "MODE 3" with GST.
- 7) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-199.

OR



Not 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 32 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-199.

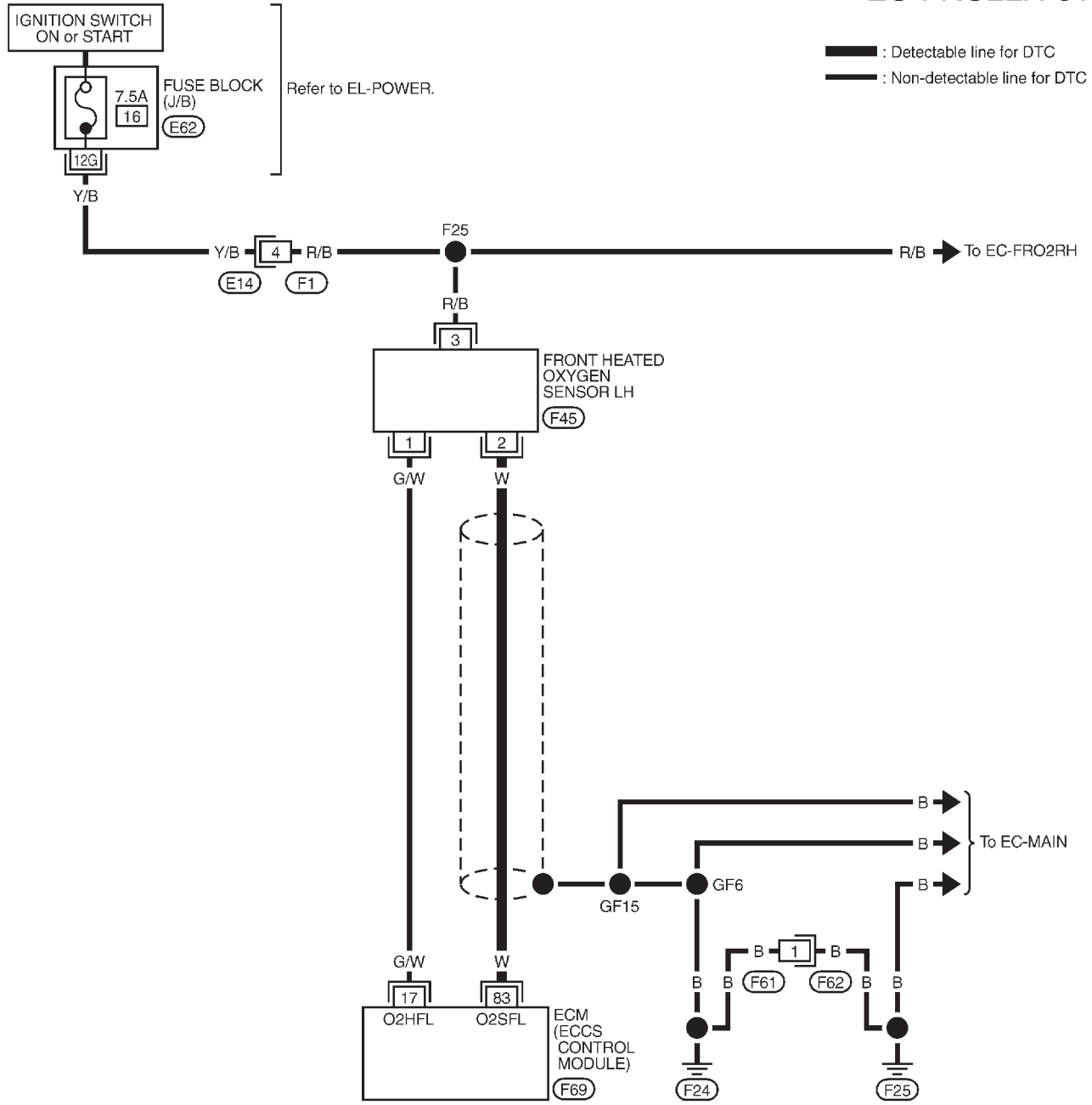
- When using GST, "DTC CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

TROUBLE DIAGNOSIS FOR DTC P0134 (-B1), P0154 (-B2)

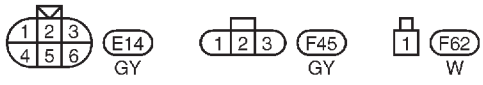
Front Heated Oxygen Sensor (High voltage)
(Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)

LEFT BANK

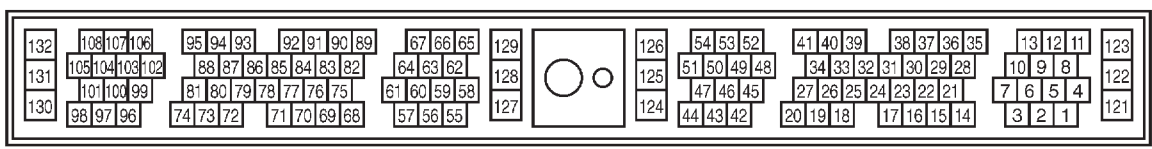
EC-FRO2LH-01



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Refer to last page (Foldout page).

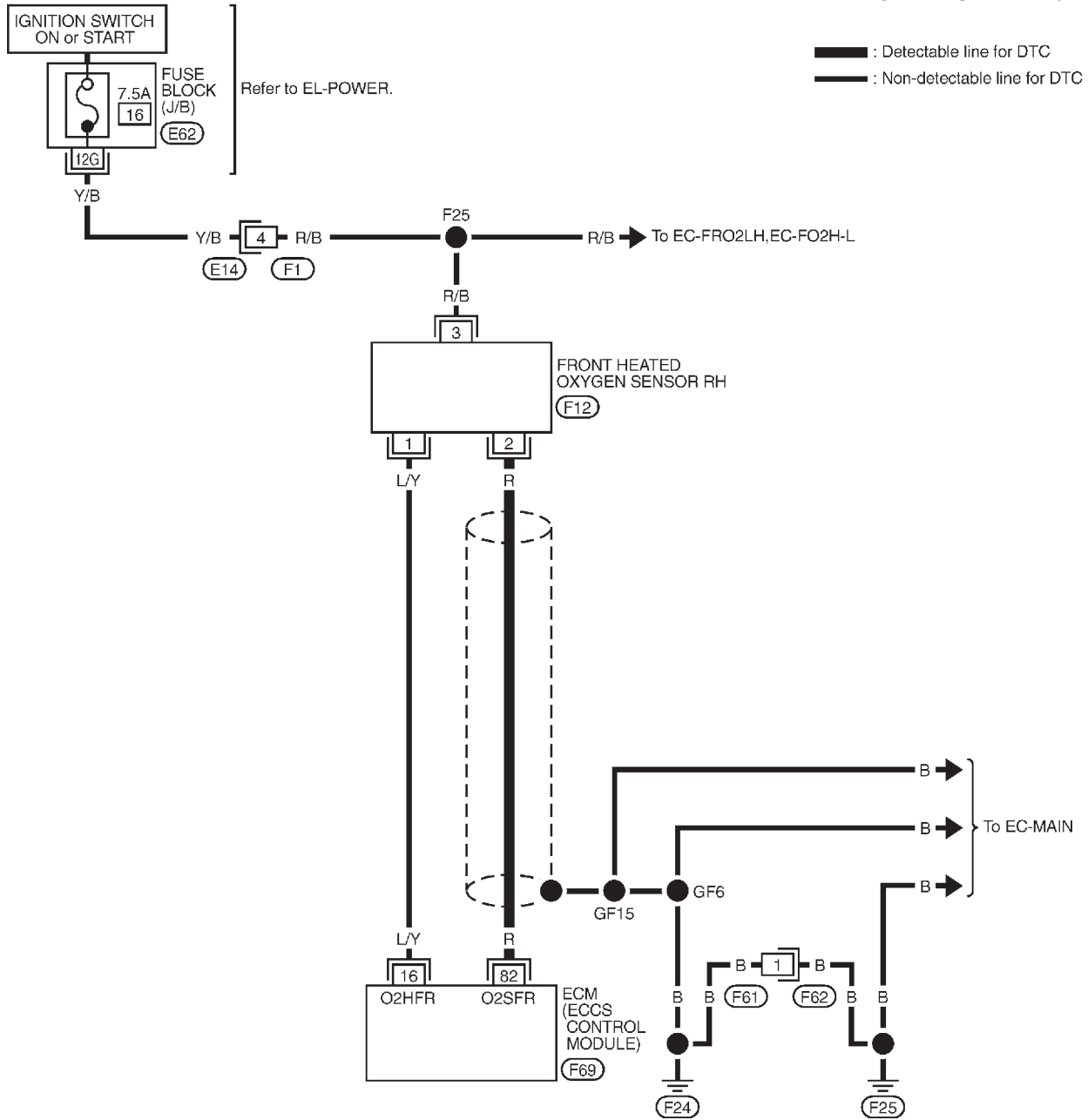


TROUBLE DIAGNOSIS FOR DTC P0134 (-B1), P0154 (-B2)

Front Heated Oxygen Sensor (High voltage) (Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)

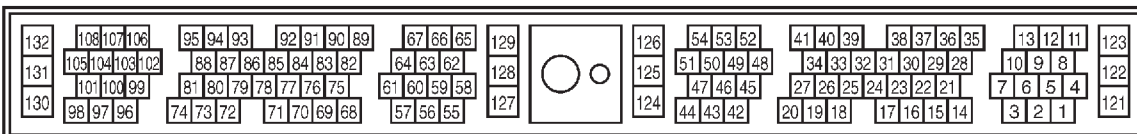
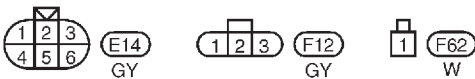
RIGHT BANK

EC-FRO2RH-01



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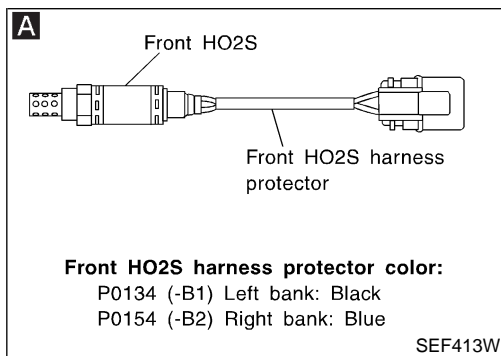
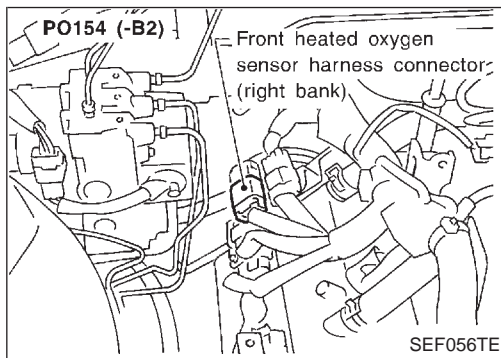
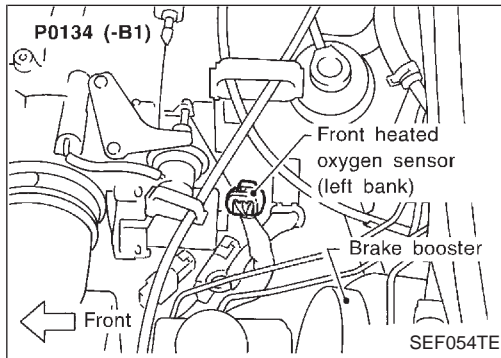
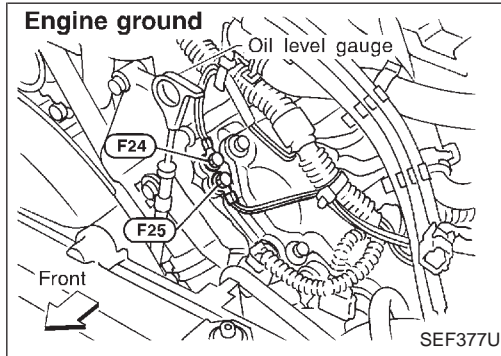
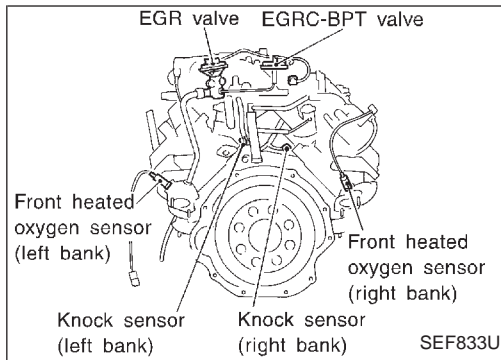
(E62)



TROUBLE DIAGNOSIS FOR DTC P0134 (-B1), P0154 (-B2)

Front Heated Oxygen Sensor (High voltage) (Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

Loosen and retighten front heated oxygen sensor.

Tightening torque:
40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect corresponding front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM and sensor terminals.

NG → Repair harness or connectors.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0134	83	2	LH (Black)
P0154	82	2	RH (Blue)

Continuity should exist.

4. Check harness continuity between ECM and sensor or ground.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0134	83 or 2	Ground	LH (Black)
P0154	82 or 2	Ground	RH (Blue)

Continuity should not exist.

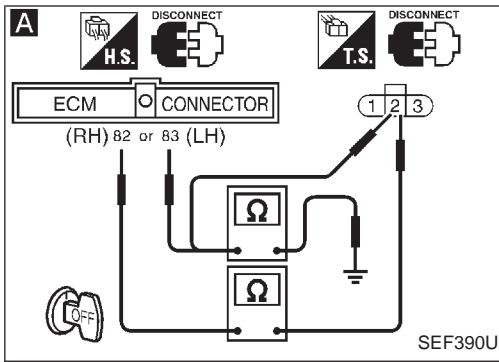
If OK, check harness for short to ground and short to power.

OK
↓
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TROUBLE DIAGNOSIS FOR DTC P0134 (-B1), P0154 (-B2)

Front Heated Oxygen Sensor (High voltage) (Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)



CHECK COMPONENT
(Front heated oxygen sensor).

1. Turn ignition switch "OFF".
2. Disconnect sensor harness connector and check for water.
Water should not exist.
If OK, go to step 3.
3. Check front heated oxygen sensor.
Refer to "COMPONENT INSPECTION" on next page.

REPAIR OR REPLACE FRONT HO2S.
Repair or replace harness and/or connectors as follows.

1. Check front HO2S harness protector color.
Black: Left bank (-B1)
Blue: Right bank (-B2)
2. Repair or replace malfunctioning front HO2S.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

OK

INSPECTION END

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
A/F ALPHA-B1	XXX %

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Front Heated Oxygen Sensor (High voltage) (Front HO2S) (P0134: Left bank), (P0154: Right bank) (Cont'd)

COMPONENT INSPECTION

Front heated oxygen sensor

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, 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-II 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 below:

cycle | 1 | 2 | 3 | 4 | 5 |

FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

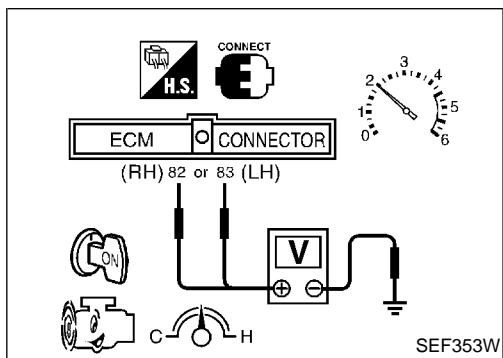
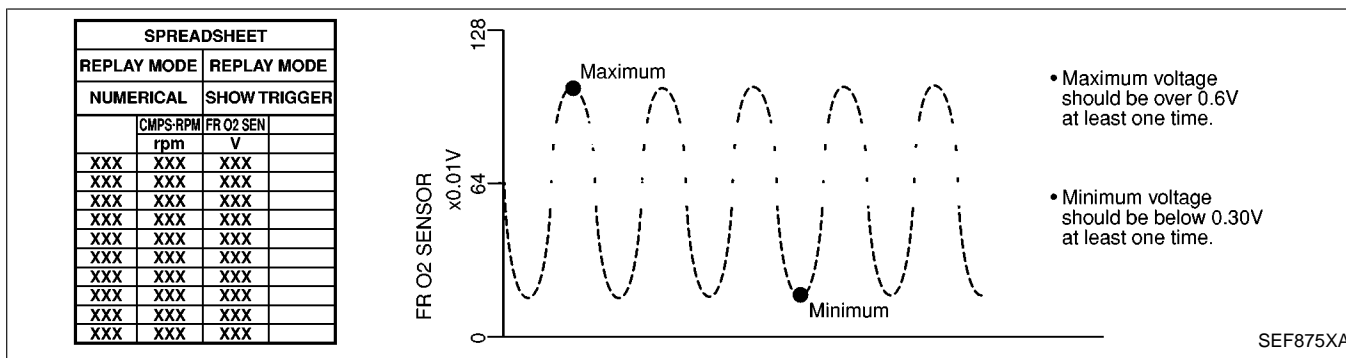
R = "FR O2 MNTR-B1 (-B2)", "RICH"

L = "FR O2 MNTR-B1 (-B2)", "LEAN"

- "FR O2 SEN-B1 (-B2)" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1 (-B2)" voltage goes below 0.30V at least once.
- 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.

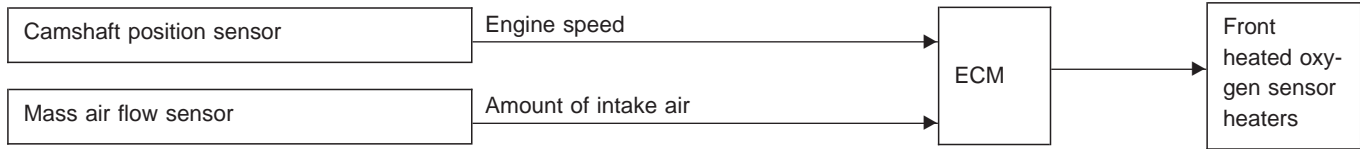


OR

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal ⑧ RH, ⑧ LH (sensor signal) and ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR). See EC-68.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.30V at least one time.
 - The voltage never exceeds 1.0V.

Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank)

SYSTEM DESCRIPTION



The ECM performs ON/OFF control of the front heated oxygen sensor heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
O2 SEN HTR-B1	<ul style="list-style-type: none"> Engine speed: Idle 	ON
O2 SEN HTR-B2	<ul style="list-style-type: none"> Engine speed: Above 3,200 	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
17 (LH)	G/W	Front heated oxygen sensor heaters (left bank)	Engine is running. └ Engine speed is below 3,200 rpm.	0 - 0.5V
16 (RH)	L/Y		Engine is running. └ Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0135 0901 (Left bank)	<ul style="list-style-type: none"> The current amperage in the front heated oxygen sensor heater circuit is out of the normal range. (The improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.) 	<ul style="list-style-type: none"> Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) Front heated oxygen sensor heater
P0155 1001 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
FR O2 HTR-B1	ON

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Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE 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 10.5.



- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 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-206.

OR



- 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) Restart 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-206.

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

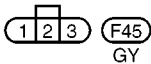
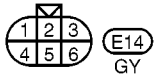
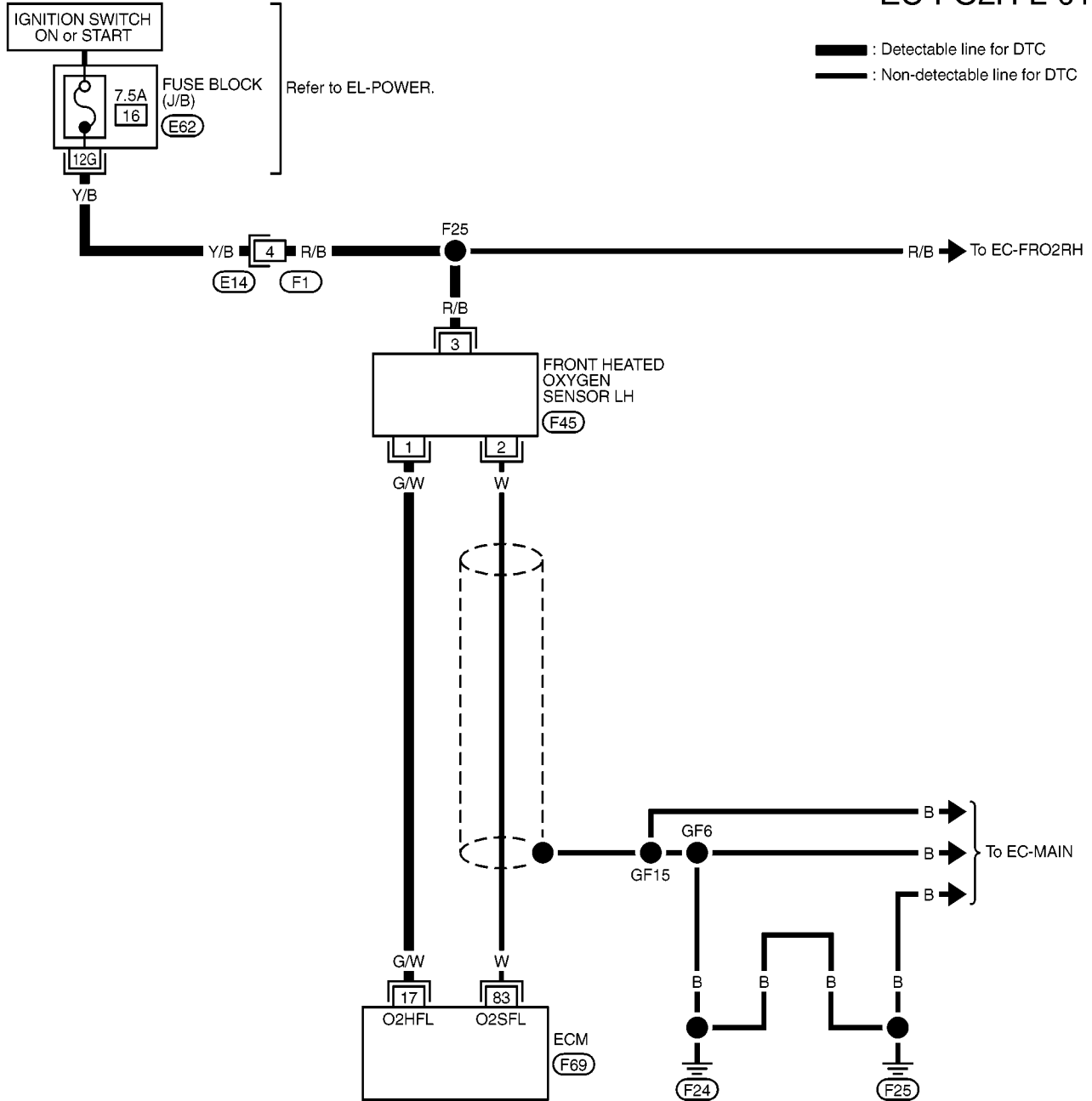
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TROUBLE DIAGNOSIS FOR DTC P0135 (-B1), P0155 (-B2)

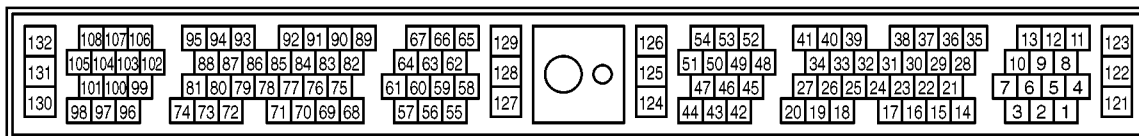
Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank) (Cont'd)

LEFT BANK

EC-FO2H-L-01



Refer to last page (Foldout page).
(E62)

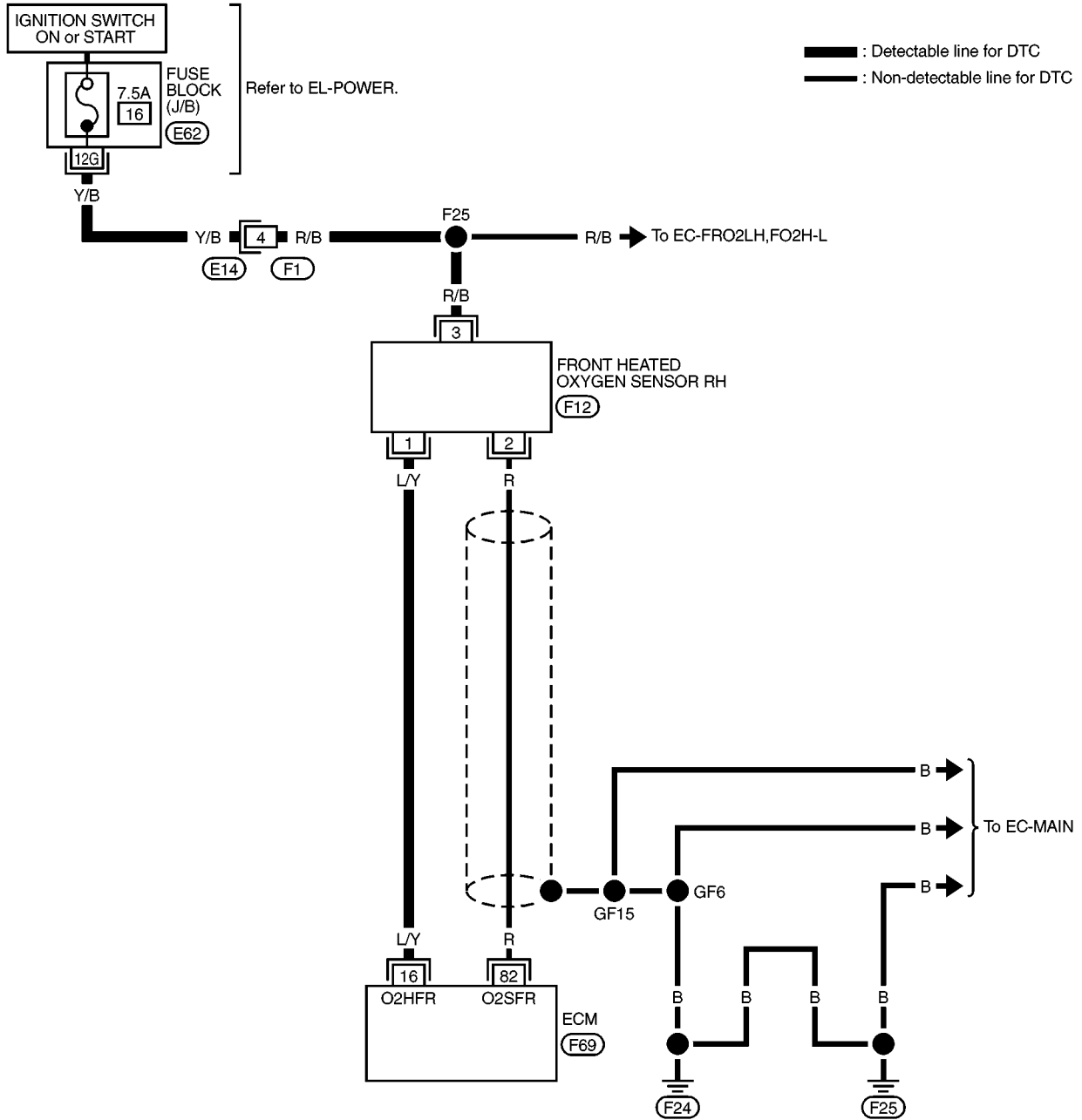


TROUBLE DIAGNOSIS FOR DTC P0135 (-B1), P0155 (-B2)

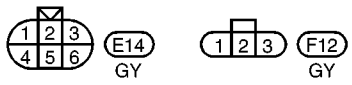
Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank) (Cont'd)

RIGHT BANK

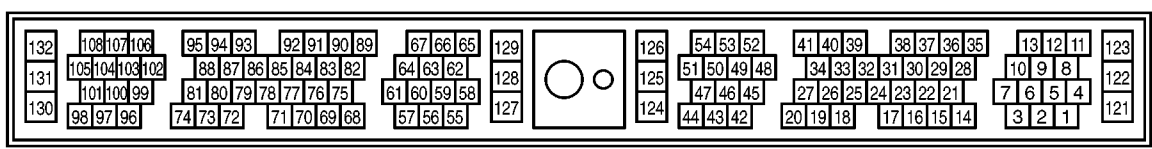
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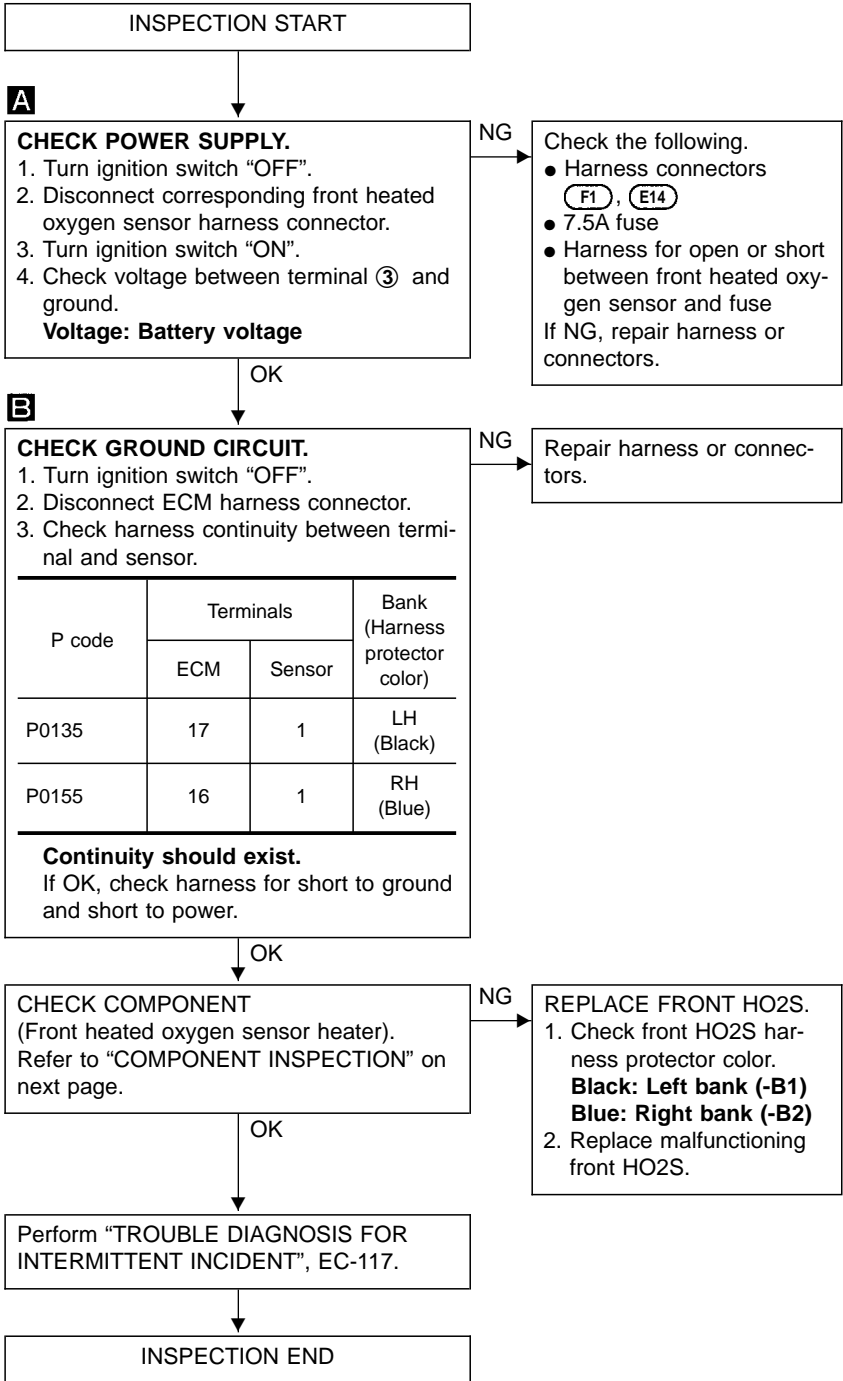
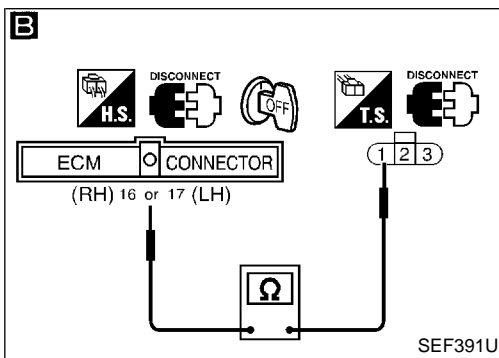
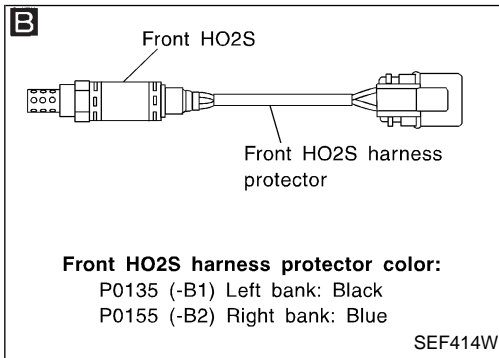
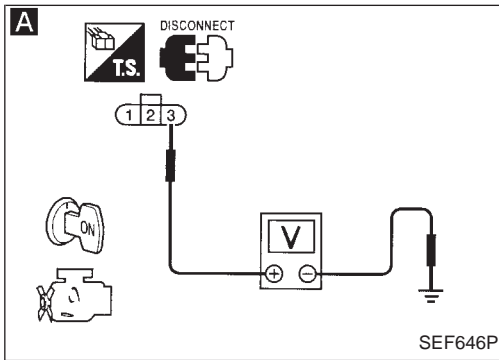
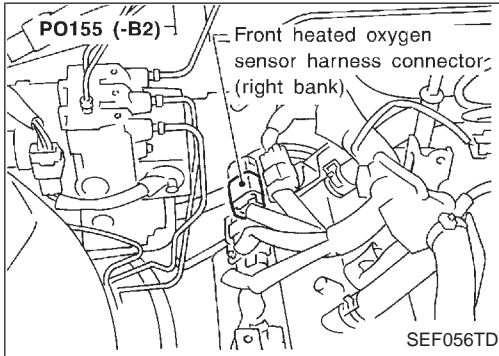
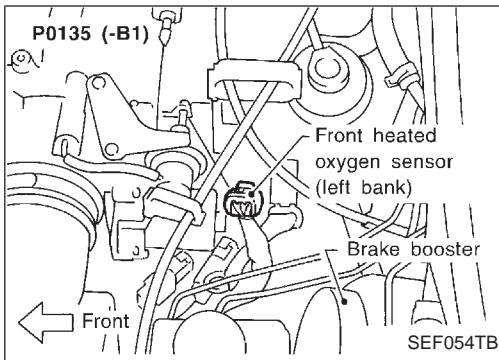
Refer to last page (Foldout page).
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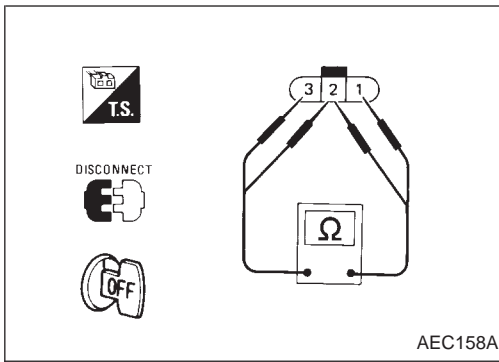


TROUBLE DIAGNOSIS FOR DTC P0135 (-B1), P0155 (-B2)

Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE





Front Heated Oxygen Sensor Heater (P0135: Left bank), (P0155: Right bank) (Cont'd)

COMPONENT INSPECTION

Front heated oxygen sensor heater

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.

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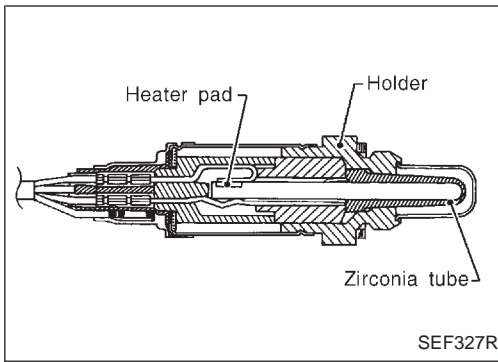
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Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensor (Rear HO2S), 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-II REFERENCE VALUE IN DATA MONITOR MODE

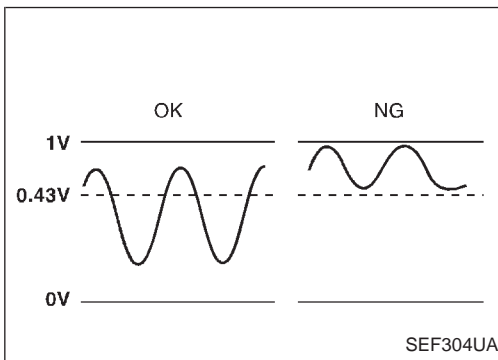
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
89 (RH)	W	Rear heated oxygen sensors	Engine is running.	0 - Approximately 1.0V
90 (LH)	Y		After warming up to normal operating temperature and revving engine from idle up to 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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 the sensor is sufficiently low during the various driving condition such as fuel-cut.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137 0511 (Left bank)	● The minimum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open.) ● Rear heated oxygen sensors ● Fuel pressure ● Injectors
P0157 0314 (Right bank)		

RR O2 SEN-B1 P0137	
COND1: OUT OF COMD	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF911X

RR O2 SEN-B1 P0137	
COND1: TESTING	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF912X

RR O2 SEN-B1 P0137	
COND1: COMPLETED	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF913X

RR O2 SEN-B1 P0137	
COND1: COMPLETED	
COND2: COMPLETED	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF914X

RR O2 SEN-B1 P0137	
COMPLETED	
SELF-DIAG RESULTS	

SEF915X

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT-II screen when all tests “COND1”, “COND2” and “COND3” are completed.
- If “DIAGNOSTIC TROUBLE CODE 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).



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-II.
- 4) Touch “START”.
- 5) Start engine (TCS switch “OFF”) 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-II screen, go to step 10).
If “COMPLETED” does not appear on CONSULT-II 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-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

CMPS-RPM (POS): 1,200 - 2,500 rpm
Vehicle speed: 64 - 100 km/h (40 - 62 MPH)
B/FUEL SCHDL: 0.5 - 4.9 msec
Selector lever: Suitable position

NOTE:

- If “TESTING” is not displayed after 5 minutes, retry from step 2).
- If “COMPLETED” already appears at “COND2” on CONSULT-II screen before “Procedure for COND2” is conducted, it is unnecessary to conduct step 9).

Procedure for COND2

- 9) While driving release accelerator pedal completely with “OD” OFF from the above condition (step 8) until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

- If “TESTING” is not displayed after 5 minutes, retry from step 2).
- If “COMPLETED” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 10).

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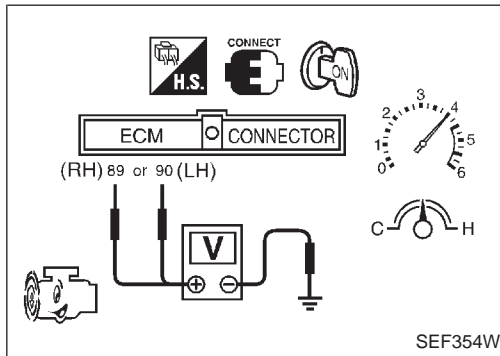
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Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO₂S) (P0137: Left bank), (P0157: Right bank) (Cont'd)

Procedure for COND3

- 10) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
- 11) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-213.



OR

OVERALL FUNCTION CHECK

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.



- 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 terminals 89 (RH), 90 (LH) (sensor signal) and ground.
- 4) Check the voltage when revving engine 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 0.43V 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 D position with "OD" OFF.

The voltage should be below 0.43V at least once during this procedure.

- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-213.

TROUBLE DIAGNOSIS FOR DTC P0137 (-B1), P0157 (-B2)

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)

LEFT BANK

EC-RRO2LH-01

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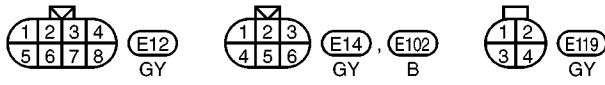
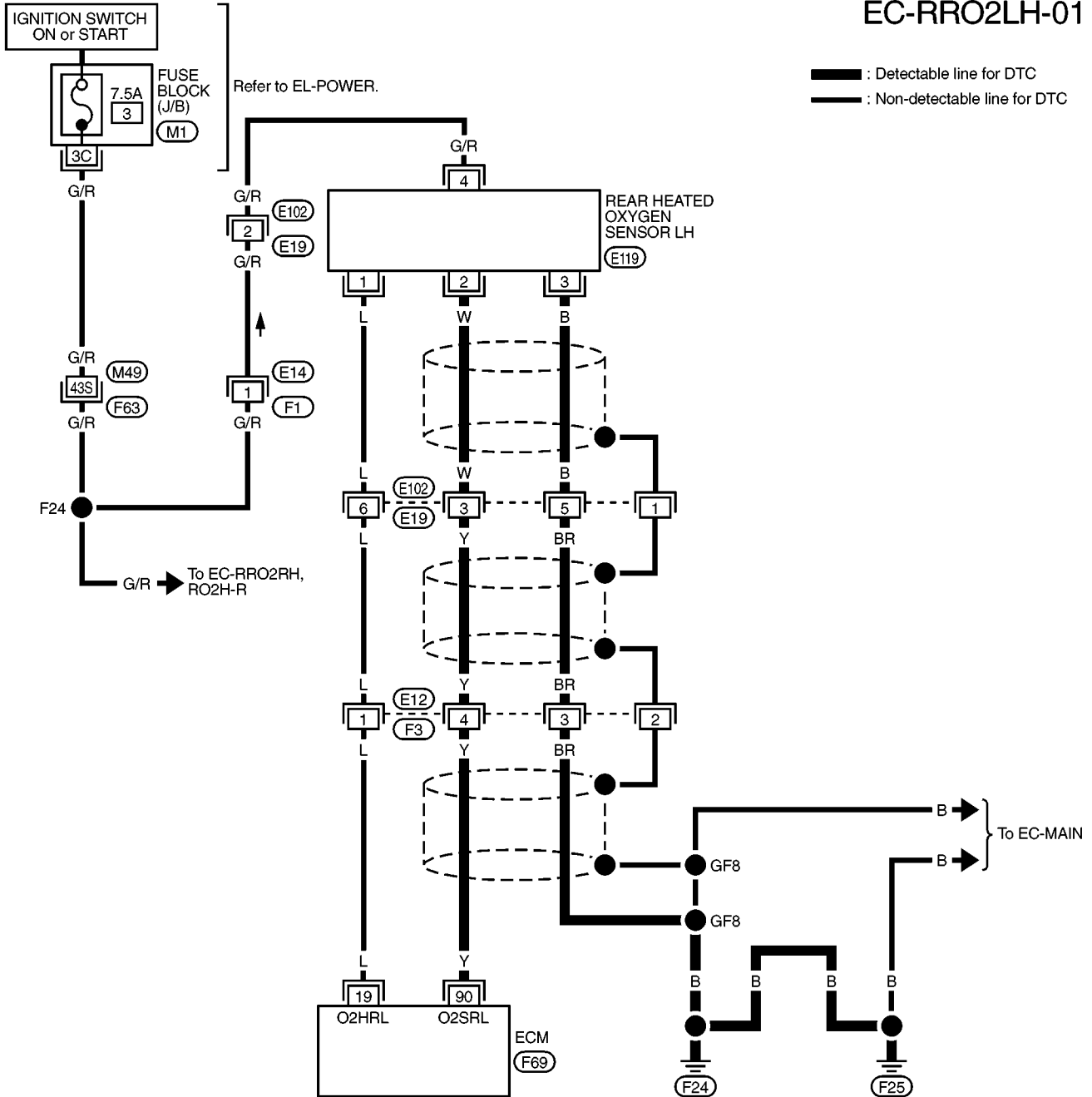
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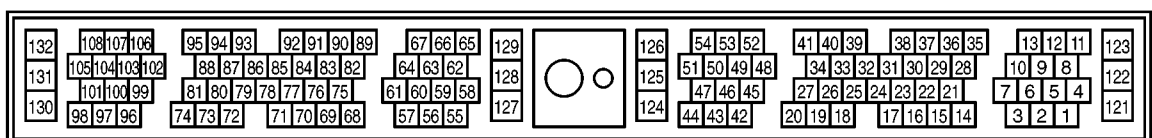
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Refer to last page (Foldout page).
 (M49), (F63)
 (M1)

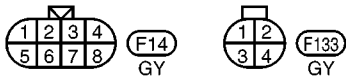
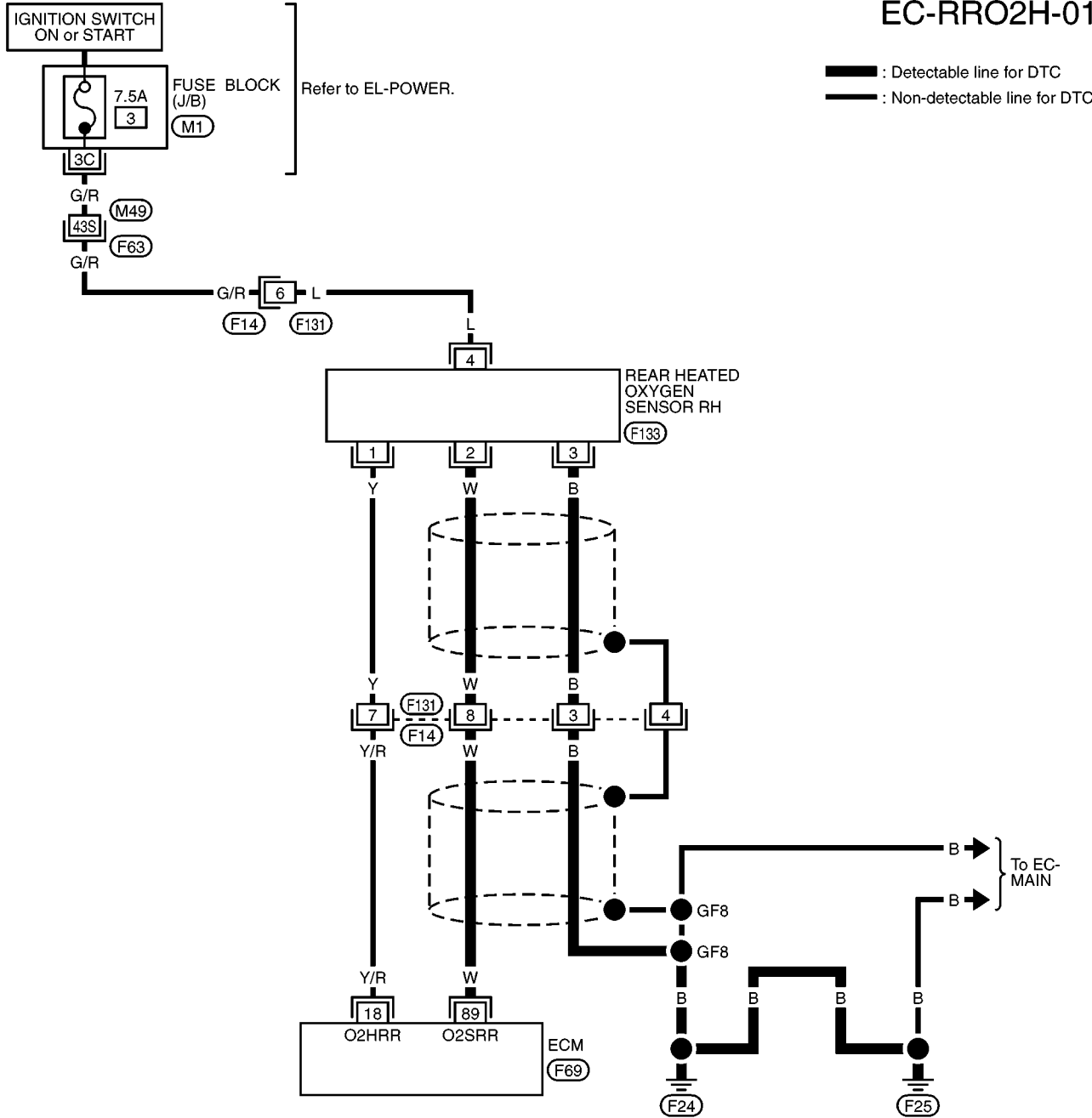


TROUBLE DIAGNOSIS FOR DTC P0137 (-B1), P0157 (-B2)

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)

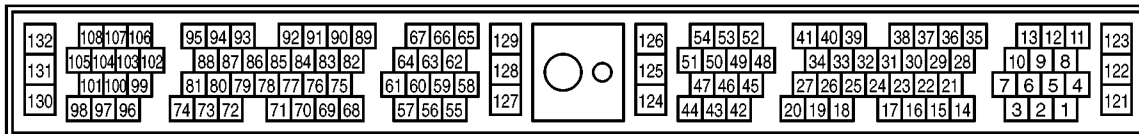
RIGHT BANK

EC-RRO2H-01



Refer to last page (Foldout page).

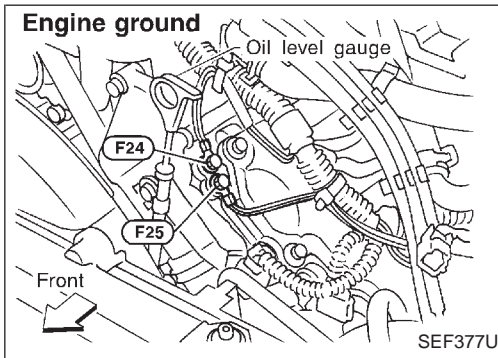
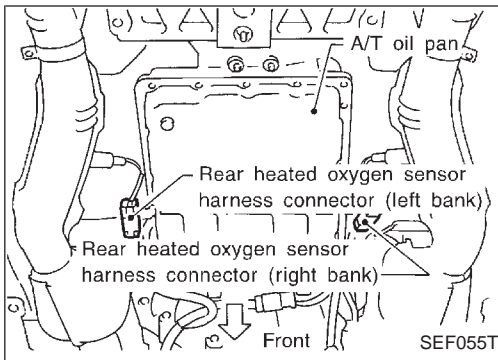
M49, F63
M1



TROUBLE DIAGNOSIS FOR DTC P0137 (-B1), P0157 (-B2)

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)

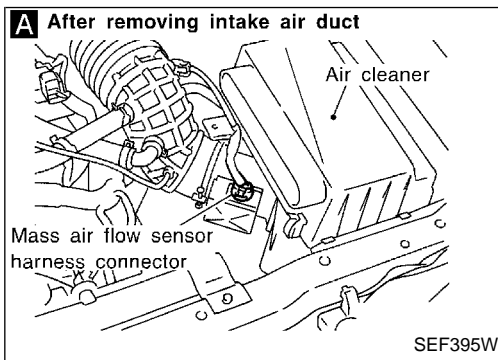
DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 %
	B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X



INSPECTION START

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

A

CLEAR THE SELF-LEARNING DATA

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs P0172, P0175 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0172, P0175", EC-249.

OR

2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs 0114, 0209 detected? Is it difficult to start engine?

No

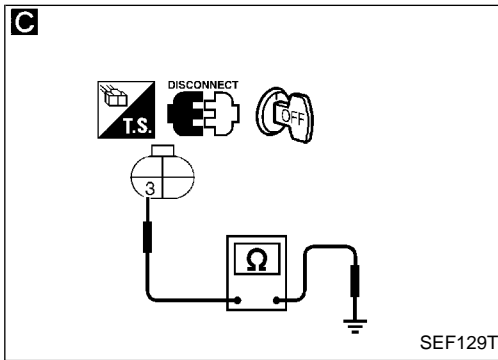
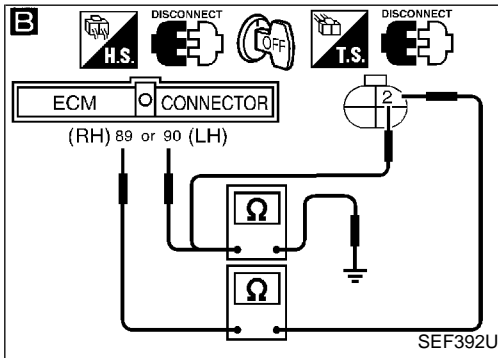
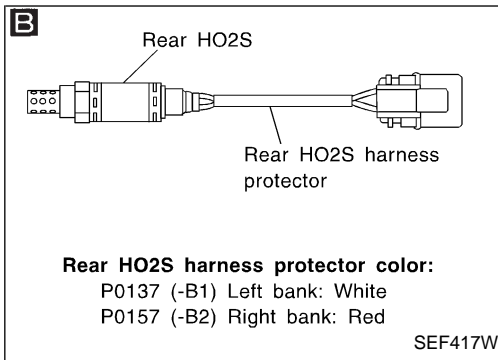
A

(Go to next page.)

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TROUBLE DIAGNOSIS FOR DTC P0137 (-B1), P0157 (-B2)

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)



B

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect corresponding rear heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and sensor.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0137	90	2	LH (White)
P0157	89	2	RH (Red)

Continuity should exist.

4. Check harness continuity between ECM and sensor or ground terminals.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0137	90 or 2	Ground	LH (White)
P0157	89 or 2	Ground	RH (Red)

Continuity should not exist.
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F3, E12) (LH) or (F14, F131) (RH)
- Harness connectors (E19, E102) (LH)

If NG, repair open circuit or short to ground or short to power in harness or connectors.

C

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Loosen and retighten ground screws.
3. Check harness continuity between terminal ③ and engine ground.

Continuity should exist.
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F3, E12) (LH) or (F14, F131) (RH)
- Harness connectors (E19, E102) (LH)
- Harness connectors (F62, F61)
- Harness for open or short between rear heated oxygen sensor and engine ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.

CHECK COMPONENT
(Rear heated oxygen sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG

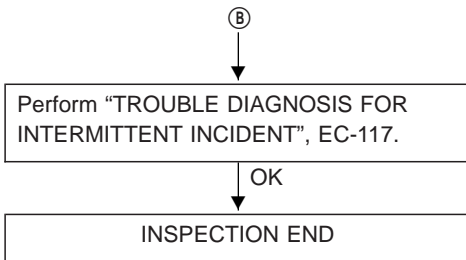
REPLACE REAR HO2S.

1. Check rear HO2S harness protector color.
White: Left bank (-B1)
Red: Right bank (-B2)
2. Replace malfunctioning rear HO2S.

OK

B
(Go to next page.)

Rear Heated Oxygen Sensor (Min. Voltage Monitoring) (Rear HO2S) (P0137: Left bank), (P0157: Right bank) (Cont'd)



GI
MA
EM

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
INJ PULSE-B1	XXX msec
IACV-AAC/V	XXX step

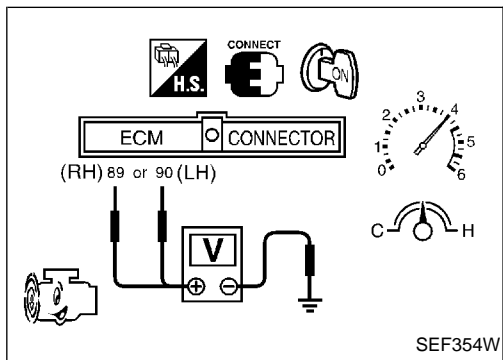
SEF763X

COMPONENT INSPECTION

Rear heated oxygen sensor

- 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-II.
- 4) Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
**"RR O2 SEN-B1 (-B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
 "RR O2 SEN-B1 (-B2)" should be below 0.43V at least once when the "FUEL INJECTION" is -25%.**

LC
EC



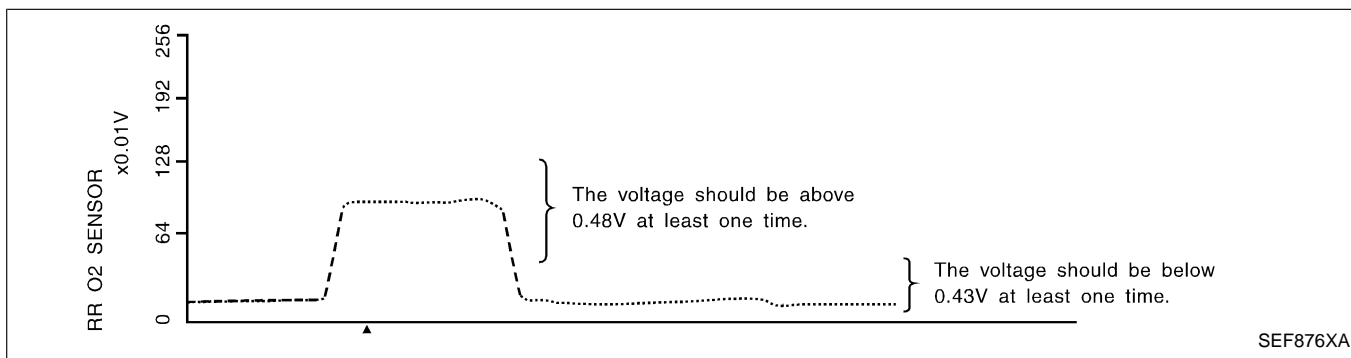
- OR
- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
 - 2) Stop vehicle with engine running.
 - 3) Set voltmeter probes between ECM terminals 89 (RH), 90 (LH) (sensor signal) and ground.
 - 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
**The voltage should be above 0.48V at least once.
 If the voltage is above 0.48V 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 D position with "OD" OFF.
The voltage should be below 0.43V at least once.

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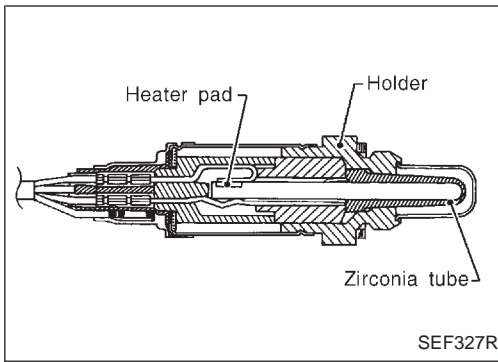
CAUTION:

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

BT
HA
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IDX



Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensor (Rear HO2S), 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-II REFERENCE VALUE IN DATA MONITOR MODE

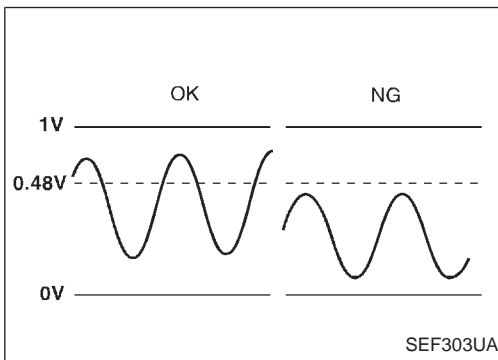
Specification data are reference values.

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 ↔ 0.6 - 1.0V

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
90 (LH)	Y	Rear heated oxygen sensor	Engine is running.	0 - Approximately 1.0V
89 (RH)	W		After warming up to normal operating temperature and revving engine from idle up to 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138 (-B1) 0510 (Left bank)	● The maximum voltage from the sensor is not reached to the specified voltage.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Rear heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks
P0158 (-B2) 0313 (Right bank)		

RR O2 SEN-B1 P0138	
COND1: OUT OF COMD	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF916X

RR O2 SEN-B1 P0138	
COND1: TESTING	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF917X

RR O2 SEN-B1 P0138	
COND1: COMPLETED	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF918X

RR O2 SEN-B1 P0138	
COND1: COMPLETED	
COND2: COMPLETED	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF919X

RR O2 SEN-B1 P0138	
COMPLETED	
SELF-DIAG RESULTS	

SEF920X

Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- “COMPLETED” will appear on CONSULT-II screen when all tests “COND1”, “COND2” and “COND3” are completed.
- If “DIAGNOSTIC TROUBLE CODE 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).



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-II.
- 4) Touch “START”.
- 5) Start engine (TCS switch “OFF”) and let it idle for at least 30 seconds.
- 6) Rev engine to 2,000 rpm 2 or 3 times quickly under no load.
If “COMPLETED” appears on CONSULT-II screen, go to step 10).
If “COMPLETED” does not appear on CONSULT-II 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-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.)

CMPS-RPM (POS): 1,200 - 2,500 rpm
Vehicle speed: 64 - 100 km/h (40 - 62 MPH)
B/FUEL SCHDL: 0.5 - 4.9 msec
Selector lever: Suitable position

NOTE:

- If “TESTING” is not displayed after 5 minutes, retry from step 2).
- If “COMPLETED” already appears at “COND2” on CONSULT-II screen before “Procedure for COND2” is conducted, it is unnecessary to conduct step 9).

Procedure for COND2

- 9) While driving, release accelerator pedal completely with “OD” OFF from the above condition [step 8] until “INCOMPLETE” at “COND2” on CONSULT-II screen is turned to “COMPLETED”. (It will take approximately 4 seconds.)

NOTE:

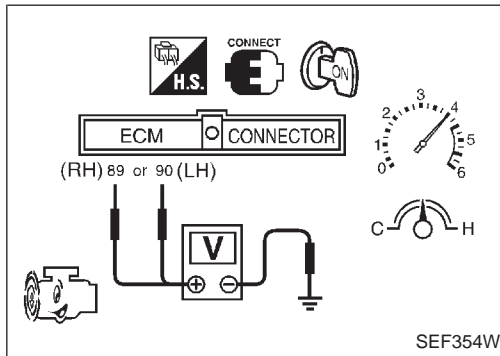
If “COMPLETED” is already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 10).

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Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

Procedure for COND3

- 10) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take maximum of approximately 6 minutes.)
- 11) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-221.



OR

OVERALL FUNCTION CHECK

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.



- 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 terminals 89 (RH), 90 (LH) (sensor signal) and ground.
- 4) Check the voltage when revving engine 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 0.48V 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 D position with "OD" OFF.
The voltage should be above 0.48V at least once during this procedure.
- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-221.

TROUBLE DIAGNOSIS FOR DTC P0138 (-B1), P0158 (-B2)

Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

LEFT BANK

EC-RRO2LH-01

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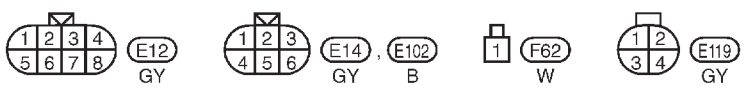
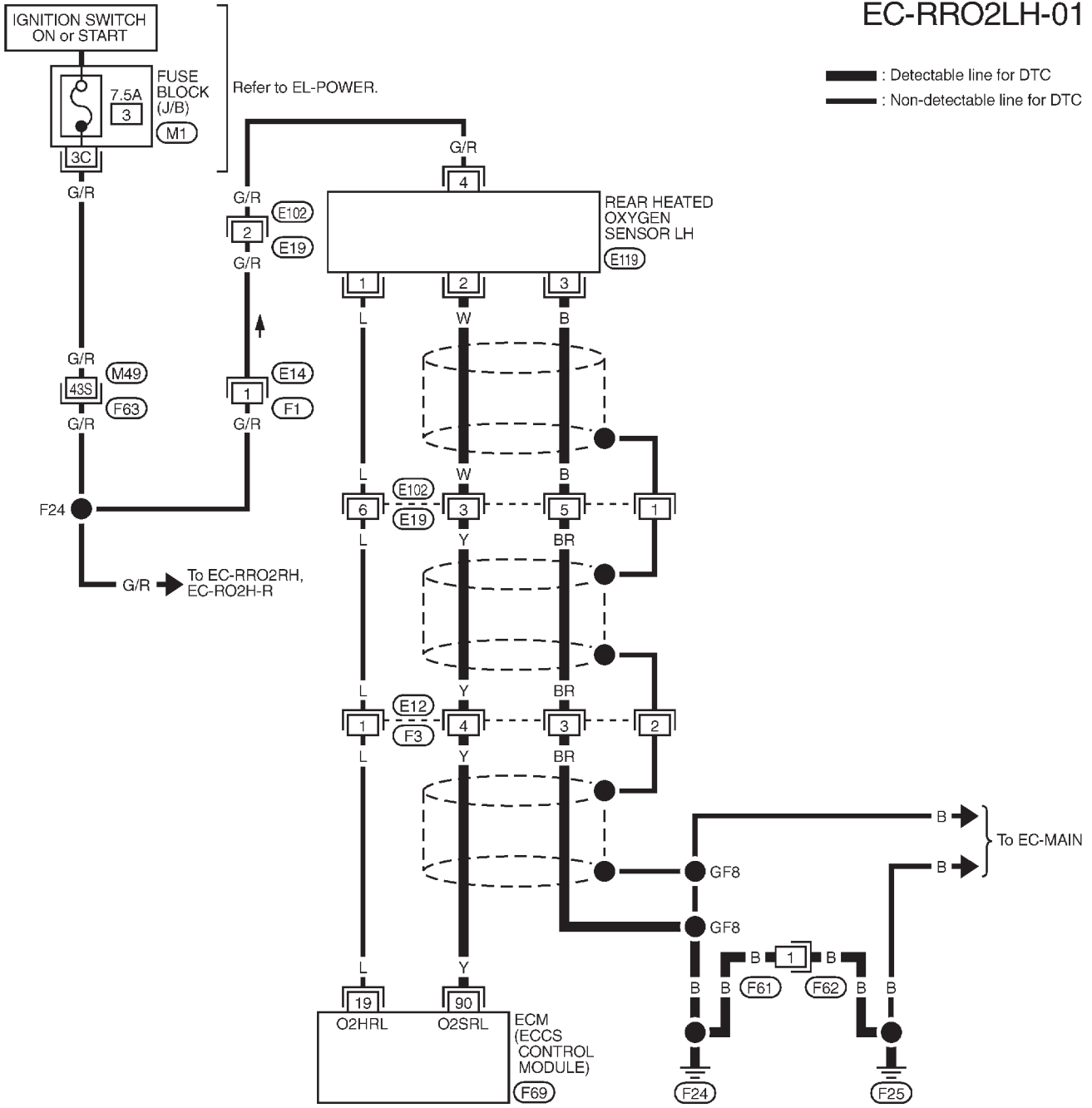
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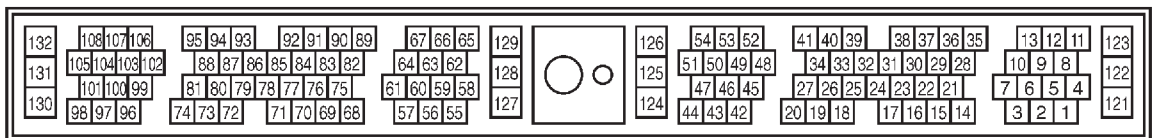
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(M49), (F63)
(M1)

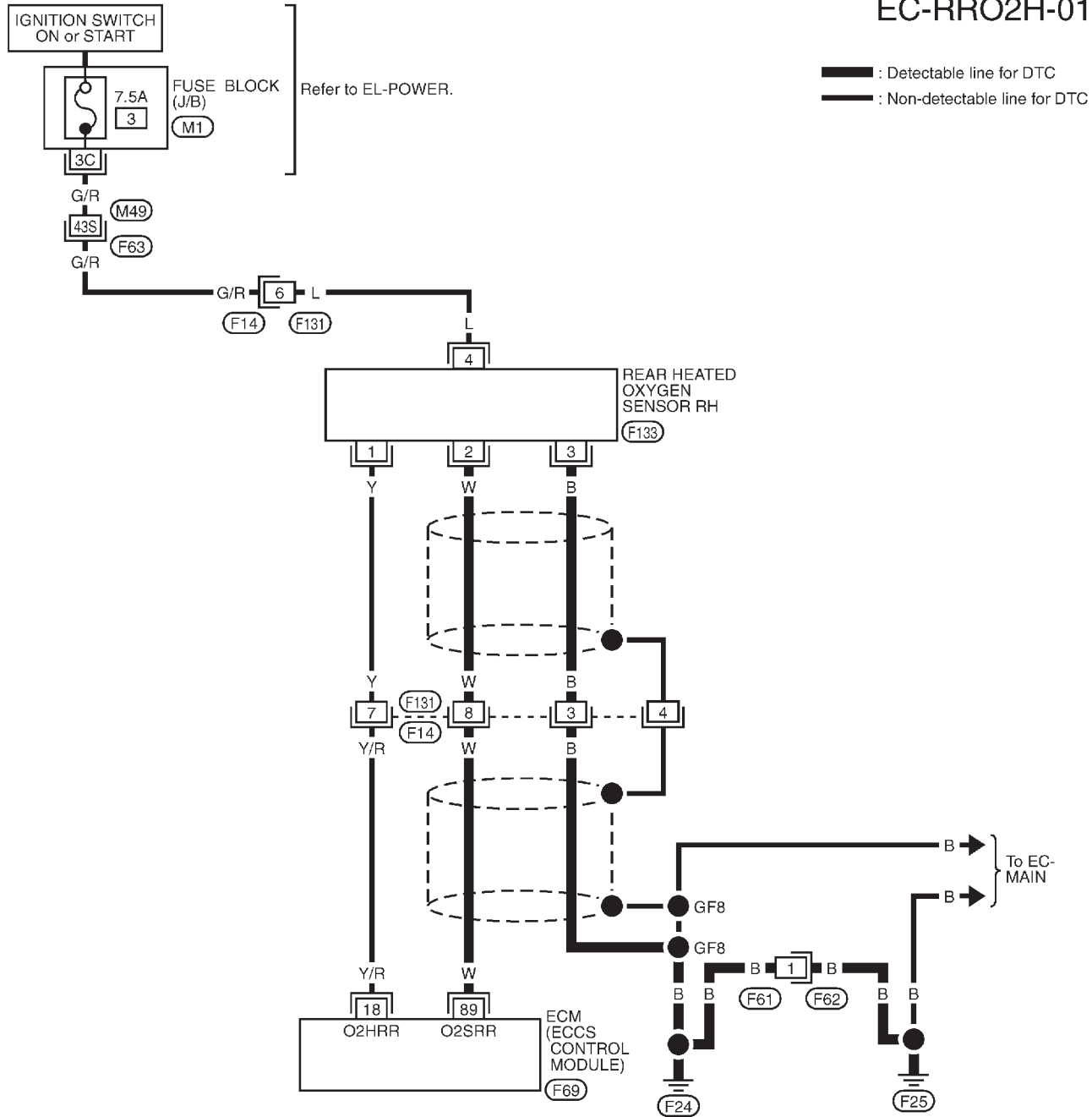


TROUBLE DIAGNOSIS FOR DTC P0138 (-B1), P0158 (-B2)

Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

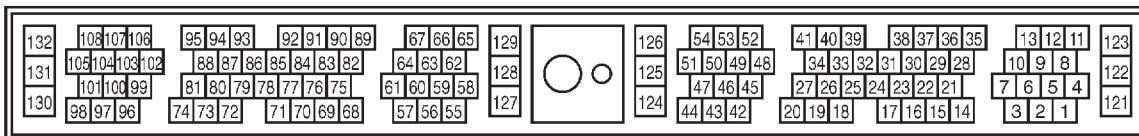
RIGHT BANK

EC-RRO2H-01



Refer to last page (Foldout page).

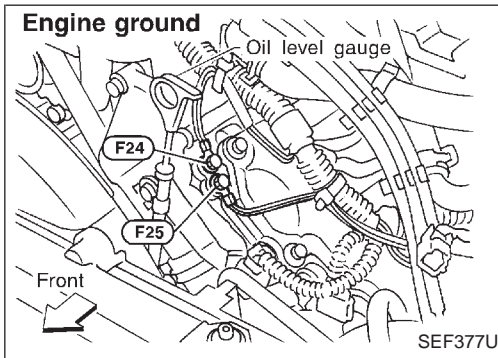
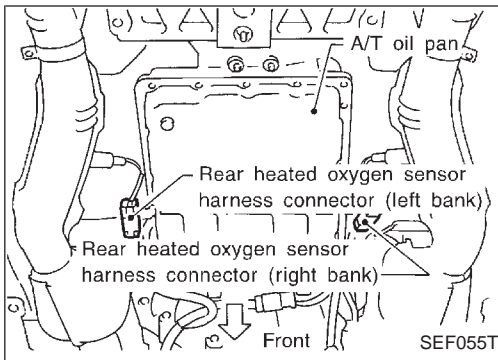
(M49), (F63)
(M1)



TROUBLE DIAGNOSIS FOR DTC P0138 (-B1), P0158 (-B2)

Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

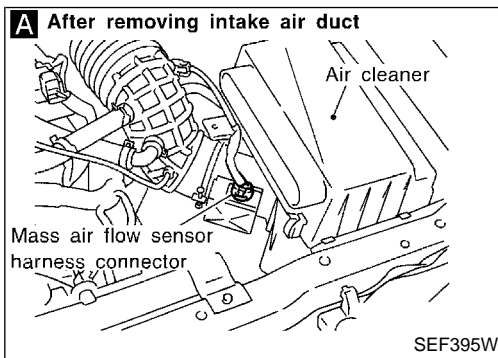
DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 % B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X



INSPECTION START

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

A

CLEAR THE SELF-LEARNING DATA

1. Start engine and warm it up to normal operating temperature.
 2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
 3. Clear the self-learning control coefficient by touching "CLEAR".
 4. Run engine for at least 10 minutes at idle speed.
- Are the 1st trip DTCs P0171, P0174 detected? Is it difficult to start engine?**

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0174", EC-243.

OR

2. Turn ignition switch "OFF".
 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
 4. Stop engine and reconnect mass air flow sensor harness connector.
 5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
 6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
 7. Run engine for at least 10 minutes at idle speed.
- Are the 1st trip DTCs 0115, 0210 detected? Is it difficult to start engine?**

No

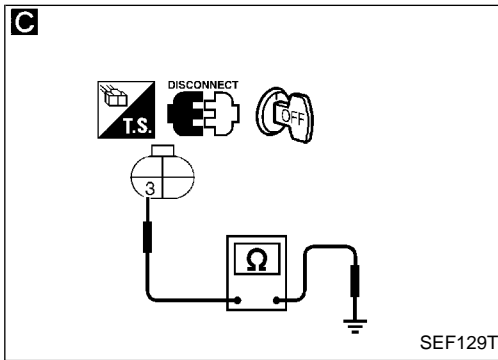
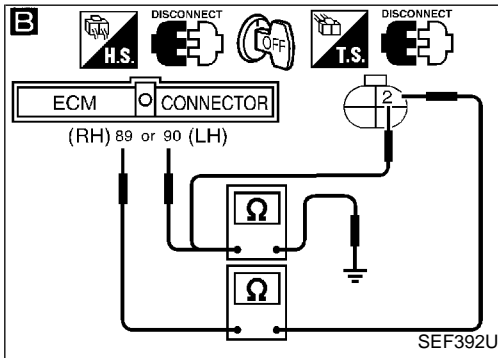
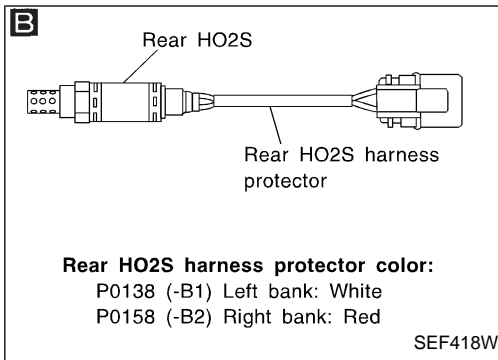
A

(Go to next page.)

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TROUBLE DIAGNOSIS FOR DTC P0138 (-B1), P0158 (-B2)

Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)



B

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and sensor.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0138	90	2	LH (White)
P0158	89	2	RH (Red)

Continuity should exist.

4. Check harness continuity between ECM and sensor or ground terminals.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0138	90 or 2	Ground	LH (White)
P0158	89 or 2	Ground	RH (Red)

Continuity should not exist.

If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F3), (E12) (LH) or (F14), (F131) (RH)
- Harness connectors (E19), (E102) (LH)

If OK, check harness for short to ground and short to power.

C

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Loosen and retighten ground screws.
3. Check harness continuity between terminal ③ and engine ground.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F3), (E12) (LH) or (F14), (F131) (RH)
- Harness connectors (E19), (E102) (LH)
- Harness connectors (F62), (F61)
- Harness for open or short between rear heated oxygen sensor and engine ground

If OK, check harness for short to ground and short to power.

CHECK COMPONENT (Rear heated oxygen sensor). Refer to "COMPONENT INSPECTION" on next page.

NG

REPLACE REAR HO2S.

1. Check rear HO2S harness protector color.
White: Left bank (-B1)
Red: Right bank (-B2)
2. Replace malfunctioning rear HO2S.

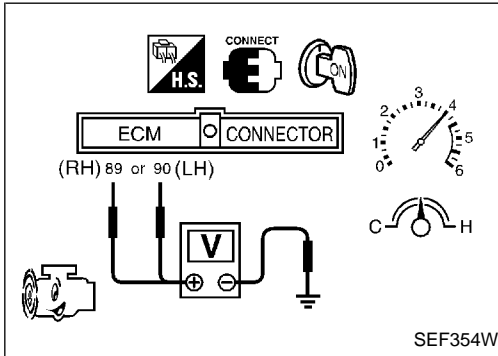
OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
INJ PULSE-B1	XXX msec
IACV-AAC/V	XXX step

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Rear Heated Oxygen Sensor (Max. Voltage Monitoring) (Rear HO2S) (P0138: Left bank), (P0158: Right bank) (Cont'd)

COMPONENT INSPECTION

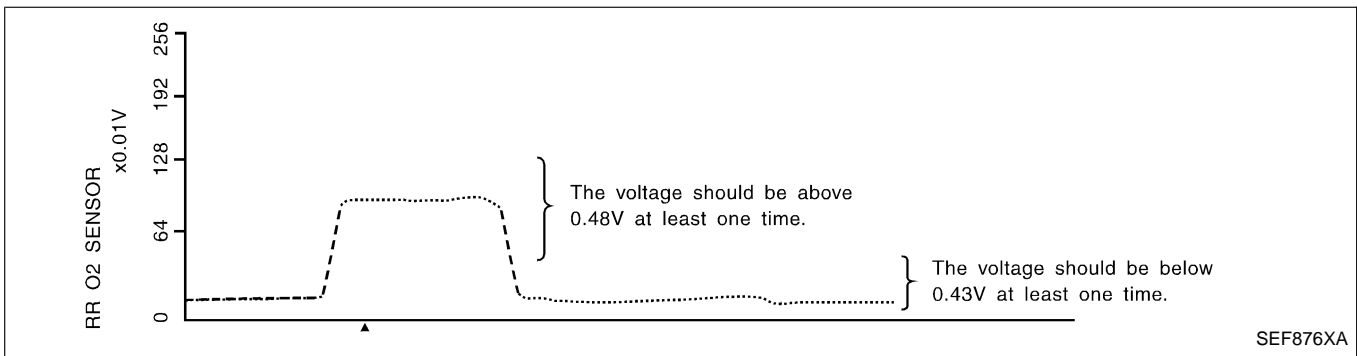
Rear heated oxygen sensor

- 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-II.
- 4) Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "RR O2 SEN-B1 (-B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
 "RR O2 SEN-B1 (-B2)" should be below 0.43V at least once when the "FUEL INJECTION" is -25%.

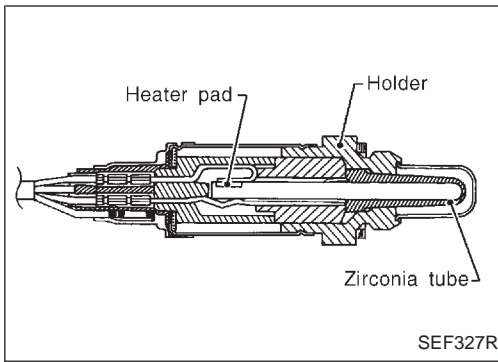
- OR
- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
 - 2) Stop vehicle with engine running.
 - 3) Set voltmeter probes between ECM terminals 89 (RH), 90 (LH) (sensor signal) and ground.
 - 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
 (depress and release accelerator pedal as soon as possible)
The voltage should be above 0.48V at least once.
If the voltage is above 0.48V 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 D position with "OD" OFF.
The voltage should be below 0.43V at least once.

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.



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Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas on left and right 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 each 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-II REFERENCE VALUE IN DATA MONITOR MODE

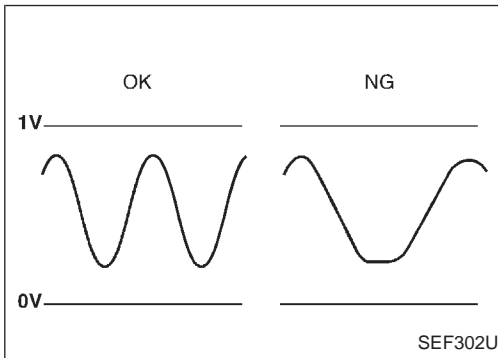
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up Revsing engine from idle up to 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2		LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
89 (RH)	W	Rear heated oxygen sensors	Engine is running.	0 - Approximately 1.0V
90 (LH)	Y		After warming up to normal operating temperature and revving engine from idle up to 2,000 rpm.	



ON BOARD DIAGNOSIS LOGIC

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139 0707 (Left bank)	● It takes more time for the sensor to respond between rich and lean than the specified time.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Rear heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks
P0159 0708 (Right bank)		

RR O2 SEN-B1 P0139	
COND1: OUT OF COMD	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF921X

RR O2 SEN-B1 P0139	
COND1: TESTING	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF922X

RR O2 SEN-B1 P0139	
COND1: COMPLETED	
COND2: INCOMPLETE	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF923X

RR O2 SEN-B1 P0139	
COND1: COMPLETED	
COND2: COMPLETED	
COND3: INCOMPLETE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF924X

RR O2 SEN-B1 P0139	
COMPLETED	
SELF-DIAG RESULTS	

SEF925X

Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- "COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.
- If "DIAGNOSTIC TROUBLE CODE 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).



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-II.
- 4) Touch "START".
- 5) Start engine (TCS switch "OFF") 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-II 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-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)
CMPS-RPM (POS): 1,200 - 2,500 rpm
Vehicle speed: 64 - 100 km/h (40 - 62 MPH)
B/FUEL SCHDL: 0.5 - 4.9 msec
Selector lever: Suitable position

NOTE:

- If "TESTING" is not displayed after 5 minutes, retry from step 2).
- If "COMPLETED" already appears at "COND2" on CONSULT-II screen before "Procedure for COND2" is conducted, it is unnecessary to conduct step 9).

Procedure for COND2

- 9) While driving, release accelerator pedal completely with "OD" OFF from the above condition [step 8)] until "INCOMPLETE" at "COND2" on CONSULT-II screen has turned to "COMPLETED". (It will take approximately 4 seconds.)

NOTE:

- If "COMPLETED" already appears at "COND3" on CONSULT-II screen before "Procedure for COND3" is conducted, it is unnecessary to conduct step 10).

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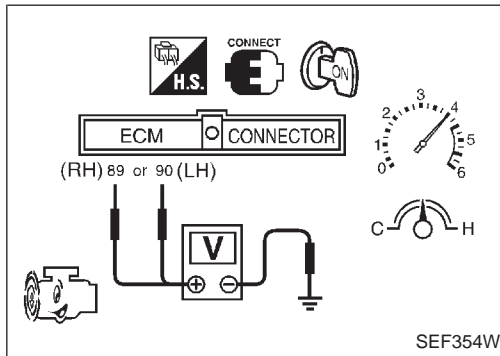
EL

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Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

Procedure for COND3

- 10) Stop vehicle and let it idle until "INCOMPLETE" of "COND3" on CONSULT-II screen has turned to "COMPLETED". (It will take a maximum of approximately 6 minutes.)
- 11) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-229.



OR

OVERALL FUNCTION CHECK

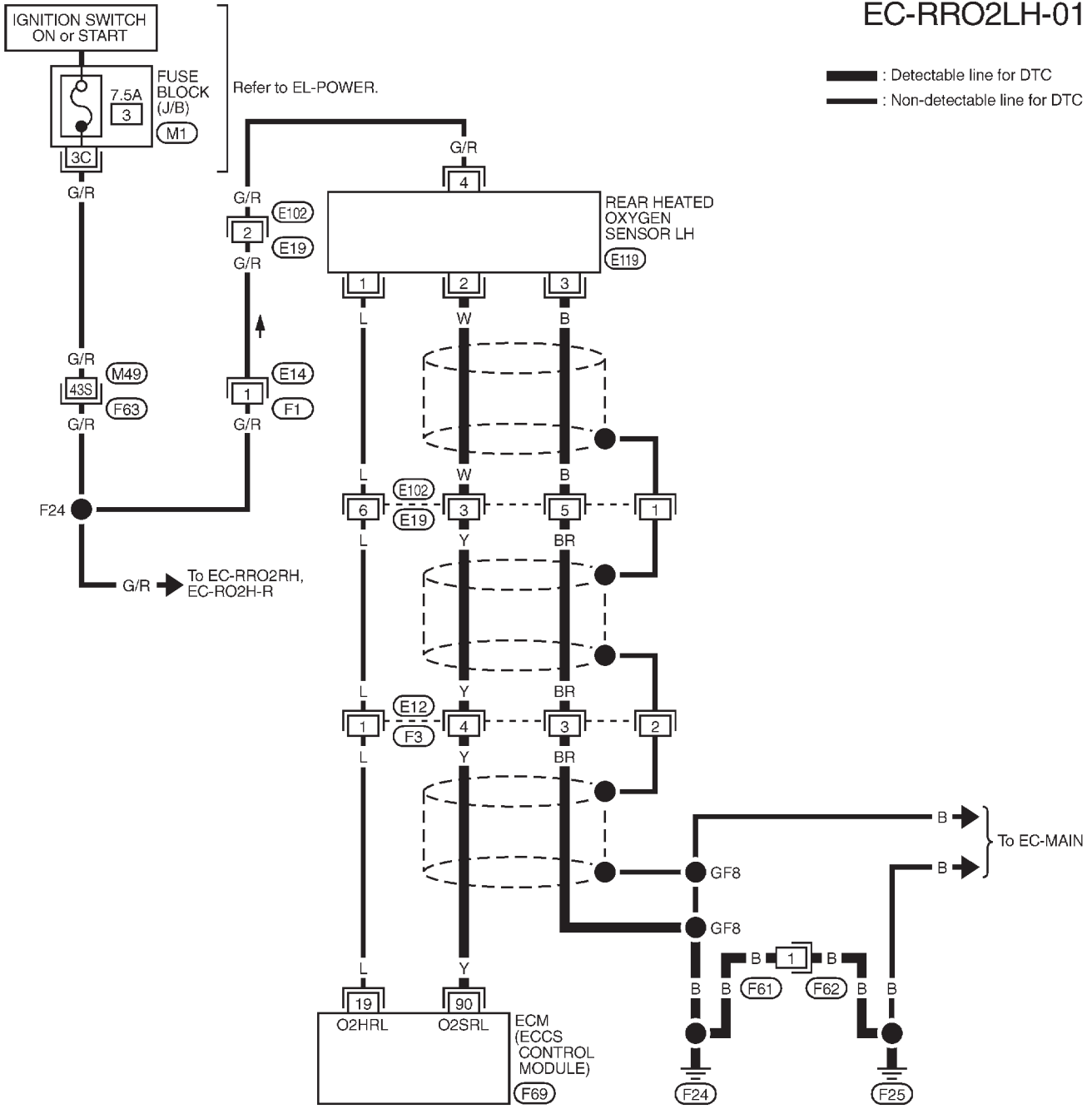
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

- 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 terminals ⑧⑨ RH, ⑩⑨ LH (sensor signal) and 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 changed 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 D position with "OD" OFF.
The voltage should be changed at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-229.

TROUBLE DIAGNOSIS FOR DTC P0139 (-B1), P0159 (-B2)

Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

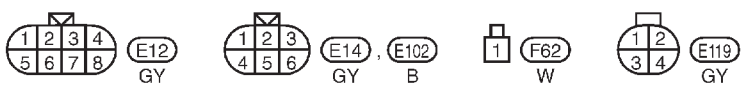
LEFT BANK



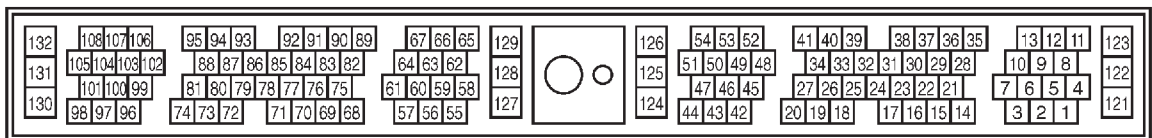
EC-RRO2LH-01

— : Detectable line for DTC
 — : Non-detectable line for DTC

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Refer to last page (Foldout page).
 (M49, F63)
 (M1)



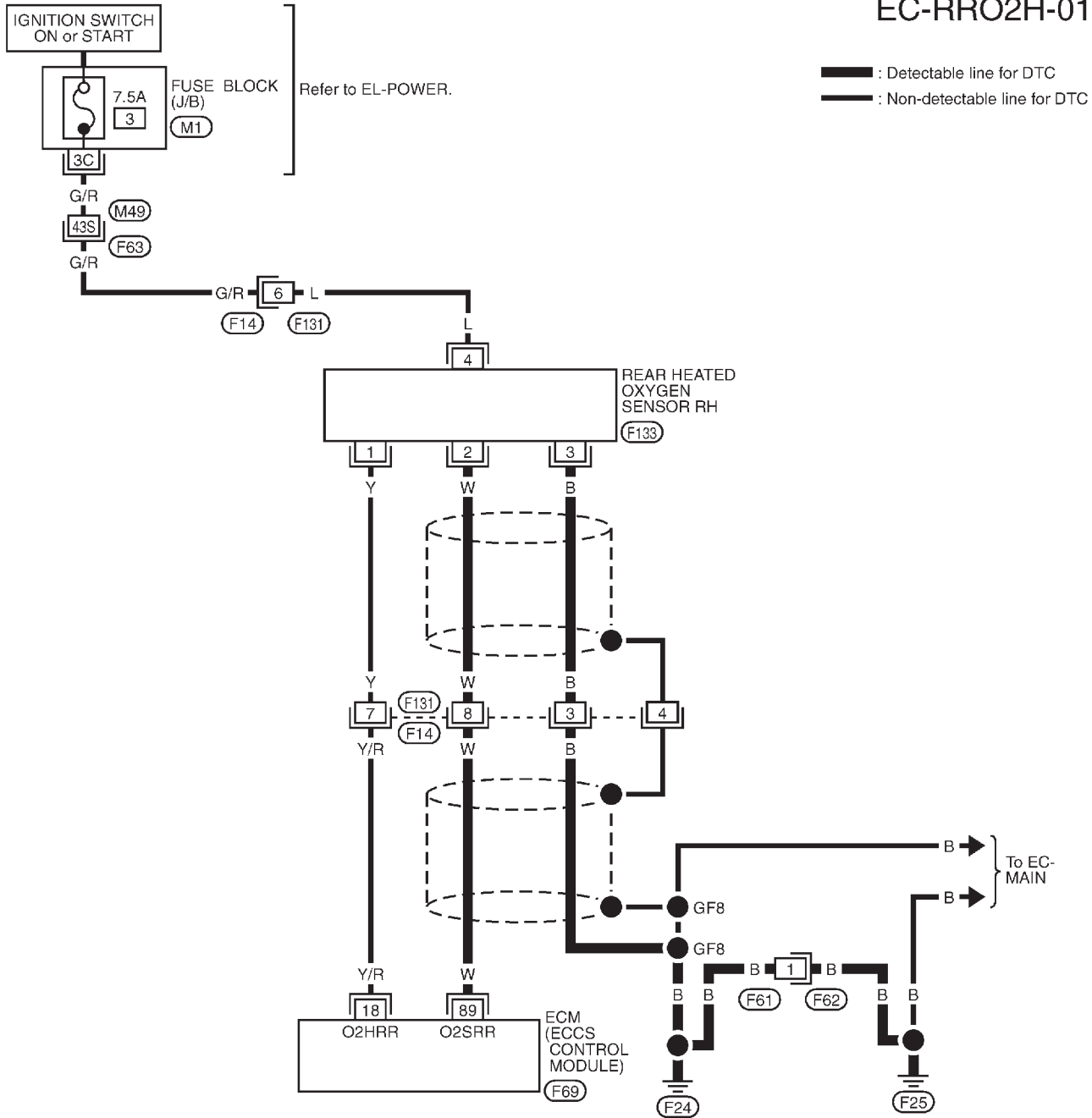
TEC245

TROUBLE DIAGNOSIS FOR DTC P0139 (-B1), P0159 (-B2)

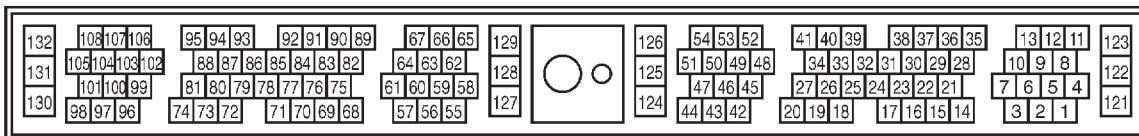
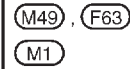
Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

RIGHT BANK

EC-RRO2H-01



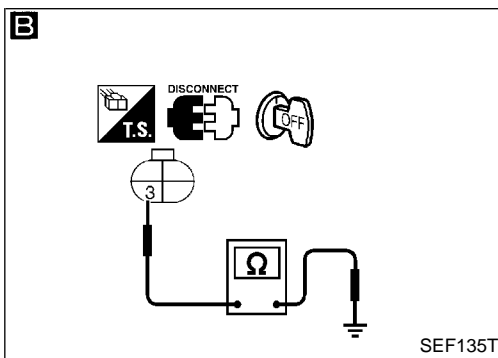
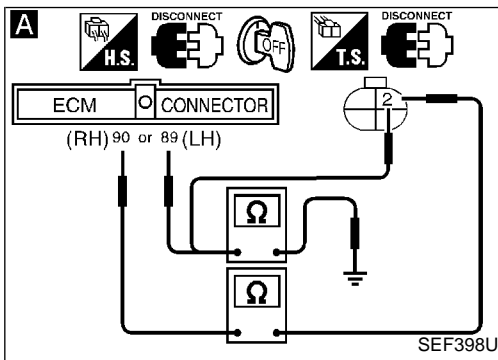
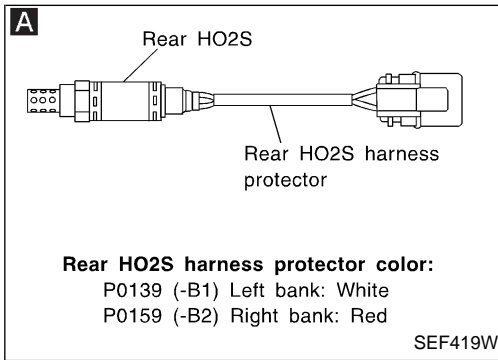
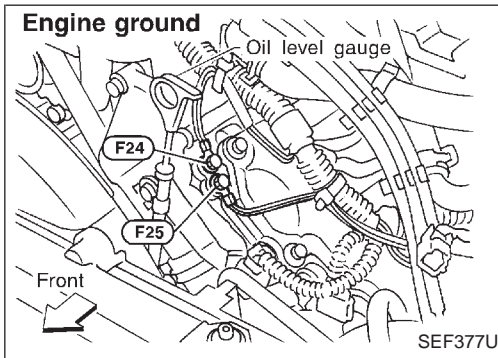
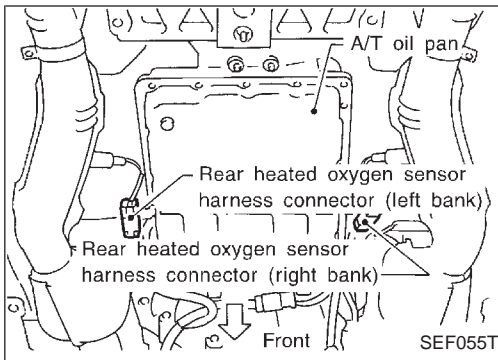
Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P0139 (-B1), P0159 (-B2)

Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

A

CHECK INPUT SIGNAL CIRCUIT.
 1. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
 2. Check harness continuity between ECM and sensor terminals.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0139	90	2	LH (White)
P0159	89	2	RH (Red)

Continuity should exist.
 3. Check harness continuity between ECM sensor or ground terminals.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0139	90 or 2	Ground	LH (White)
P0159	89 or 2	Ground	RH (Red)

Continuity should not exist.
 If OK, check harness for short to ground and short to power.

OK

B
CHECK GROUND CIRCUIT.
 Check harness continuity between terminal ③ and engine ground.
Continuity should exist.
 If OK, check harness for short to ground and short to power.

OK

CHECK COMPONENT (Rear heated oxygen sensor). Refer to "COMPONENT INSPECTION" on next page.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

OK

INSPECTION END

NG

Check the following.

- Harness connectors (F3, E12 (LH) or F14, F131 (RH))
- Harness connectors (E19, E102 (LH))

If NG, repair open circuit or short to ground or short to power in harness or connectors.

NG

Check the following.

- Harness connectors (F3, E12 (LH) or F14, F131 (RH))
- Harness connectors (E19, E102 (LH), F62, F61)
- Harness for open or short between rear heated oxygen sensor and engine ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.

NG

REPLACE REAR HO2S.

1. Check rear HO2S harness protector color.
White: Left bank (-B1)
Red: Right bank (-B2)
2. Replace malfunctioning rear HO2S.

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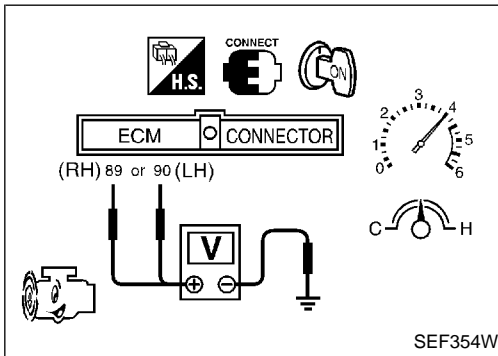
Rear Heated Oxygen Sensor (Response Monitoring) (Rear HO2S) (P0139: Left bank), (P0159: Right bank) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
INJ PULSE-B1	XXX msec
IACV-AAC/V	XXX step

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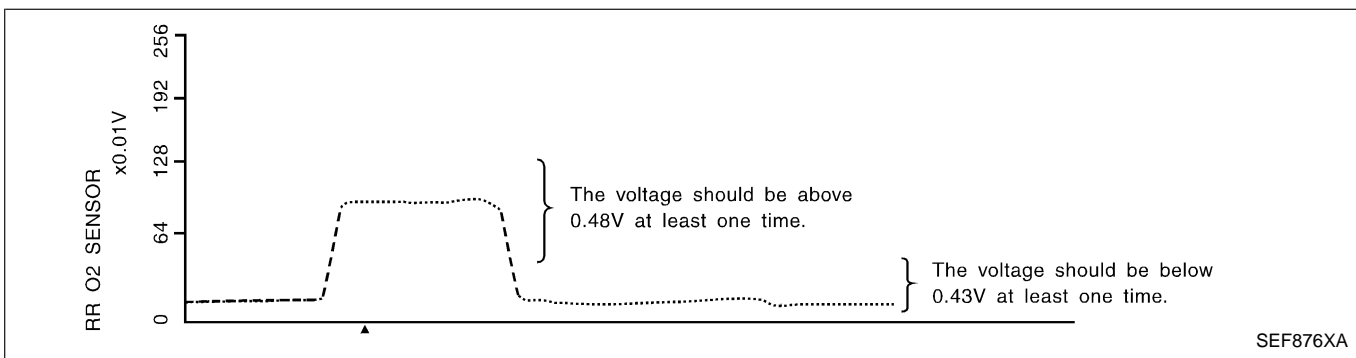
- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
- 4) Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "RR O2 SEN-B1 (-B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
 "RR O2 SEN-B1 (-B2)" should be below 0.43V at least once when the "FUEL INJECTION" is -25%.

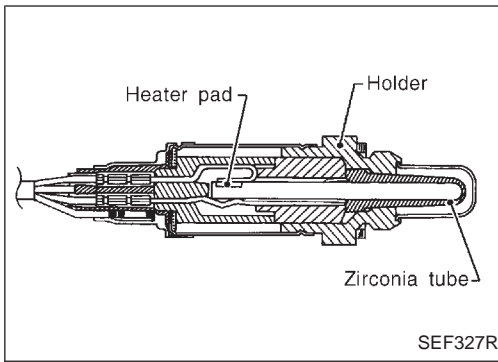
OR

- 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 terminals 89 (RH), 90 (LH) (sensor signal) and 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 0.48V at least once.
If the voltage is above 0.48V 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 D position.
The voltage should be below 0.43V at least once.

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.





Rear Heated Oxygen Sensor (High voltage) (Rear HO2S) (P0140: Left bank), (P0160: Right bank)

COMPONENT DESCRIPTION

The rear heated oxygen sensors (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas on left and right 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 each 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-II REFERENCE VALUE IN DATA MONITOR MODE

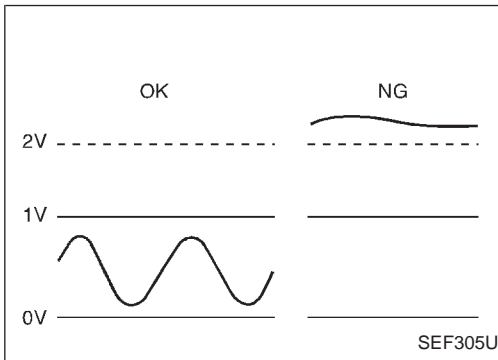
Specification data are reference values.

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 ↔ 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ↔ RICH

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
89 (RH)	W	Rear heated oxygen sensors	Engine is running.	0 - Approximately 1.0V
90 (LH)	Y		After warming up to normal operating temperature and revving engine from idle up to 2,000 rpm.	



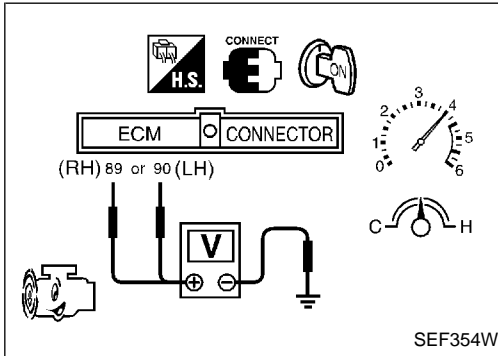
ON BOARD DIAGNOSIS LOGIC

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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140 0512 (Left bank)	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open.) ● Rear heated oxygen sensor
P0160 0315 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF747X



Rear Heated Oxygen Sensor (High voltage) (Rear HO2S) (P0140: Left bank), (P0160: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Maintain the following conditions for at least 5 consecutive seconds.
 - CMPS-RPM (POS): 1,200 - 2,500 rpm**
 - VHCL SPEED SE: 64 - 100 km/h (40 - 62 MPH)**
 - B/FUEL SCHDL: 0.5 - 4.9 msec**
 - COOLAN TEMP/S: 70 - 100°C (158 - 212°F)**
 - Selector lever: Suitable position**
- 4) Stop vehicle with engine running.
- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-235.

OR

OVERALL FUNCTION CHECK

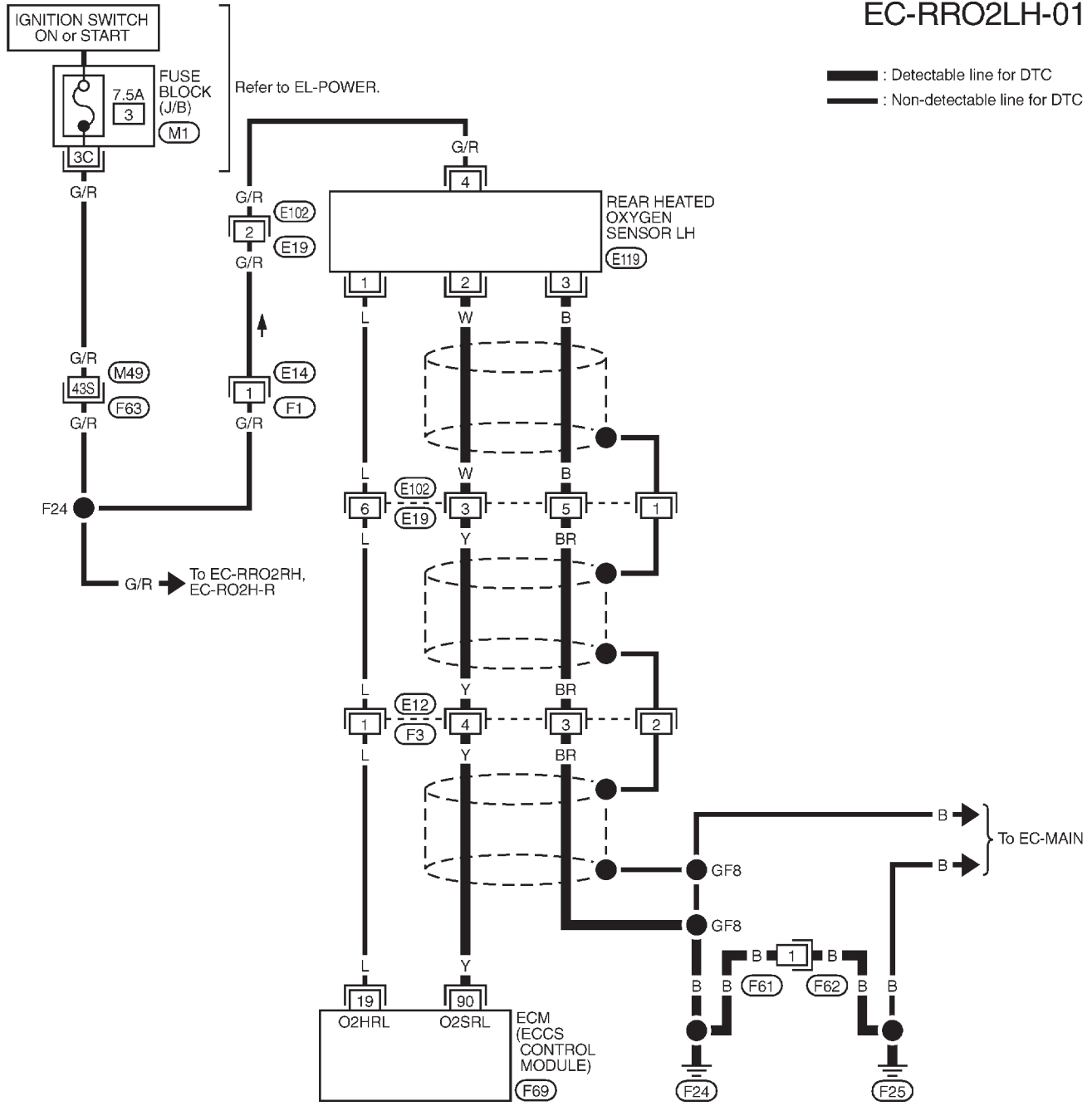
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminals 89 (RH), 90 (LH) (sensor signal) and ground.
- 3) 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.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-235.

TROUBLE DIAGNOSIS FOR DTC P0140 (-B1), P0160 (-B2)

Rear Heated Oxygen Sensor (High voltage) (Rear HO2S) (P0140: Left bank), (P0160: Right bank) (Cont'd)

LEFT BANK



EC-RRO2LH-01

— : Detectable line for DTC
 — : Non-detectable line for DTC

GI

MA

EM

LC

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FA

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ST

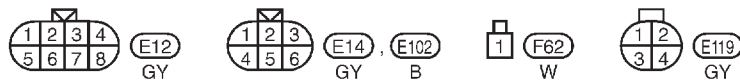
RS

BT

HA

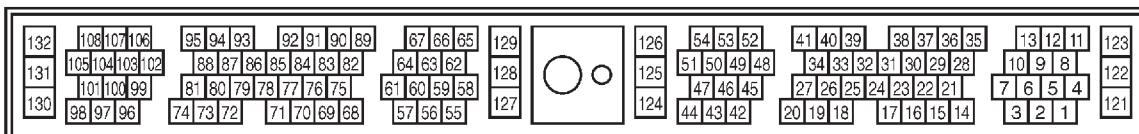
EL

IDX



Refer to last page (Foldout page).

(M49), (F63)
(M1)

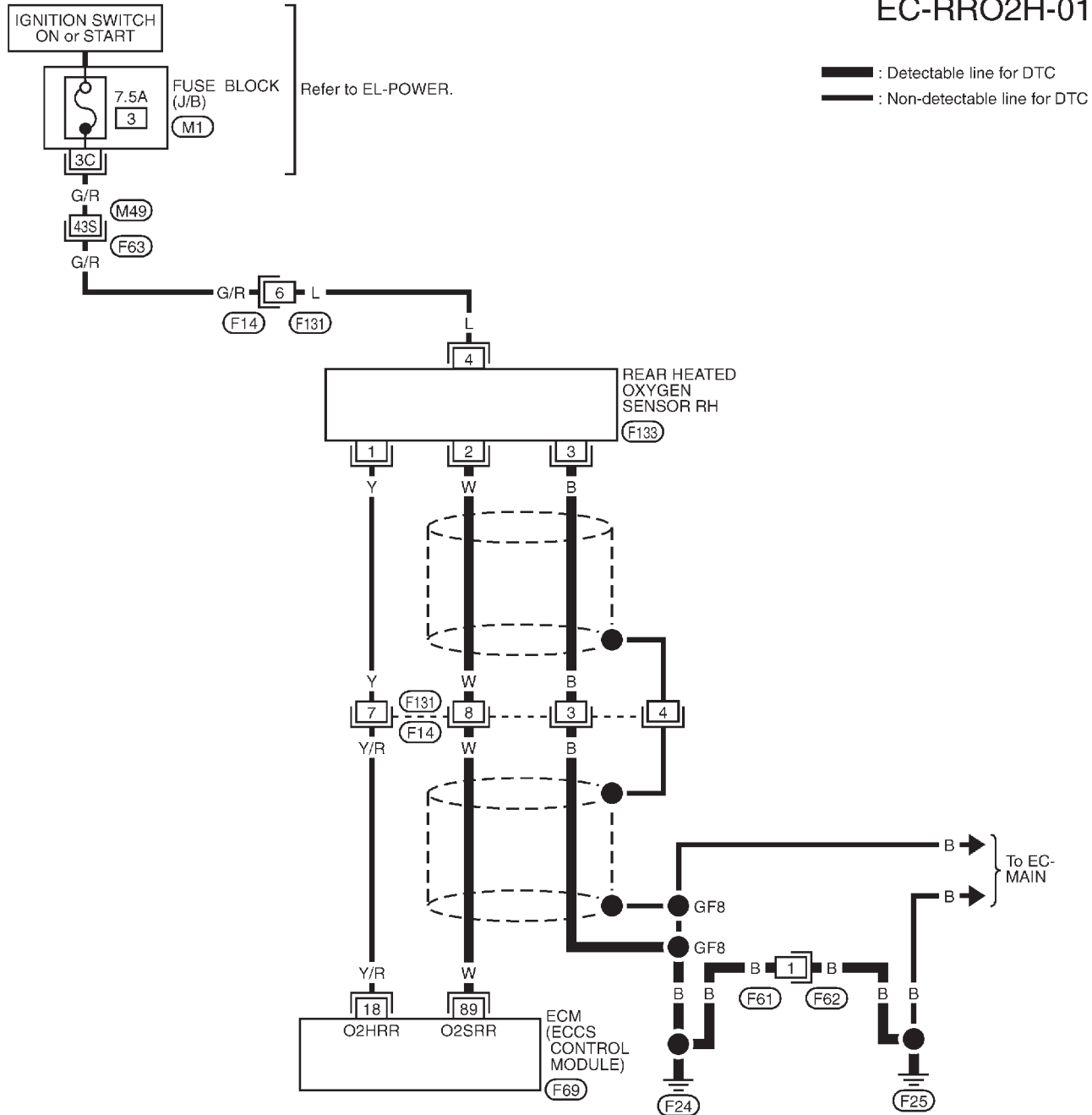


TEC245

Rear Heated Oxygen Sensor (High voltage)
(Rear HO2S) (P0140: Left bank), (P0160: Right bank) (Cont'd)

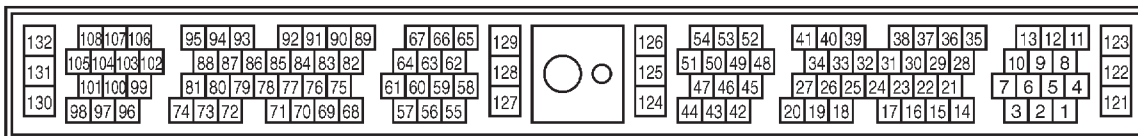
RIGHT BANK

EC-RRO2H-01



Refer to last page (Foldout page).

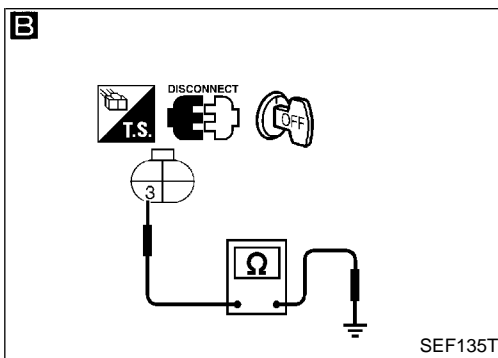
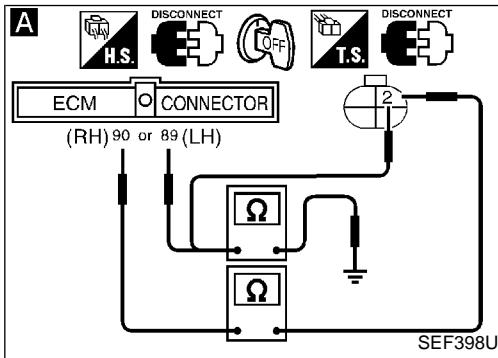
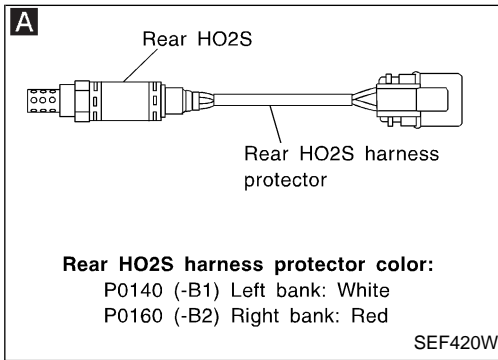
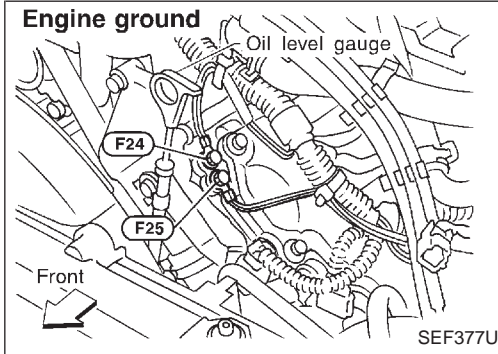
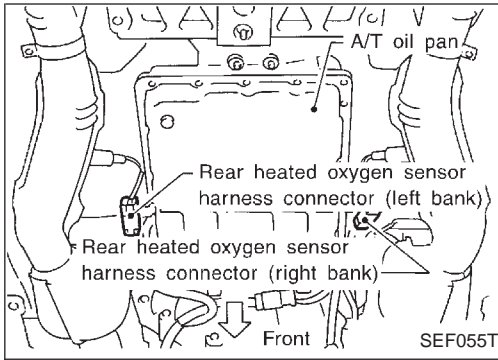
(M49), (F63)
(M1)



TROUBLE DIAGNOSIS FOR DTC P0140 (-B1), P0160 (-B2)

Rear Heated Oxygen Sensor (High voltage) (Rear HO2S) (P0140: Left bank), (P0160: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

A

- CHECK INPUT SIGNAL CIRCUIT.**
1. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
 2. Check harness continuity between ECM and sensor terminals.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0140	90	2	LH (White)
P0160	89	2	RH (Red)

- Continuity should exist.**
3. Check harness continuity between ECM sensor or ground terminals.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0140	90 or 2	Ground	LH (White)
P0160	89 or 2	Ground	RH (Red)

- Continuity should not exist.**
 If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors
 - F3, E12 (LH) or F14, F131 (RH)
 - Harness connectors
 - E19, E102 (LH)

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK → **B**

- CHECK GROUND CIRCUIT.**
 Check harness continuity between terminal ③ and engine ground.
Continuity should exist.
 If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors
 - F3, E12 (LH) or F14, F131 (RH)
 - Harness connectors
 - E19, E102 (LH)
 - Harness connectors
 - F62, F61
- Harness for open or short between rear heated oxygen sensor and engine ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK →

- CHECK COMPONENT** (Rear heated oxygen sensor).
1. Turn ignition switch "OFF".
 2. Disconnect sensor harness connector and check for water.
Water should not exist.
 If OK, go to step 3.
 3. Check rear heated oxygen sensor. Refer to "COMPONENT INSPECTION" on next page.

NG → Repair or replace harness and/or connectors or replace corresponding heated oxygen sensor.

OK → Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

GI
MA
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LC
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IDX

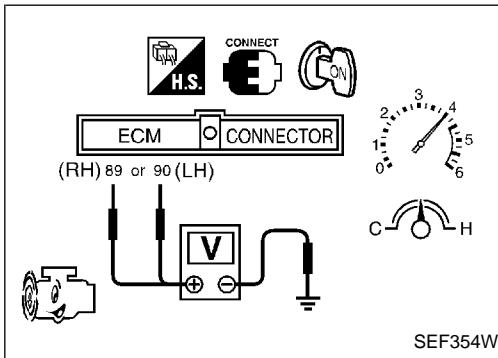
Rear Heated Oxygen Sensor (High voltage) (Rear HO2S) (P0140: Left bank), (P0160: Right bank) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLANT TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
INJ PULSE-B1	XXX msec
IACV-AAC/V	XXX step

SEF763X



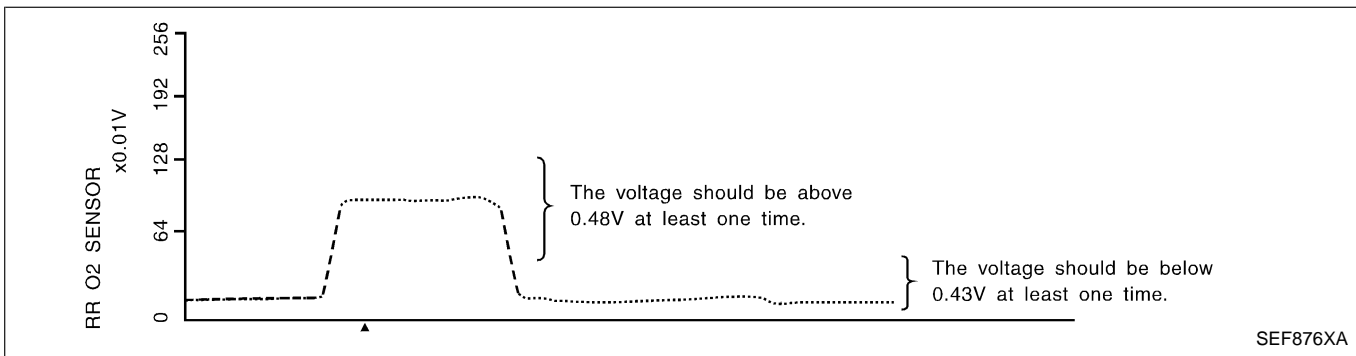
- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
- 4) Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "RR O2 SEN-B1 (-B2)" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
 "RR O2 SEN-B1 (-B2)" should be below 0.43V at least once when the "FUEL INJECTION" is -25%.

OR

- 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 terminals 89 (RH), 90 (LH) (sensor signal) and 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 0.48V at least once.
If the voltage is above 0.48V 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 D position with "OD" OFF.
The voltage should be below 0.43V at least once.

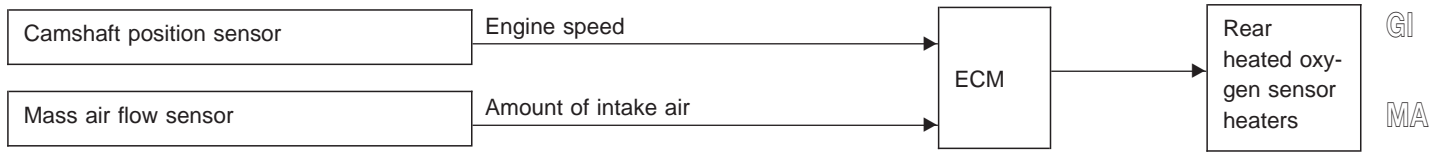
CAUTION:

- 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.



Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank)

SYSTEM DESCRIPTION



The ECM performs ON/OFF control of the rear heated oxygen sensor heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Rear heated oxygen sensor heaters
Ignition switch "ON" (Engine stopped)	OFF
At idle [after driving for 2 minutes at a speed of more than 70 km/h (43 MPH)]	ON

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
O2 SEN HTR-B1 O2 SEN HTR-B2	<ul style="list-style-type: none"> Engine speed: At idle [after driving for 2 minutes at a speed of more than 70 km/h (43 MPH)] 	ON
	<ul style="list-style-type: none"> Engine speed: Above 3,600 rpm Ignition "ON" with engine stopped 	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
18	Y/R	Rear heated oxygen sensor heater (right bank)	Engine is running. └ At idle [after driving 2 minutes at 70 km/h (43 MPH) or more]	0 - 0.5V
19	L	Rear heated oxygen sensor heater (left bank)	Ignition switch "ON" └ Engine stopped Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0902 (Left bank)	<ul style="list-style-type: none"> The current amperage in the rear heated oxygen sensor heater circuit is out of the normal range. (The improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.) 	<ul style="list-style-type: none"> Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) Rear heated oxygen sensor heater
P0161 1002 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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.



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-241.

OR



- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Select "MODE 3" with GST.
- 5) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-241.

When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

TROUBLE DIAGNOSIS FOR DTC P0141 (-B1), P0161 (-B2)

Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank) (Cont'd)

LEFT BANK

EC-RO2H-L-01

GI

MA

EM

LC

EC

FE

AT

PD

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RA

BR

ST

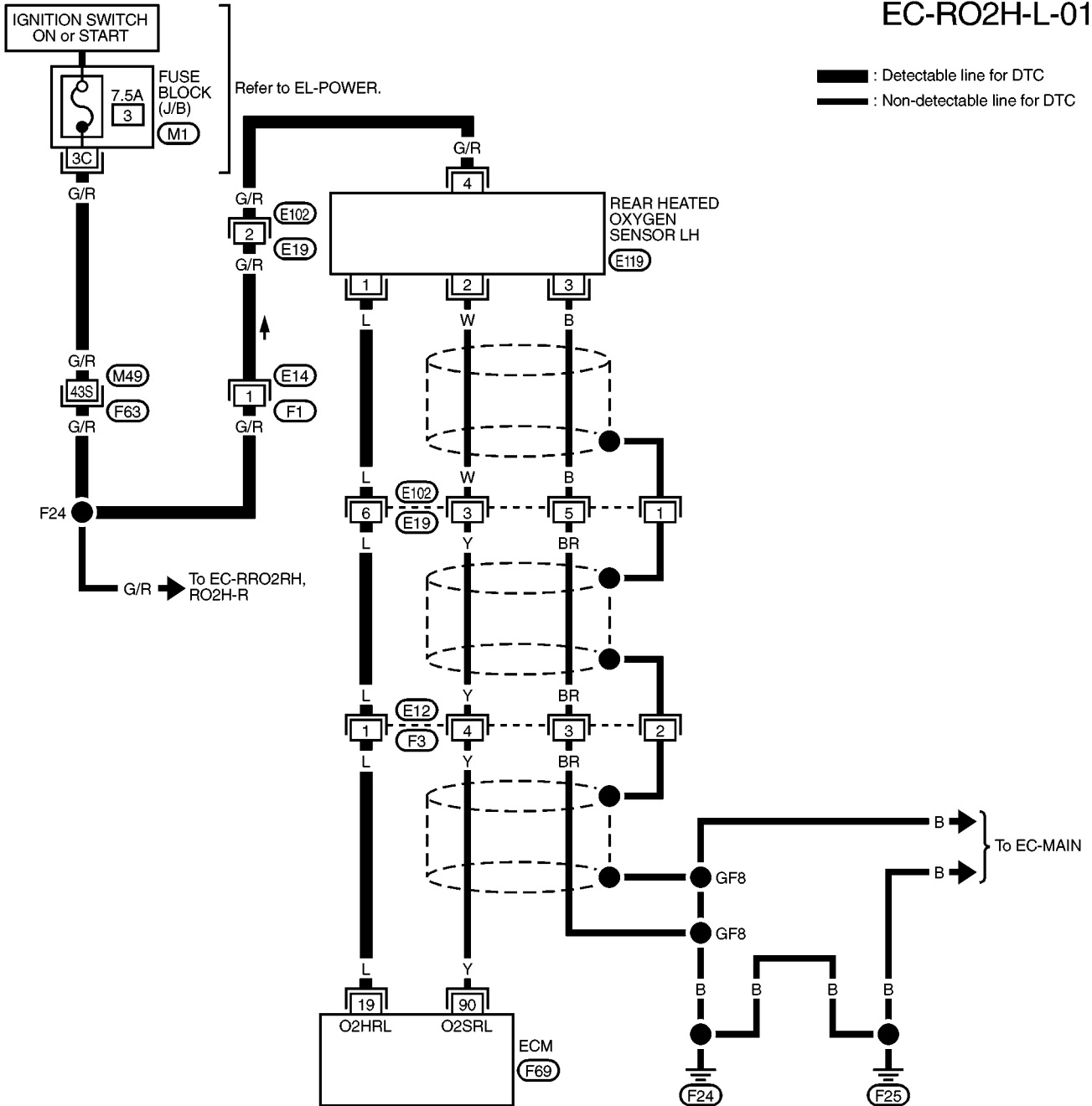
RS

BT

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EL

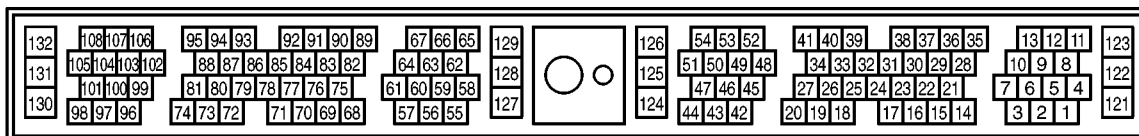
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Refer to last page (Foldout page).

(M49), (F63)

(M1)

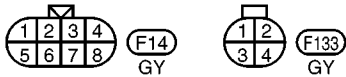
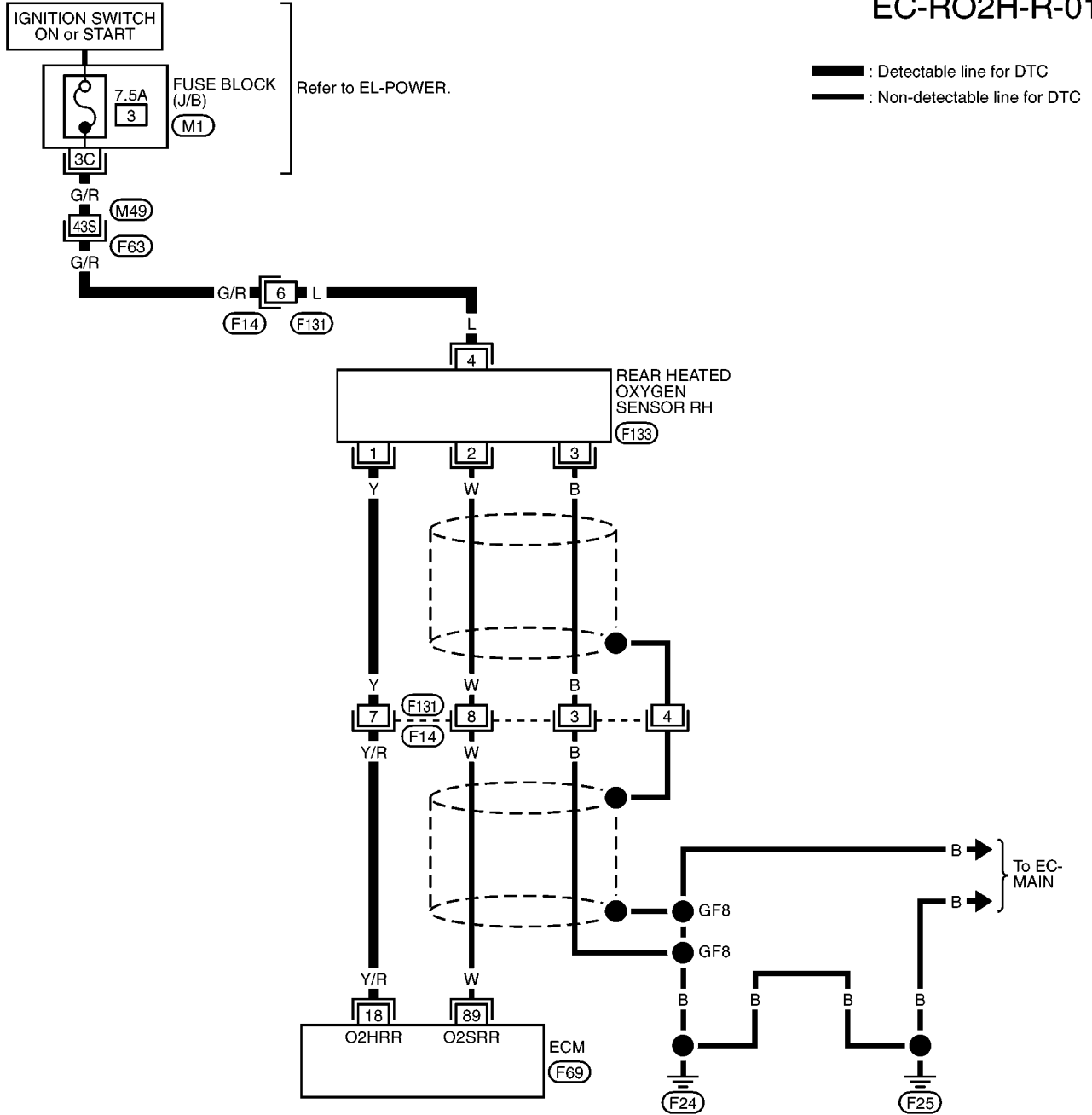


TROUBLE DIAGNOSIS FOR DTC P0141 (-B1), P0161 (-B2)

Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank) (Cont'd)

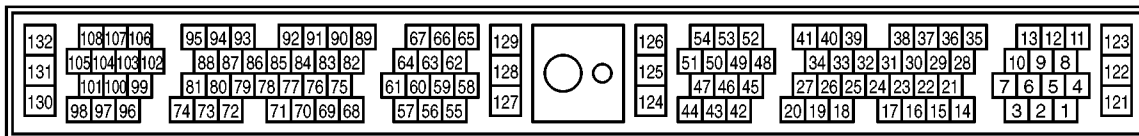
RIGHT BANK

EC-RO2H-R-01



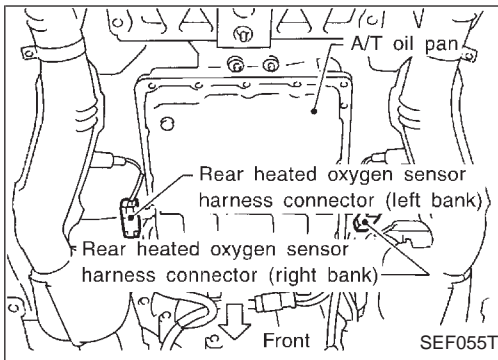
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(M49), (F63)
(M1)

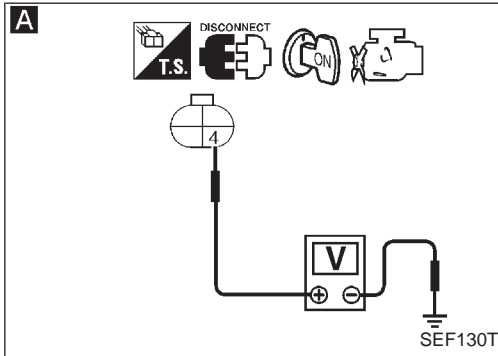


Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank) (Cont'd)

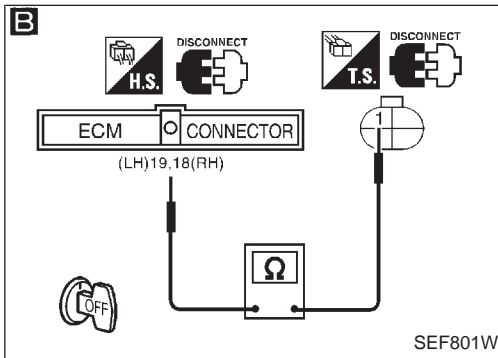
DIAGNOSTIC PROCEDURE



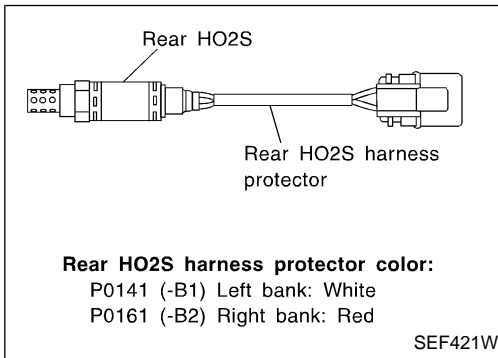
SEF055T



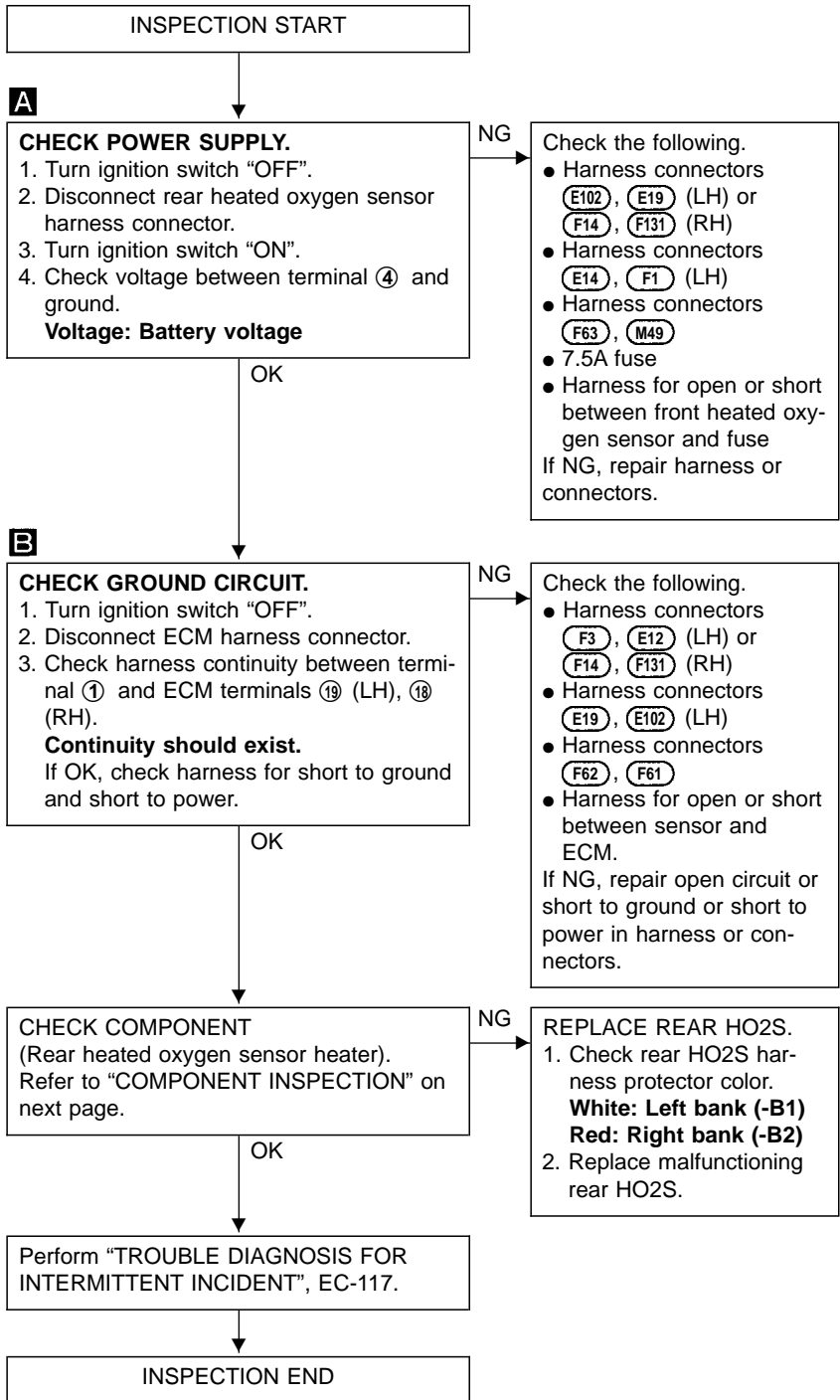
SEF130T



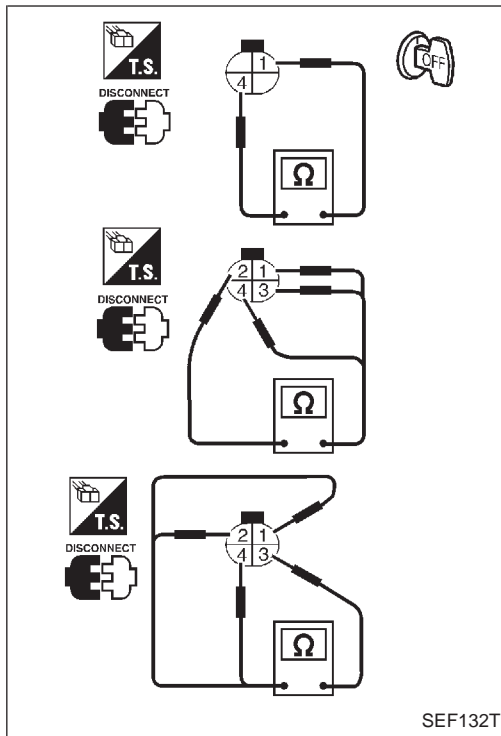
SEF801W



SEF421W



GI
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 IDX



Rear Heated Oxygen Sensor Heaters (P0141: Left bank), (P0161: Right bank) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

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 front heated oxygen sensor.

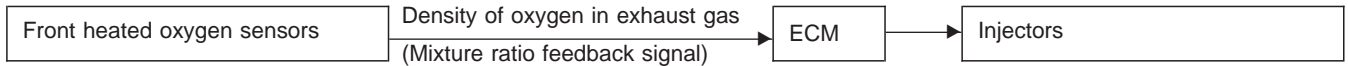
CAUTION:

- 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.

Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank)

ON BOARD DIAGNOSIS LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115 (Left bank)	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	<ul style="list-style-type: none"> Intake air leaks Front heated oxygen sensor Injectors Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor
P0174 0210 (Right bank)		

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 % B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

SEF748X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

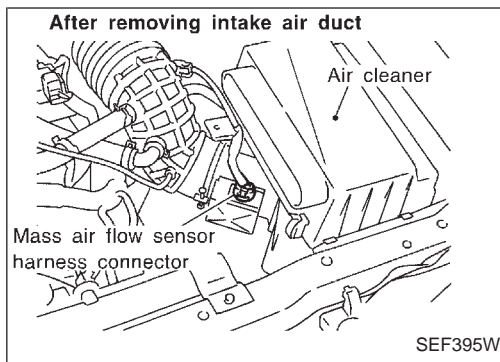
NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



- Start engine and warm it up to normal operating temperature.
- Turn ignition switch “OFF” and wait at least 5 seconds.
- Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “ACTIVE TEST” mode with CONSULT-II.
- Clear the self-learning control coefficient by touching “CLEAR”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to “DIAGNOSTIC PROCEDURE”, EC-247.
- If it is difficult to start engine at step 6), the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to “DIAGNOSTIC PROCEDURE”, EC-247. If engine does not start, visually check for exhaust and intake air leak.

OR



Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank) (Cont'd)



- 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 3 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 run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "DIAGNOSTIC PROCEDURE", EC-247.
- 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-247. If the engine does not start, visually check for exhaust and intake air leak.

OR



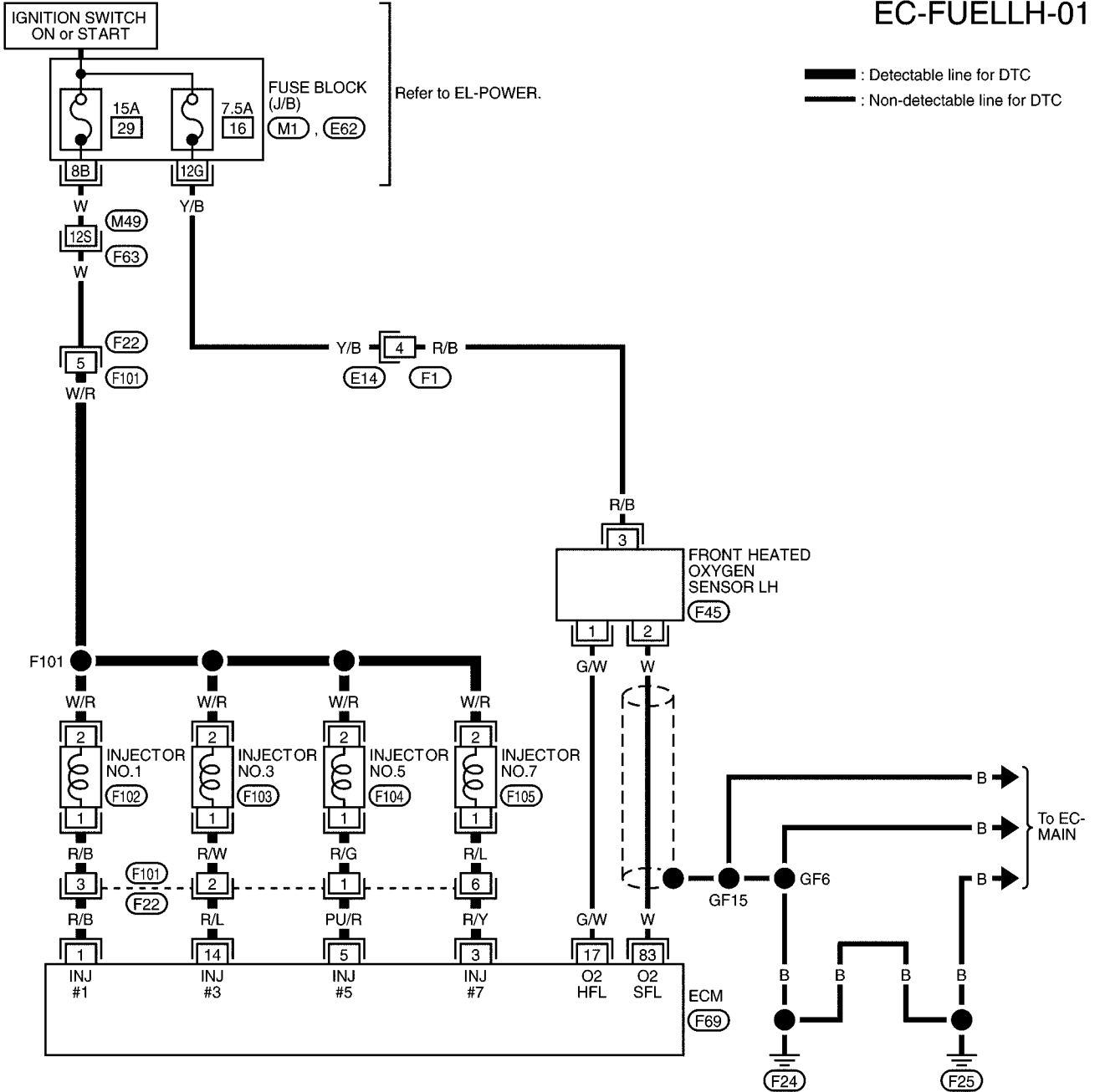
- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart engine and run it at least 3 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Turn ignition switch "ON".
- 6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. Make sure DTC 0102 is detected.
- 7) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 8) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. Make sure DTC 0505 is detected.
- 9) Start engine again and run it for at least 10 minutes at idle speed. The DTC 0115 should be detected at this stage, if a malfunction exists. If so, go to "DIAGNOSTIC PROCEDURE", EC-247.
- 10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
- 11) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-247. If the engine does not start, visually check for exhaust and intake air leak.

TROUBLE DIAGNOSIS FOR DTC P0171 (-B1), P0174 (-B2)

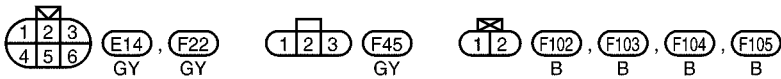
Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank) (Cont'd)

LEFT BANK

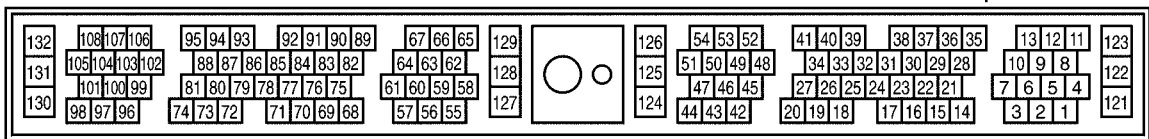
EC-FUELLH-01



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Refer to last page (Foldout page).
 (M49) (F63)
 (M1)
 (E62)

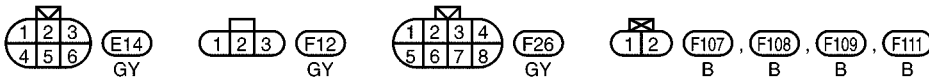
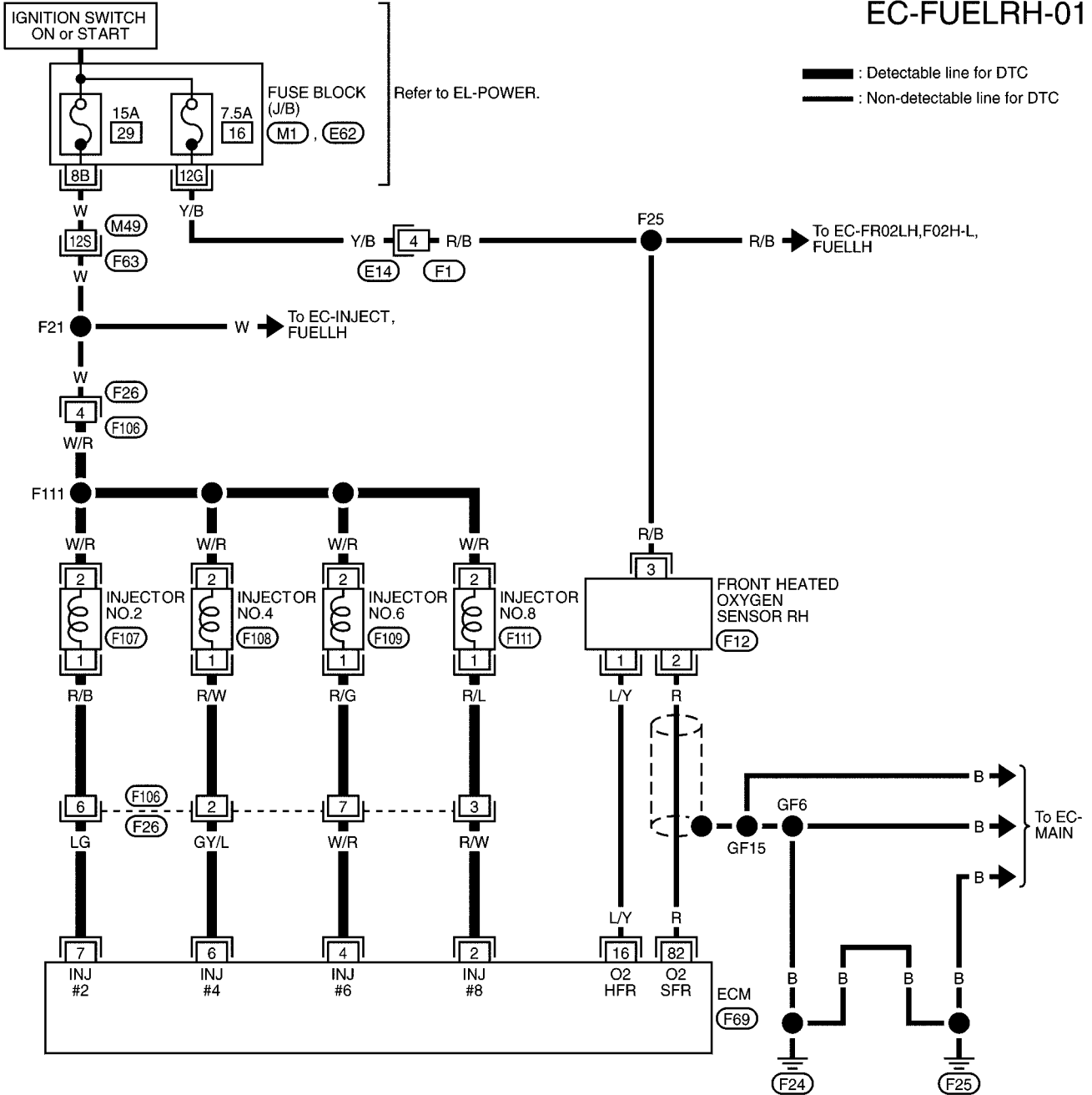


TROUBLE DIAGNOSIS FOR DTC P0171 (-B1), P0174 (-B2)

Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank) (Cont'd)

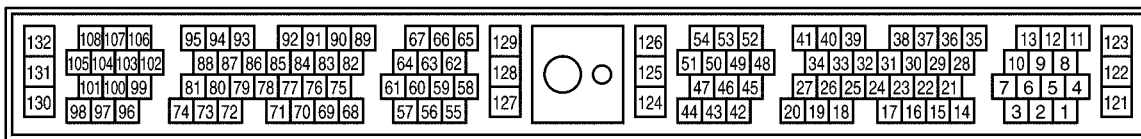
RIGHT BANK

EC-FUELRH-01



Refer to last page (Foldout page).

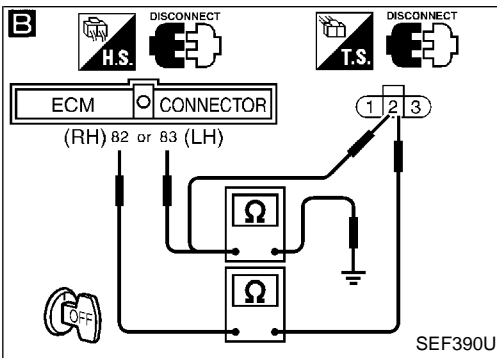
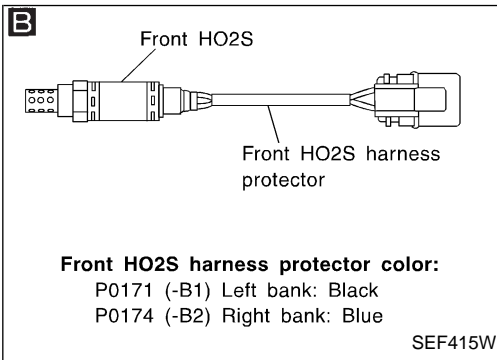
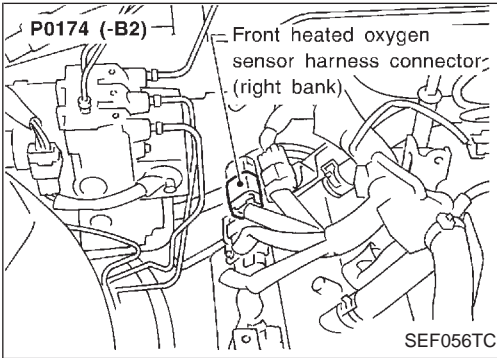
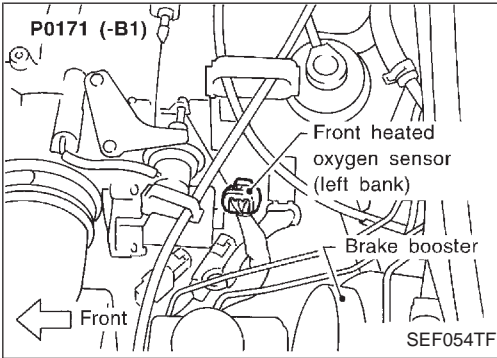
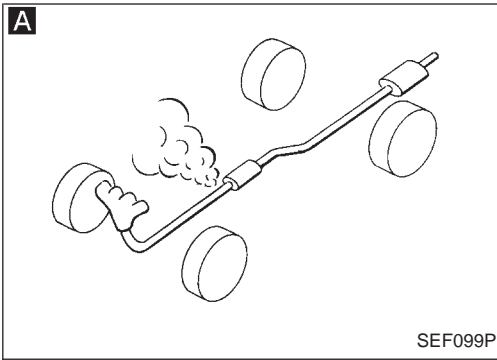
- (M49) (F63)
- (M1)
- (E62)



TROUBLE DIAGNOSIS FOR DTC P0171 (-B1), P0174 (-B2)

Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.

NG → Repair or replace.

OK ↓

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak between the mass air flow sensor and the intake manifold.

NG → Repair or replace.

OK ↓

B

CHECK FRONT HEATED OXYGEN SENSOR.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM and sensor terminals.

NG → Repair harness or connectors.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0171	83	2	LH (Black)
P0174	82	2	RH (Blue)

Continuity should exist.
4. Check harness continuity between ECM and sensor or ground.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0171	83 or 2	Ground	LH (Black)
P0174	82 or 2	Ground	RH (Blue)

Continuity should not exist.
If OK, check harness for short to ground and short to power.

OK ↓

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-37.
2. Install fuel pressure gauge and check fuel pressure.
At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check the following.
• Fuel pump and circuit Refer to EC-521.
• Fuel pressure regulator Refer to EC-37.
• Fuel lines Refer to EC-38.
• Fuel lines Refer to "ENGINE MAINTENANCE" in MA section.
• Fuel filter for clogging If NG, repair or replace.

OK ↓

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
3.0 - 6.0 g-m/sec: at idling
12.9 - 25.3 g-m/sec: at 2,500 rpm

OR

Check "mass air flow" in MODE 1 with GST.
3.0 - 6.0 g-m/sec: at idling
12.9 - 25.3 g-m/sec: at 2,500 rpm

OR

Check mass air flow sensor output voltage, refer to EC-131.
Approximately 2.1V: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-124.

OK ↓

(Go to next page.)

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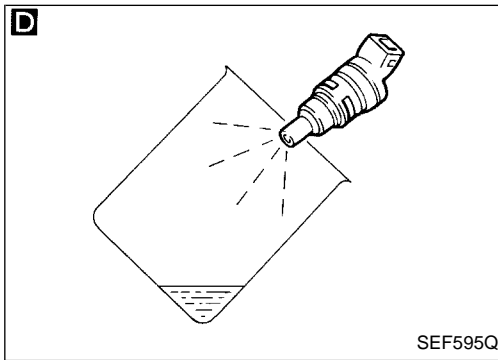
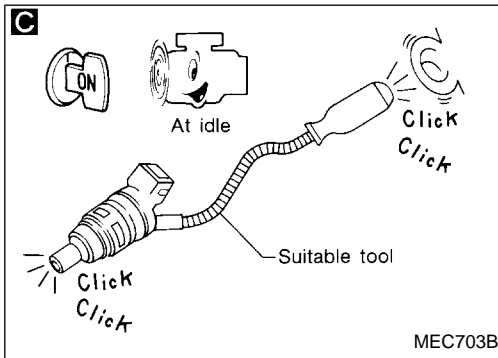
TROUBLE DIAGNOSIS FOR DTC P0171 (-B1), P0174 (-B2)

Fuel Injection System Function (Lean side) (P0171: Left bank), (P0174: Right bank) (Cont'd)

C

ACTIVETEST	
POWER BALANCE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX step

SEF793X



- C**
- CHECK FUNCTION OF INJECTORS.**
1. Install all parts removed.
 2. Start engine.
 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
 4. Make sure that each circuit produces a momentary engine speed drop.
- OR
3. Listen to each injector operating sound.
Clicking noise should be heard.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-513. Repair harness or connectors.

OK → Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

1. Turn ignition switch "OFF".
2. Remove injector gallery assembly. Refer to EC-38. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

- D**
1. Disconnect all ignition coil harness connectors.
 2. Place pans or saucers under each injector.
 3. Crank engine for about 3 seconds. Make sure that fuel sprays out vigorously from injectors.
Fuel should be sprayed evenly for each cylinder.

NG → Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

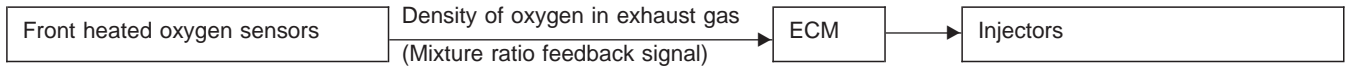
OK → Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank)

ON BOARD DIAGNOSIS LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the 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).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114 (Left bank)	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> Front heated oxygen sensor Injectors Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor
P0175 0209 (Right bank)		

ACTIVE TEST	
SELF-LEARNING CONT	B1 100 % B2 100 %
MONITOR	
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %

SEF762X

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

SEF748X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

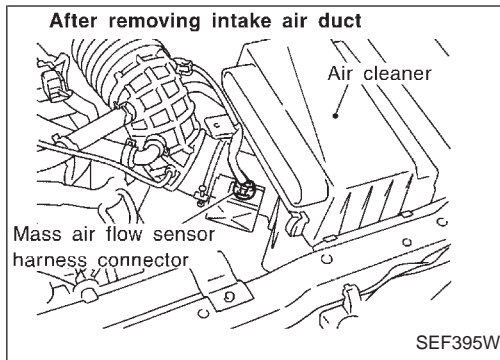
NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



- 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-II.
- 4) Clear the self-learning control coefficient by touching “CLEAR”.
- 5) Select “DATA MONITOR” mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to “DIAGNOSTIC PROCEDURE”, EC-253.
- 7) If it is difficult to start engine at step 6), the fuel injection system has a malfunction.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to “DIAGNOSTIC PROCEDURE”, EC-253. If engine does not start, remove ignition plugs and check for fouling, etc.

OR



Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank) (Cont'd)



- 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 3 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 run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "DIAGNOSTIC PROCEDURE", EC-253.
- 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-253. If engine does not start, remove ignition plugs and check for fouling, etc.

OR



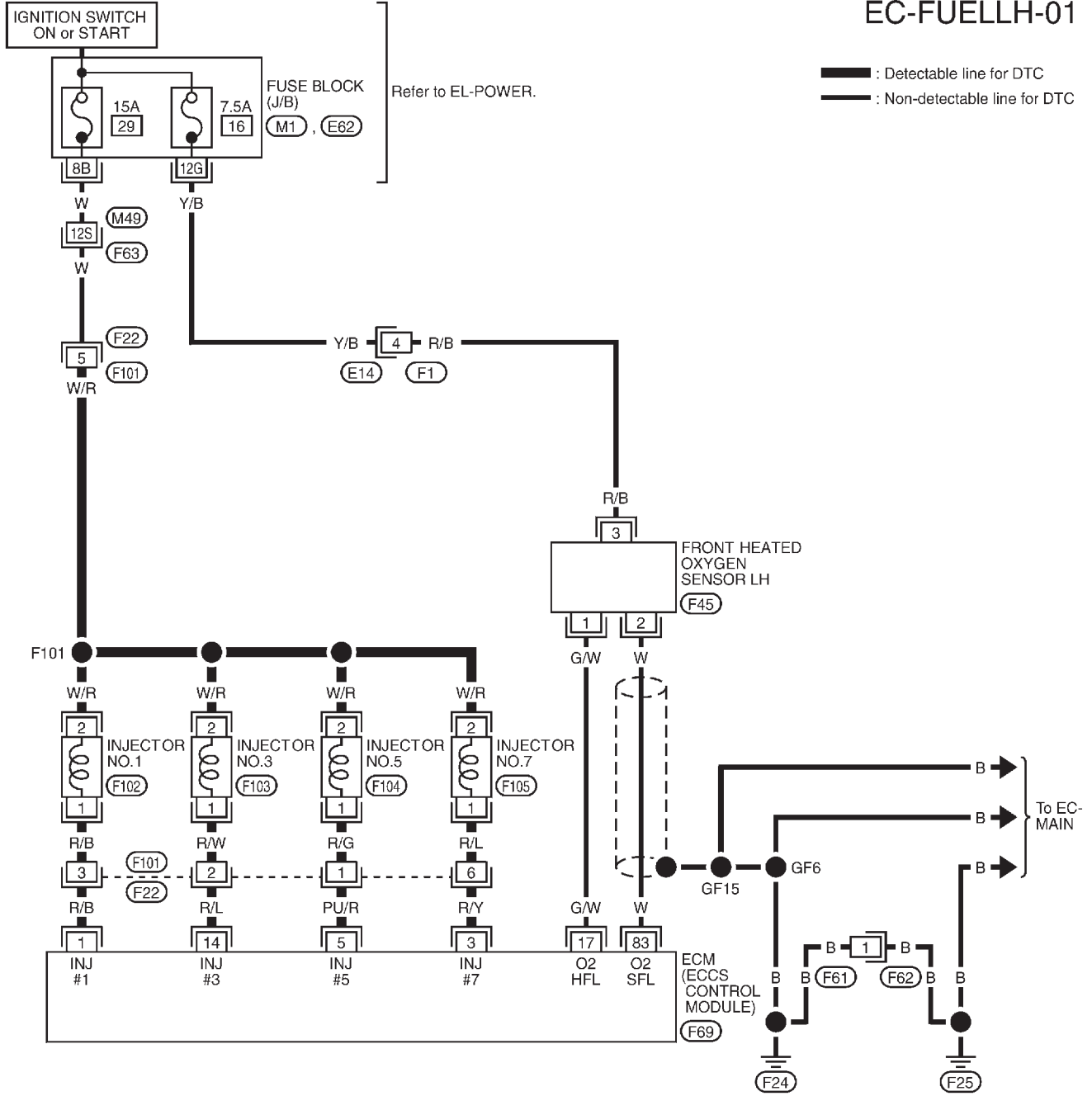
- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Disconnect mass air flow sensor harness connector.
- 4) Then restart engine and run it for at least 3 seconds at idle speed.
- 5) Stop engine and reconnect mass air flow sensor harness connector.
- 6) Turn ignition switch "ON".
- 7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. Make sure DTC 0102 is detected.
- 8) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 9) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. Make sure DTC 0505 is detected.
- 10) Start engine again and run it for at least 10 minutes at idle speed.
The DTC 0114 should be detected at this stage, if a malfunction exists. If so, go to "DIAGNOSTIC PROCEDURE", EC-253.
- 11) If it is difficult to start engine at step 10, the fuel injection system also has a malfunction.
- 12) Crank engine while depressing accelerator pedal. If engine starts, go to "DIAGNOSTIC PROCEDURE", EC-253. If engine does not start, remove ignition plugs and check for fouling, etc.

TROUBLE DIAGNOSIS FOR DTC P0172 (-B1), P0175 (-B2)

Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank) (Cont'd)

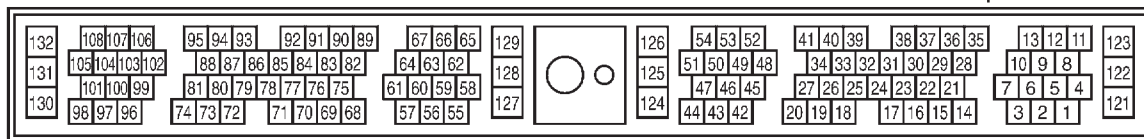
LEFT BANK

EC-FUELLH-01



Refer to last page (Foldout page).

- (M49), (F63)
- (M1)
- (E62)

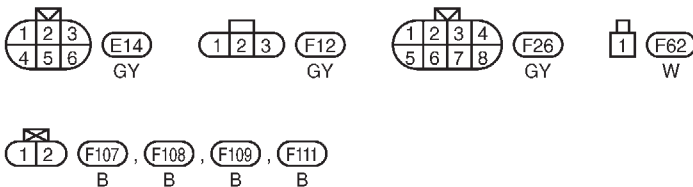
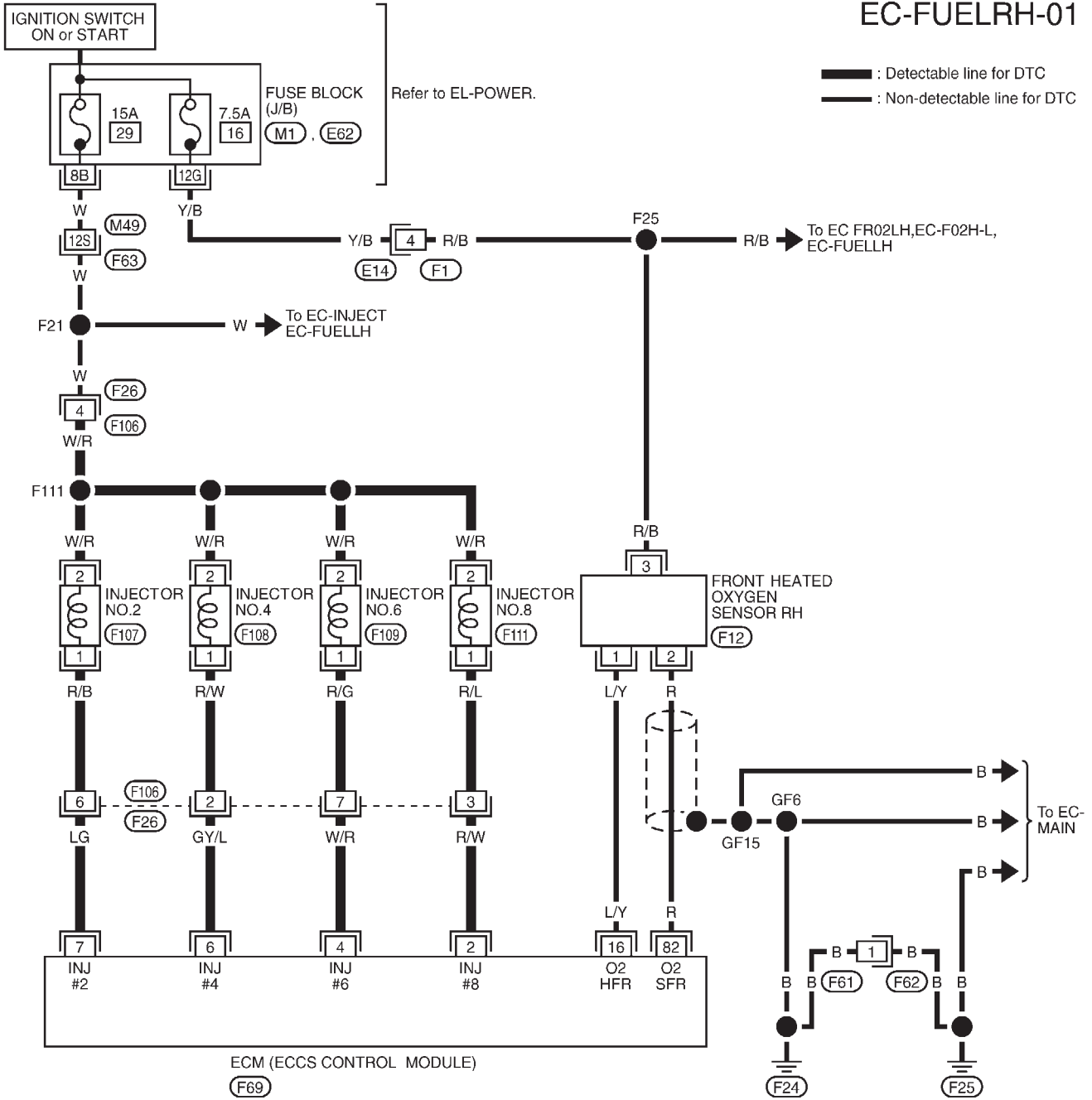


TROUBLE DIAGNOSIS FOR DTC P0172 (-B1), P0175 (-B2)

Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank) (Cont'd)

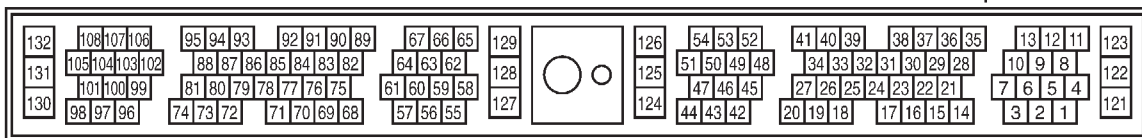
RIGHT BANK

EC-FUELRH-01



Refer to last page (Foldout page).

- M49, F63
- E62
- M1



TROUBLE DIAGNOSIS FOR DTC P0172 (-B1), P0175 (-B2)

Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START

A
CHECK FOR EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

OK

B
CHECK FRONT HEATED OXYGEN SENSOR.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM and sensor terminals.

NG → Repair harness or connectors.

P code	Terminals		Bank (Harness protector color)
	ECM	Sensor	
P0172	83	2	LH (Black)
P0175	82	2	RH (Blue)

Continuity should exist.
4. Check harness continuity between ECM and sensor or ground.

P code	Terminals		Bank (Harness protector color)
	ECM or sensor	Ground	
P0172	83 or 2	Ground	LH (Black)
P0175	82 or 2	Ground	RH (Blue)

Continuity should not exist.
If OK, check harness for short to ground and short to power.

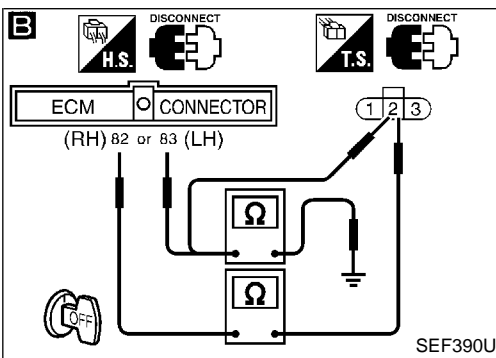
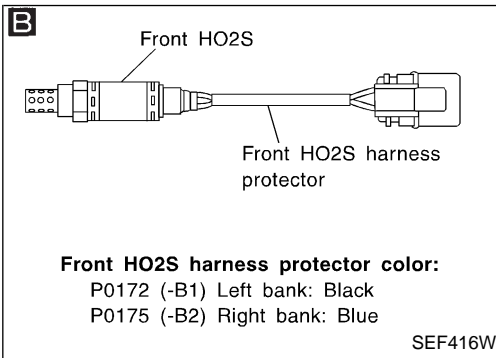
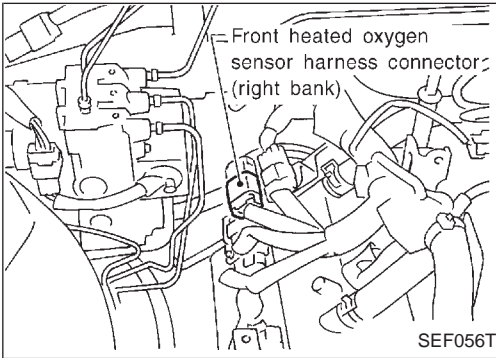
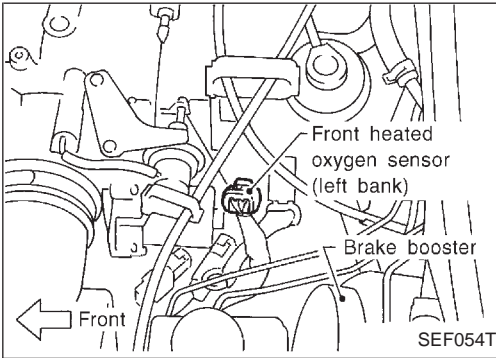
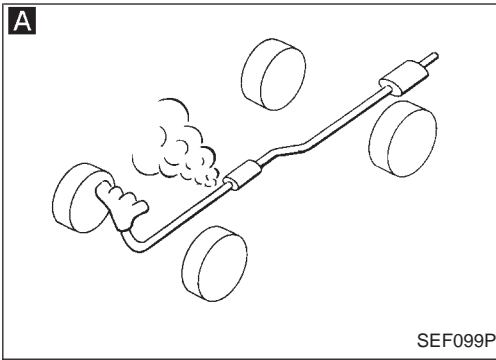
OK

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-37.
2. Install fuel pressure gauge and check fuel pressure.
At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check the following.
• Fuel pump and circuit Refer to EC-521.
• Fuel pressure regulator Refer to EC-37.
If NG, repair or replace.

OK

(Go to next page.)



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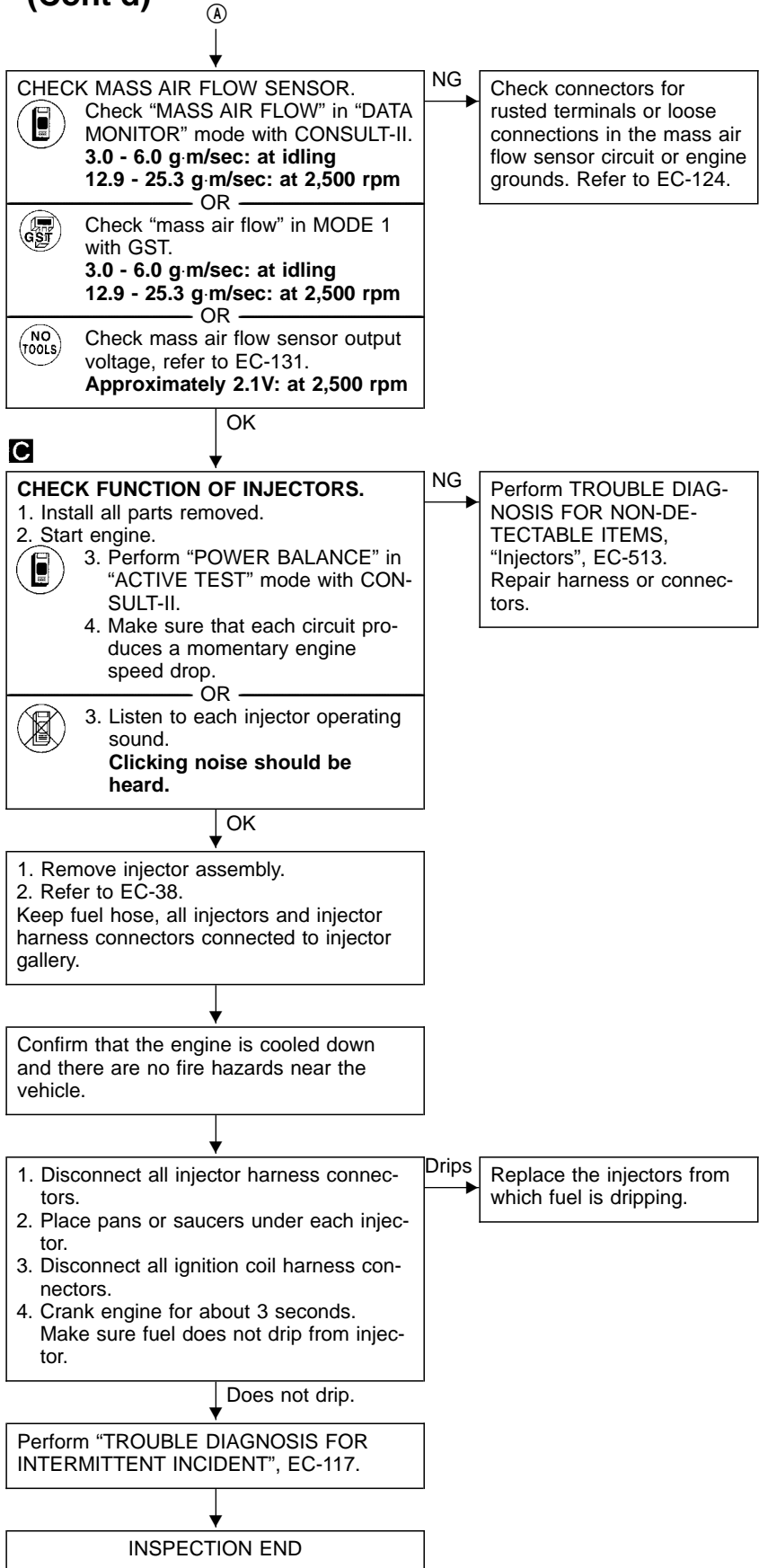
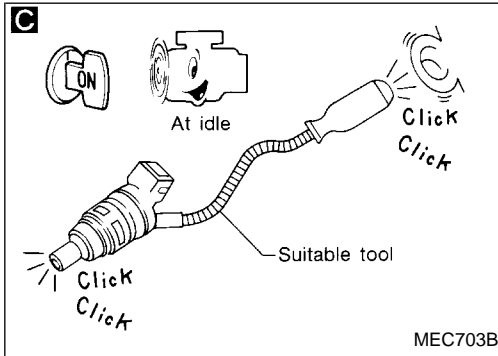
TROUBLE DIAGNOSIS FOR DTC P0172 (-B1), P0175 (-B2)

Fuel Injection System Function (Rich side) (P0172: Left bank), (P0175: Right bank) (Cont'd)

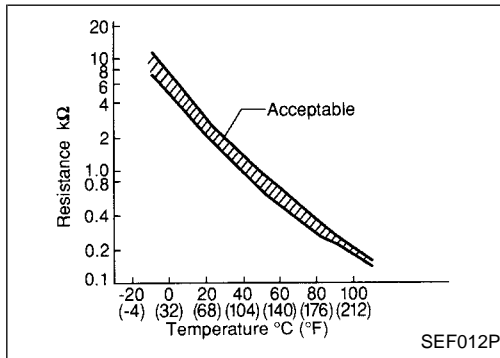
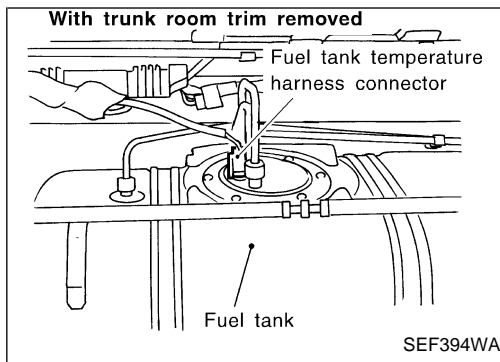
C

ACTIVETEST	
POWER BALANCE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX step

SEF793X



TROUBLE DIAGNOSIS FOR DTC P0180



Fuel Tank Temperature Sensor

COMPONENT DESCRIPTION

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.

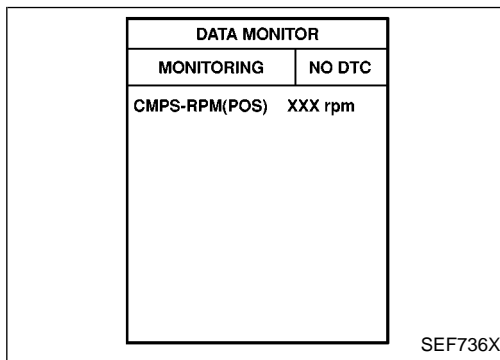
<Reference data>

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 ⑨ (Fuel tank temperature sensor) and ECM terminal (128) (ECM ground).

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Causes)
P0180 0402	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Fuel tank temperature sensor



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-258.
If the result is OK, go to following step.

NOTE:

If "COOLAN TEMP/S" is already less than 90°C (194°F) before step 4), the result will be OK.

If "COOLAN TEMP/S" is above 90°C (194°F), go to the following step.

- 4) Cool engine down until "COOLAN TEMP/S" is less than 90°C (194°F).
- 5) Wait at least 10 seconds.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-258.

TROUBLE DIAGNOSIS FOR DTC P0180

Fuel Tank Temperature Sensor (Cont'd)

OR

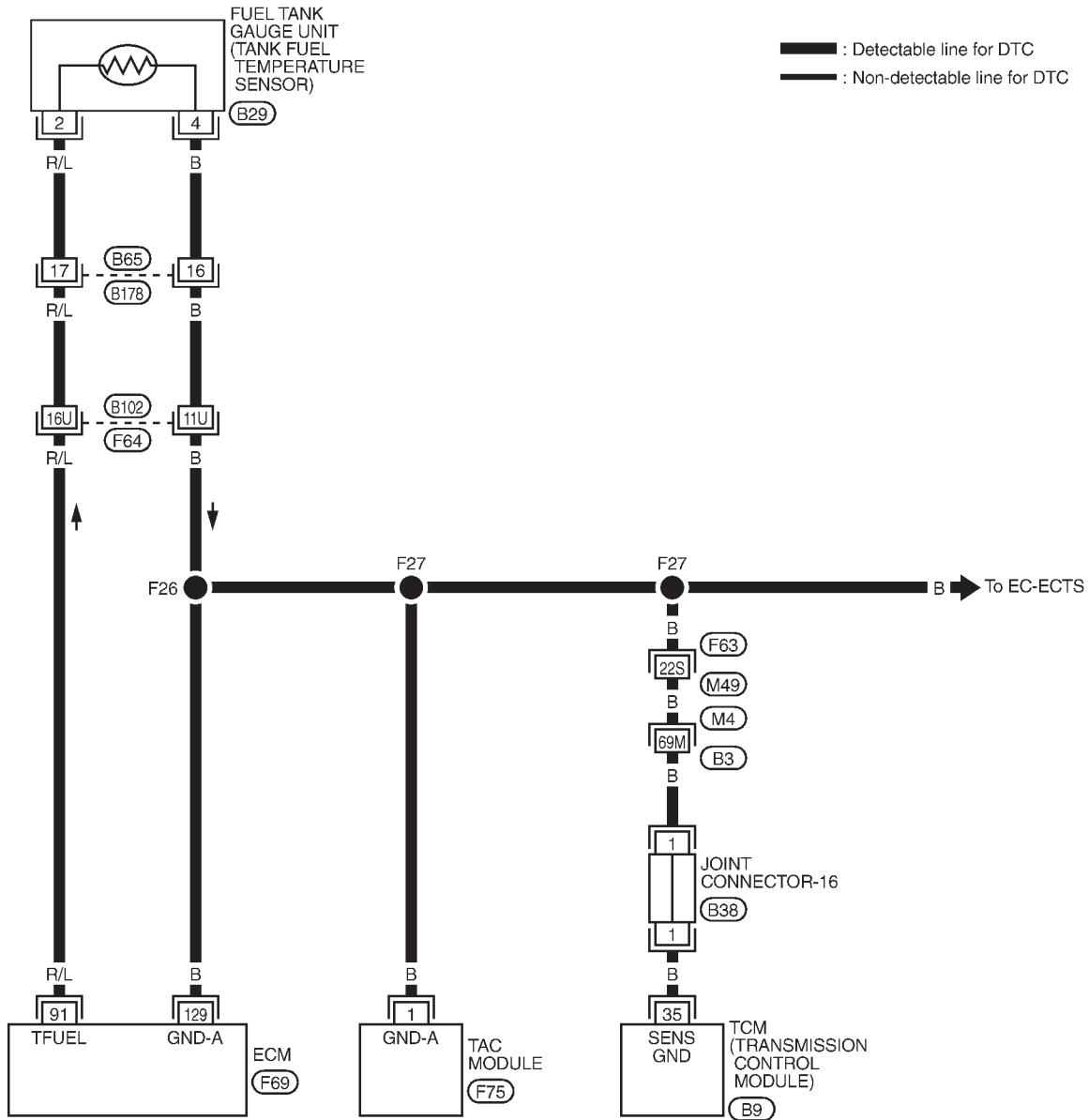


Follow the procedure "With CONSULT-II" above.

TROUBLE DIAGNOSIS FOR DTC P0180

Fuel Tank Temperature Sensor (Cont'd)

EC-TFTS-01



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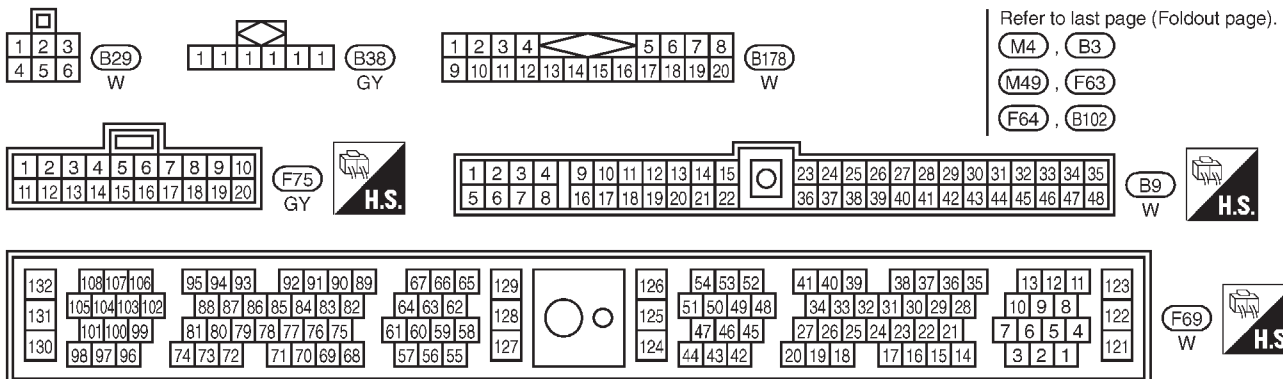
RS

BT

HA

EL

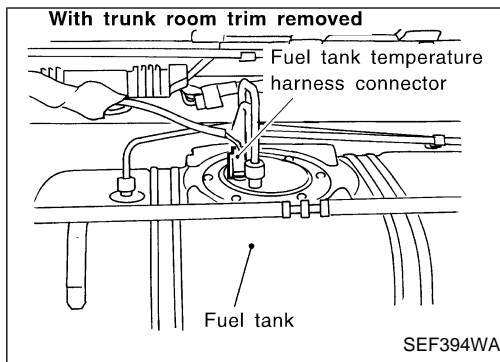
IDX



TROUBLE DIAGNOSIS FOR DTC P0180

Fuel Tank Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect fuel tank temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT-II or tester.

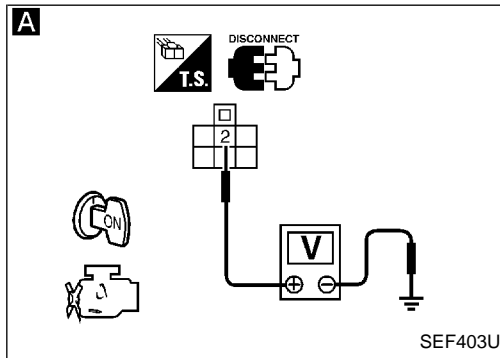
Voltage: Approximately 5V

NG

Check the following.

- Harness connectors (B65), (B178)
- Harness connectors (B102), (F64)
- Harness for open or short between ECM and fuel tank temperature sensor

If NG, repair harness or connector.



B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ④ and body ground.

Continuity should exist.

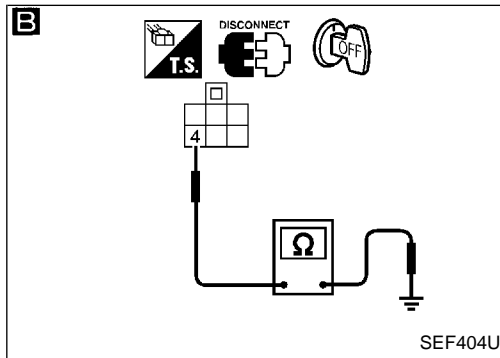
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F64), (B102)
- Harness connectors (B178), (B65)
- Harness connectors (F63), (M49), (M4), (B3)
- Joint connector-16
- Harness for open or short between ECM and sensor
- Harness for open or short between TCM (Transmission control module) and sensor
- Harness for open or short between fuel tank temperature sensor and throttle actuator control (TAC) module

If NG, repair harness or connectors.



OK

CHECK COMPONENT
(Fuel tank temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG

Replace fuel tank temperature sensor.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

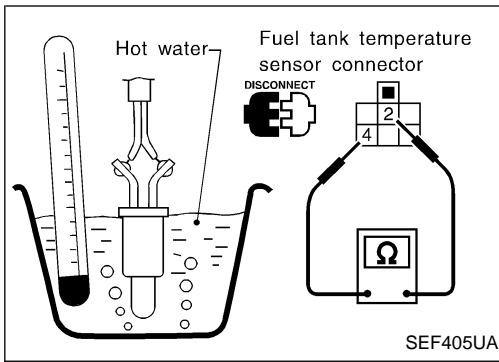
TROUBLE DIAGNOSIS FOR DTC P0180

Fuel Tank Temperature Sensor (Cont'd)

COMPONENT INSPECTION

Fuel tank temperature sensor

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.

GI

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EM

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EC

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BT

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No. 1 - 8 Cylinder Misfire, Multiple Cylinder Misfire

ON BOARD DIAGNOSIS LOGIC

If misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.

The misfire detection logic consists of the following two conditions.



1. One Trip Detection Logic (Three Way Catalyst Damage)

When a misfire is detected which will overheat and damage the three way catalyst, the malfunction indicator lamp (MIL) will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 engine revolutions.

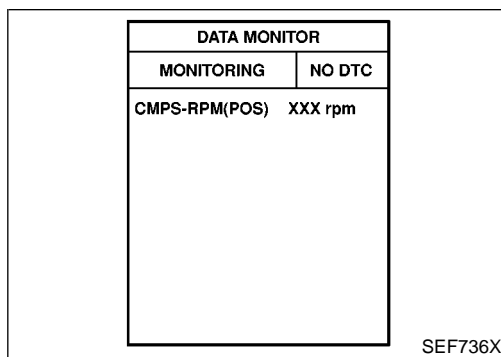
If the misfire frequency decreases to a level that will not damage the three way catalyst, the MIL will change from blinking to lighting up.

(After the first trip detection, the MIL will light up from engine starting. If a misfire is detected that will cause three way catalyst damage, the MIL will start blinking.)

2. Two Trip Detection Logic (Exhaust quality deterioration)

When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the malfunction indicator lamp will light up based on the second consecutive trip detection logic. In this condition, ECM monitors the misfire for each 1,000 revolutions of the engine.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	● Multiple cylinders misfire.	<ul style="list-style-type: none"> ● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● EGR valve ● The injector circuit is open or shorted. ● Injectors ● Intake air leaks ● The ignition secondary circuit is open or shorted. ● Lack of fuel ● Magnetized signal plate (drive plate) ● Front heated oxygen sensor
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.	
P0307 (0602)	● No. 7 cylinder misfires.	
P0308 (0601)	● No. 8 cylinder misfires.	



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT-II.


No. 1 - 8 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

- 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 - 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible during driving.

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-262.

OR

 Follow the procedure "With CONSULT-II" above.

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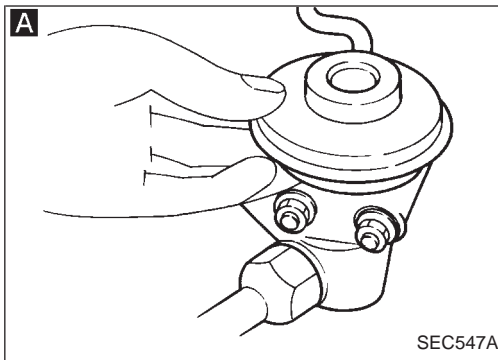
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TROUBLE DIAGNOSIS FOR DTC P0300 - P0308

No. 1 - 8 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

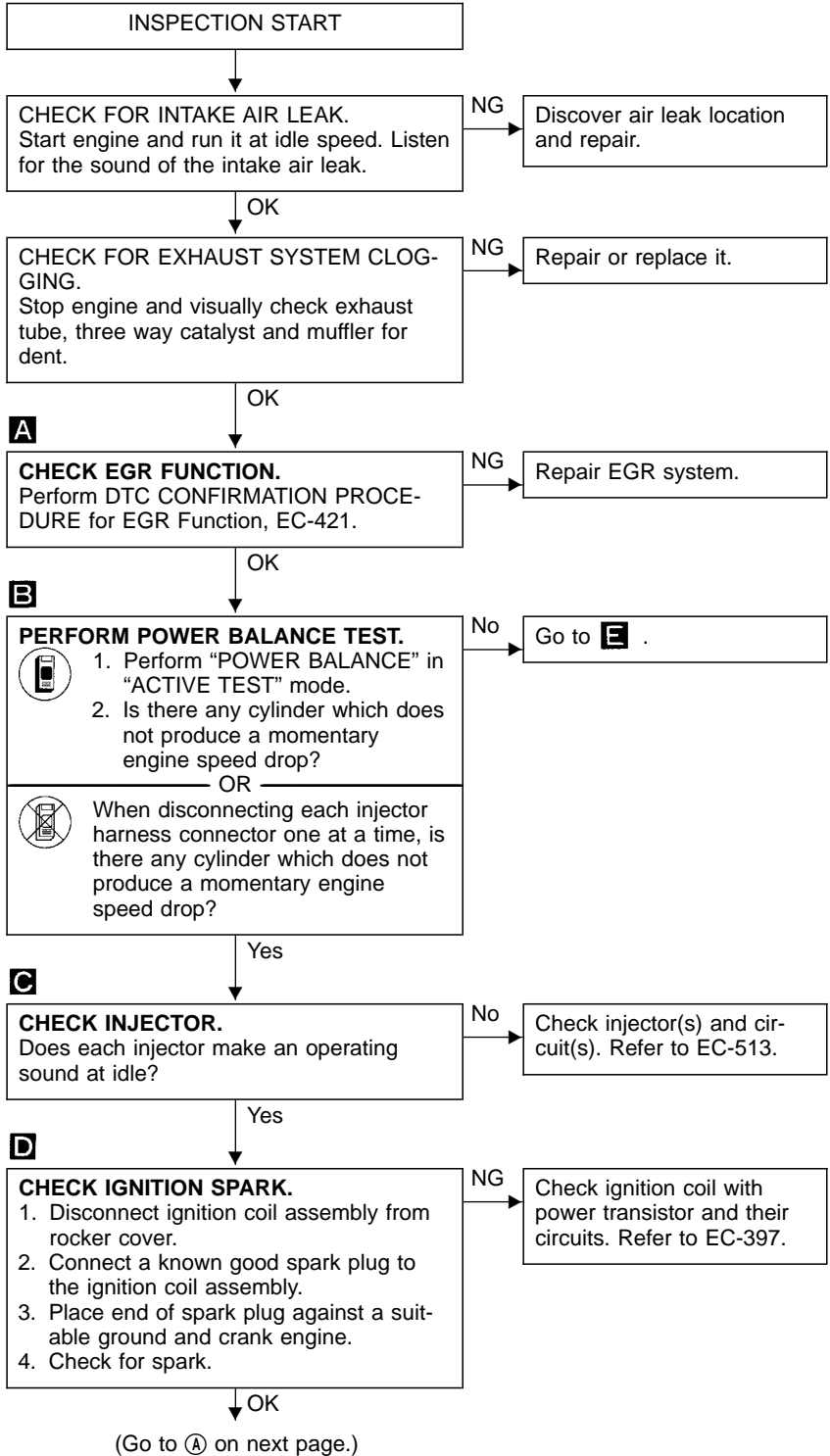
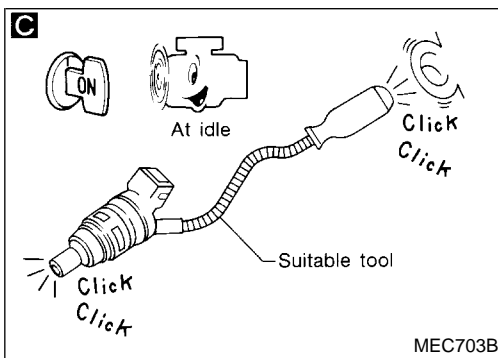
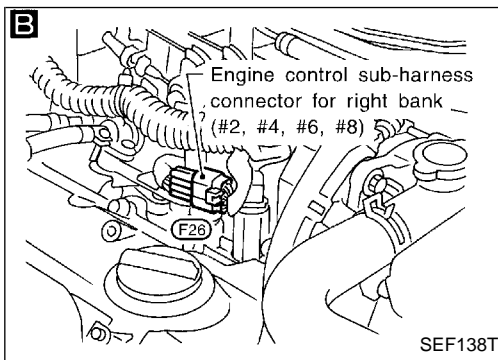
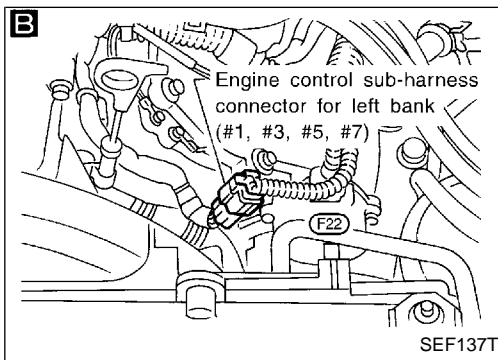
DIAGNOSTIC PROCEDURE



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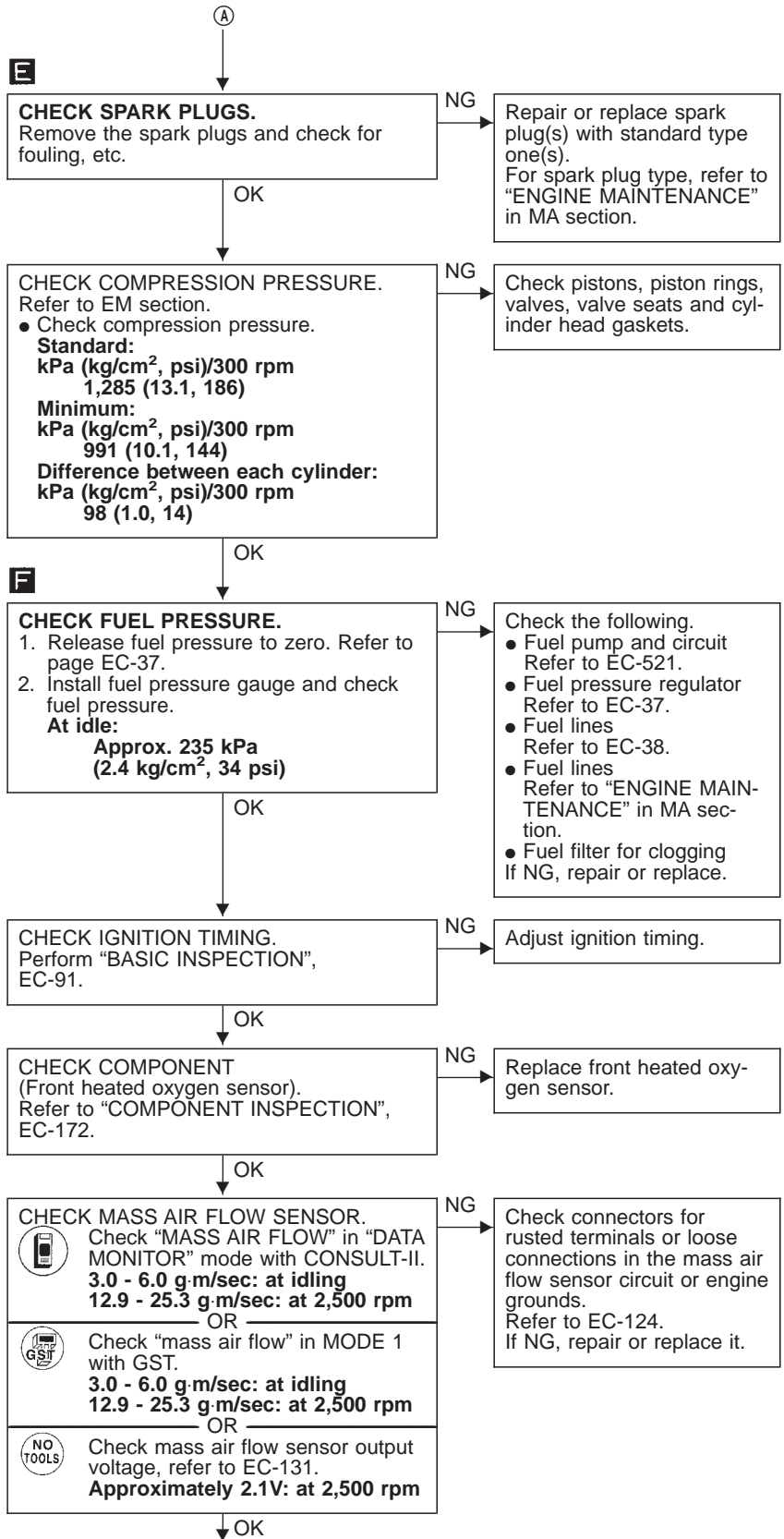
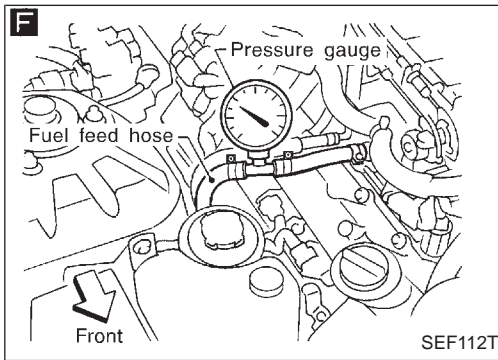
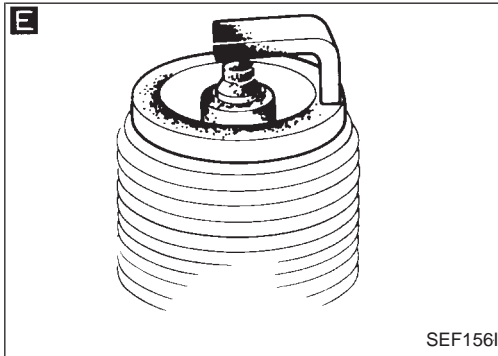
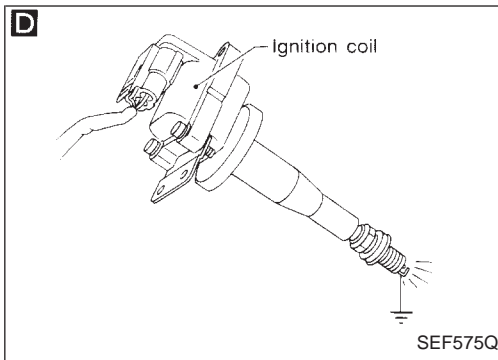
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX step

SEF793X



TROUBLE DIAGNOSIS FOR DTC P0300 - P0308

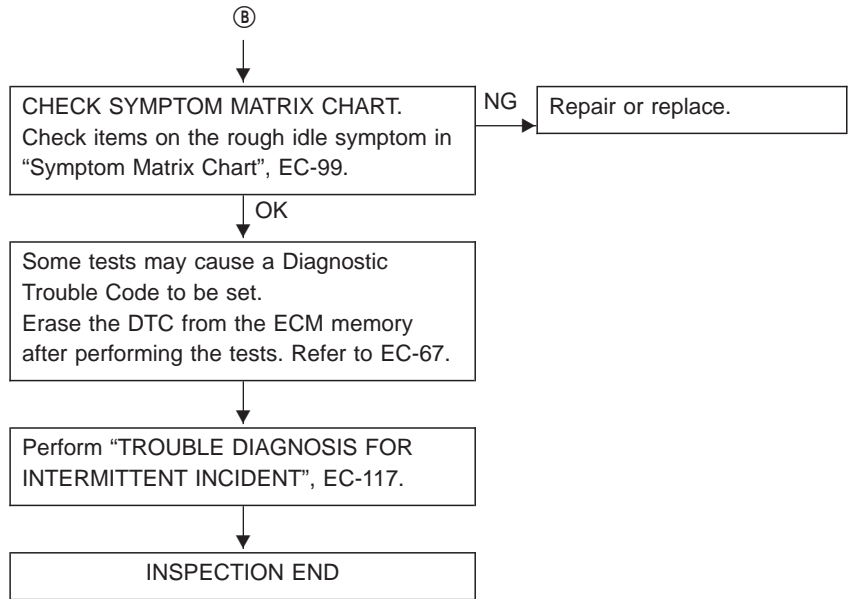
No. 1 - 8 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)

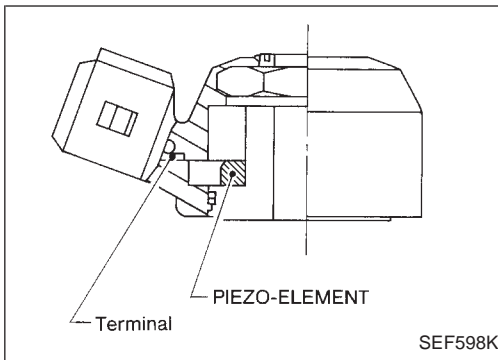


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(Go to B on next page.)

No. 1 - 8 Cylinder Misfire, Multiple Cylinder Misfire (Cont'd)





Knock Sensor (KS) (P0325: Left bank), (P0330: Right bank)

COMPONENT DESCRIPTION

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 is not stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction.

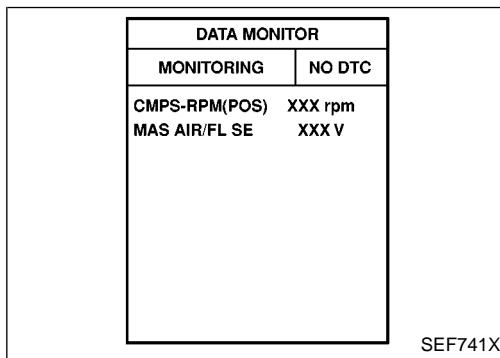
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
105	W	Knock sensor (RH)	Engine is running.	2.0 - 3.0V
108	W	Knock sensor (LH)	└ Idle speed	

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0325 0304 (Left bank)	<ul style="list-style-type: none"> An excessively low or high voltage from the knock sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The knock sensor circuit is open or shorted.) Knock sensor
P0330 0212 (Right bank)		



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

Before performing the following procedure, confirm that battery voltage is more than 10V.

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-267.

OR

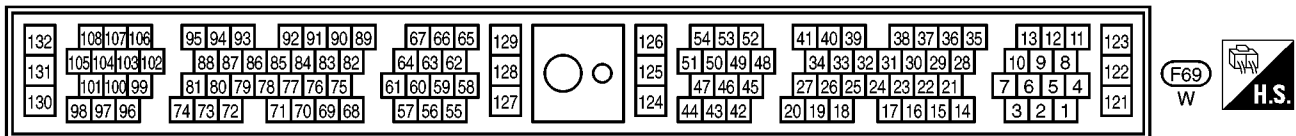
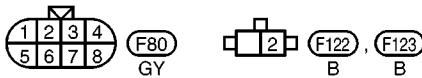
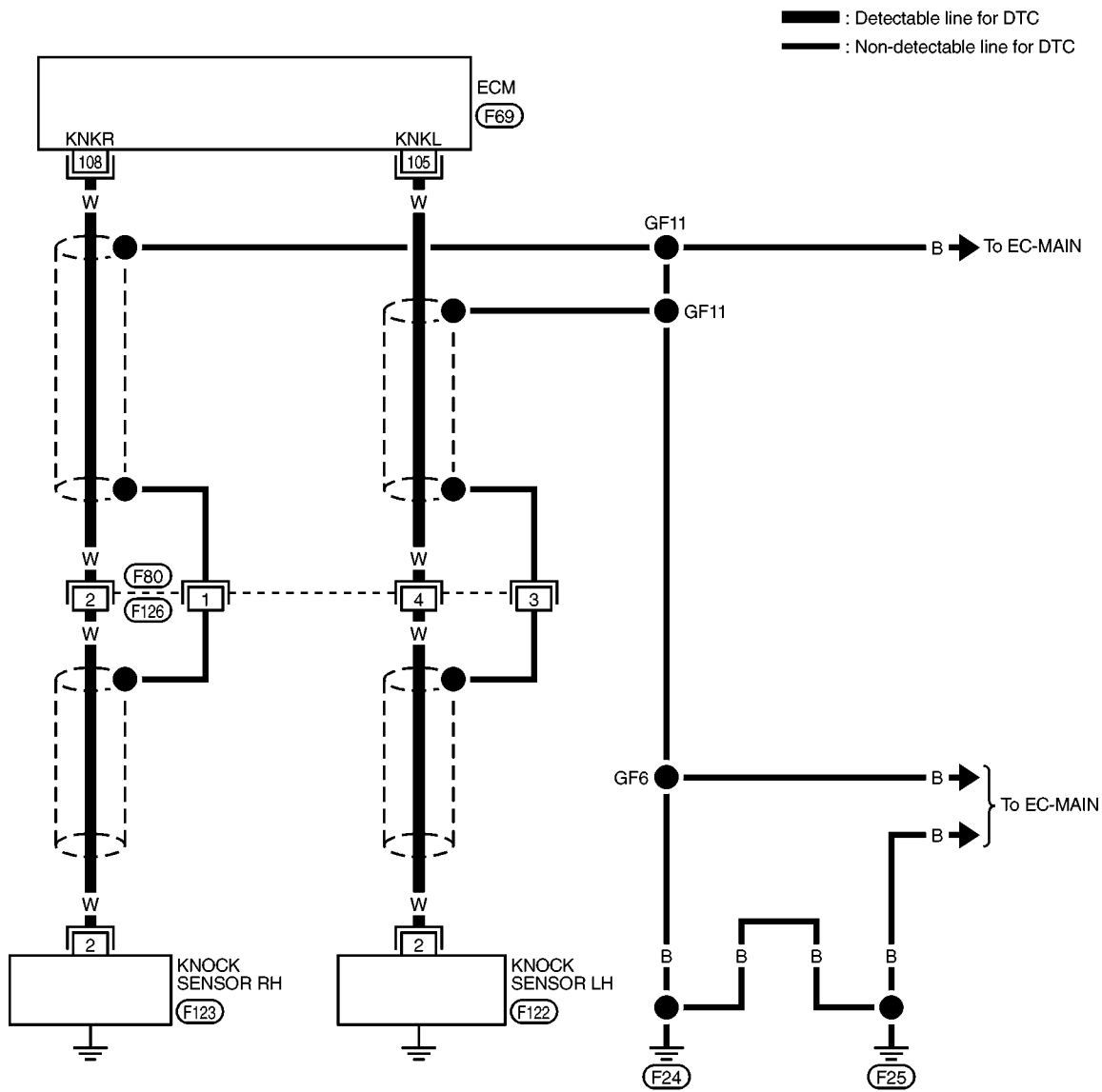
Follow the procedure "With CONSULT-II" above.

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TROUBLE DIAGNOSIS FOR DTC P0325 (-B1), P0330 (-B2)

Knock Sensor (KS) (P0325: Left bank), (P0330: Right bank) (Cont'd)

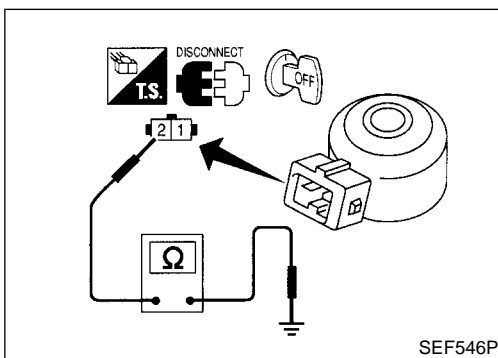
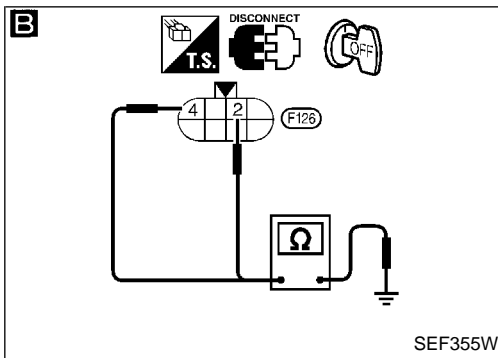
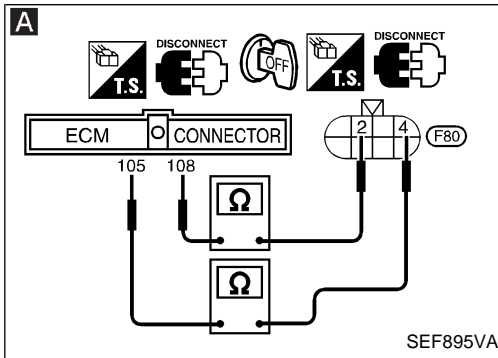
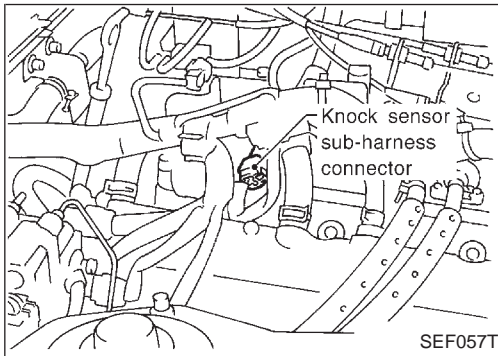
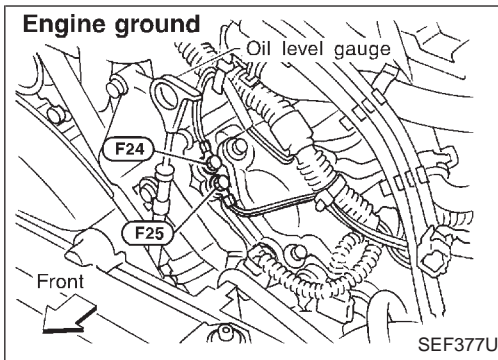
EC-KS-01



TROUBLE DIAGNOSIS FOR DTC P0325 (-B1), P0330 (-B2)

Knock Sensor (KS) (P0325: Left bank), (P0330: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

A
CHECK INPUT SIGNAL CIRCUIT-1.
1. Disconnect ECM harness connector and knock sensor sub-harness connector.
2. Check harness continuity between terminal ④ (left bank), ② (right bank) and ECM terminal ⑩⑤ (left bank), ⑩⑧ (right bank).
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

B
CHECK INPUT SIGNAL CIRCUIT-2.
Check harness continuity between terminal ④ (left bank), ② (right bank) and engine ground.
Continuity should exist.
If OK, check harness for short to ground and short to power.
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

NG → Check the following.
• Harness for open or short between knock sensor sub-harness connector-2 and knock sensor
If OK, check harness for short to ground and short to power in harness or connectors.
• As for knock sensor (COMPONENT INSPECTION), refer to below.
If NG, replace knock sensor.

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

COMPONENT INSPECTION

Knock sensor

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal ② and ground.

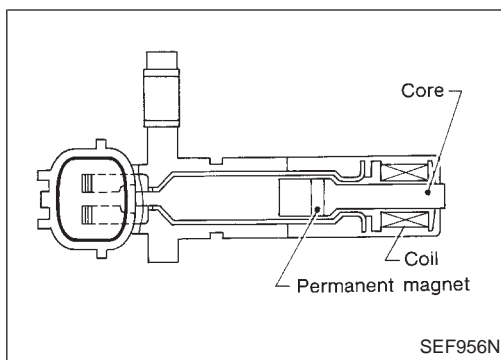
Approximately 500 - 620 kΩ [at 25°C (77°F)]

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

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use a new one.

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Crankshaft Position Sensor (CKPS) (OBD)

COMPONENT DESCRIPTION

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

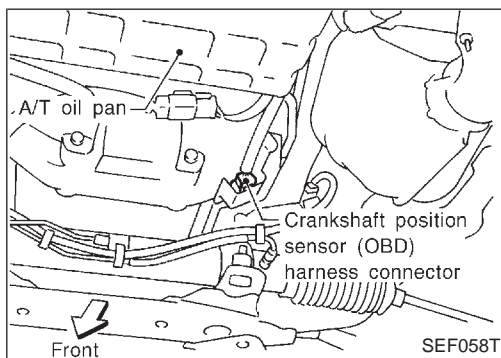
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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 of misfire.



ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC voltage)
57	B/R	Crankshaft position sensor (OBD)	<p>Engine is running. (Warm-up condition)</p> <p>└ Idle speed</p>	<p>Approximately 1.7V</p>
			<p>Engine is running. (Warm-up condition)</p> <p>└ Engine speed is 2,000 rpm.</p>	<p>Approximately 0V</p>

TROUBLE DIAGNOSIS FOR DTC P0335

Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) Crankshaft position sensor (OBD) Dead (Weak) battery

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V

SEF741X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 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-277.

OR



Follow the procedure "With CONSULT-II" above.

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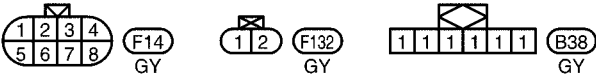
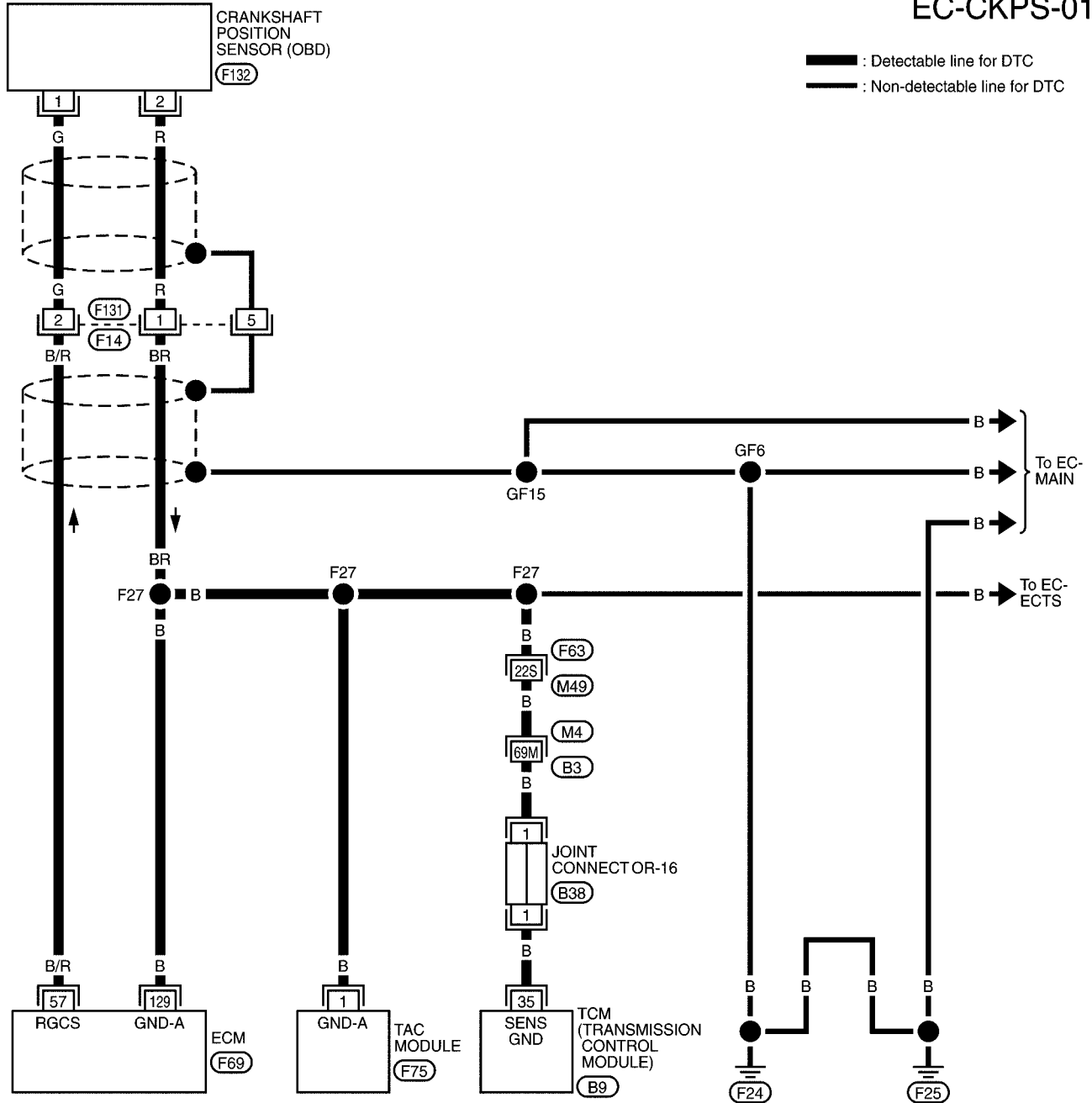
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TROUBLE DIAGNOSIS FOR DTC P0335

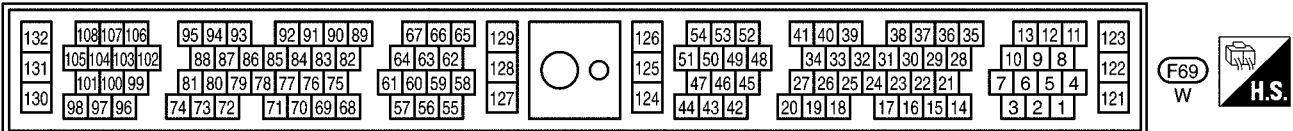
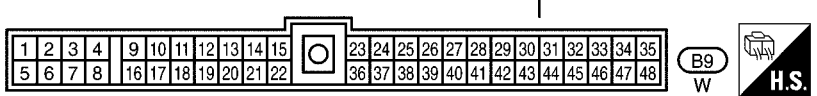
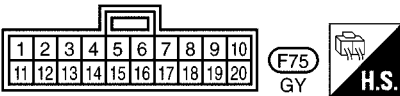
Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

EC-CKPS-01



Refer to last page (Foldout page).

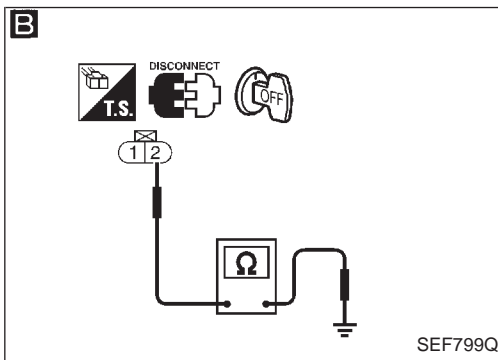
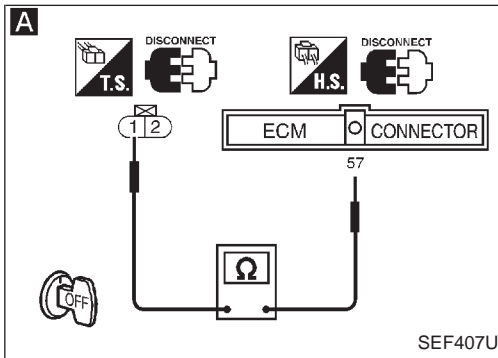
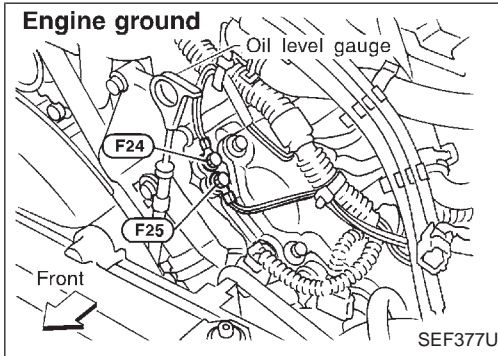
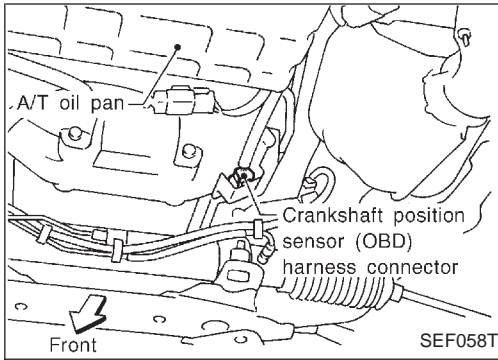
M4, B3
 M49, F63



TROUBLE DIAGNOSIS FOR DTC P0335

Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

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

A

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect crankshaft position sensor (OBD) harness connector and ECM harness connector.
2. Check continuity between sensor terminal ① and ECM terminal ⑤ with CONSULT-II or tester.

Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F14), (F131)
- Harness for open or short between crankshaft position sensor (OBD) and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

B

CHECK GROUND CIRCUIT.

Check harness continuity between terminal ② and engine ground.

Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F14), (F131)
- Harness connectors (F63), (M69)
- Harness connectors (M4), (B3)
- Joint connector-16
- Harness for open or short between crankshaft position sensor (OBD) harness connector and ECM
- Harness for open or short between crankshaft position sensor (OBD) and throttle actuator control module (TAC)
- Harness for open or short between crankshaft position sensor and TCM (Transmission Control Module)

If NG, repair open circuit or short to ground or short to power in harness or connectors.

CHECK COMPONENT [Crankshaft position sensor (OBD)]. Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

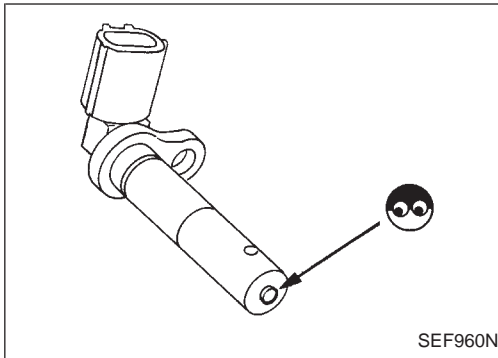
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Crankshaft Position Sensor (CKPS) (OBD) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

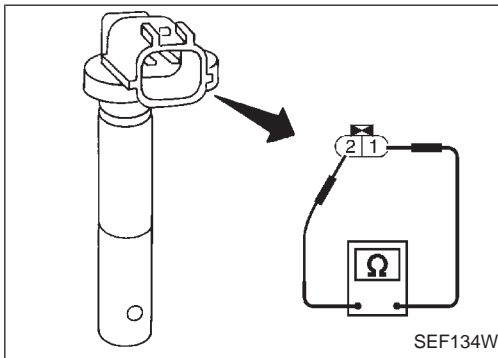
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.

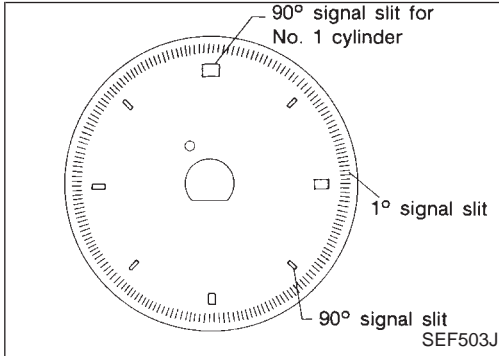
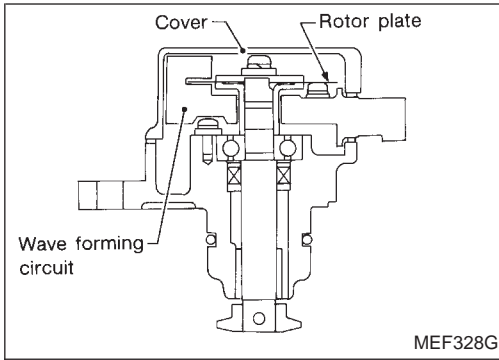


5. Check resistance as shown in the figure.

Resistance:

Approximately 166.5 - 203.5Ω [at 20°C (68°F)]





Camshaft Position Sensor (CMPS)

COMPONENT DESCRIPTION

The camshaft position sensor (CMPS) is a basic component of the ECM. It monitors engine speed and piston position. It sends signals to the ECM 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 1° signal and 8 slits for 90° signal. Light Emitting Diodes (LED) and photo diodes are built into the wave-forming circuit.

When the rotor plate passes between the LED and the photo diode, the following happens:

Slits in the rotor plate continually cut the transmitted light to the photo diode from the LED. This generates rough-shaped pulses converted into on-off pulses by the wave forming circuit sent to the ECM.

ECM TERMINALS AND REFERENCE VALUE

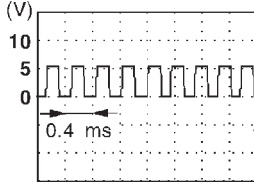
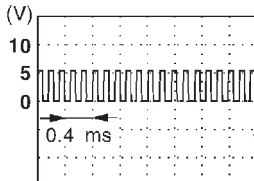
Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
124	W/B	ECM relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
55 58	P	Crankshaft position sensor (REF)	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0.6 - 1.0V <p>SEF540T</p>
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	Approximately 0.8 - 0.9V <p>SEF544T</p>

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TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
59	L	Camshaft position sensor (POS)	<div style="border: 1px solid black; display: inline-block; padding: 2px;">Engine is running.</div> (Warm-up condition) ↳ Idle speed	Approximately 2.5V  SEF547T
			<div style="border: 1px solid black; display: inline-block; padding: 2px;">Engine is running.</div> (Warm-up condition) ↳ Engine speed is 2,000 rpm.	Approximately 2.4V  SEF548T
130 131	R/G	Power supply for ECM	<div style="border: 1px solid black; display: inline-block; padding: 2px;">Ignition switch "ON"</div>	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0340 0101	A) Either 1° or 90° signal is not sent to ECM for the first few seconds during engine cranking. B) Either 1° or 90° signal is not sent to ECM during engine running. C) Either 1° or 90° signal is not in the normal pattern during engine running.	<ul style="list-style-type: none"> ● 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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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.

Camshaft Position Sensor (CMPS) (Cont'd)

Procedure for malfunction A

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V

SEF741X



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 seconds at idle speed.
(If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-277.

GI

MA

OR



Follow the procedure "With CONSULT-II" above.

EM

Procedure for malfunction B and C



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 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-277.

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Follow the procedure "With CONSULT-II" above.

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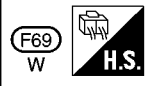
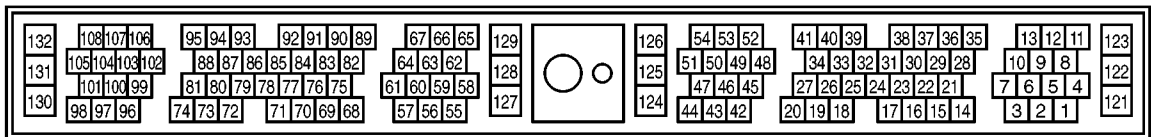
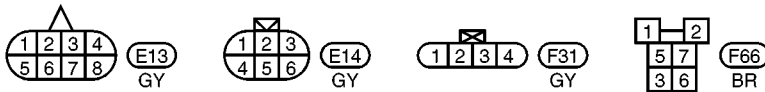
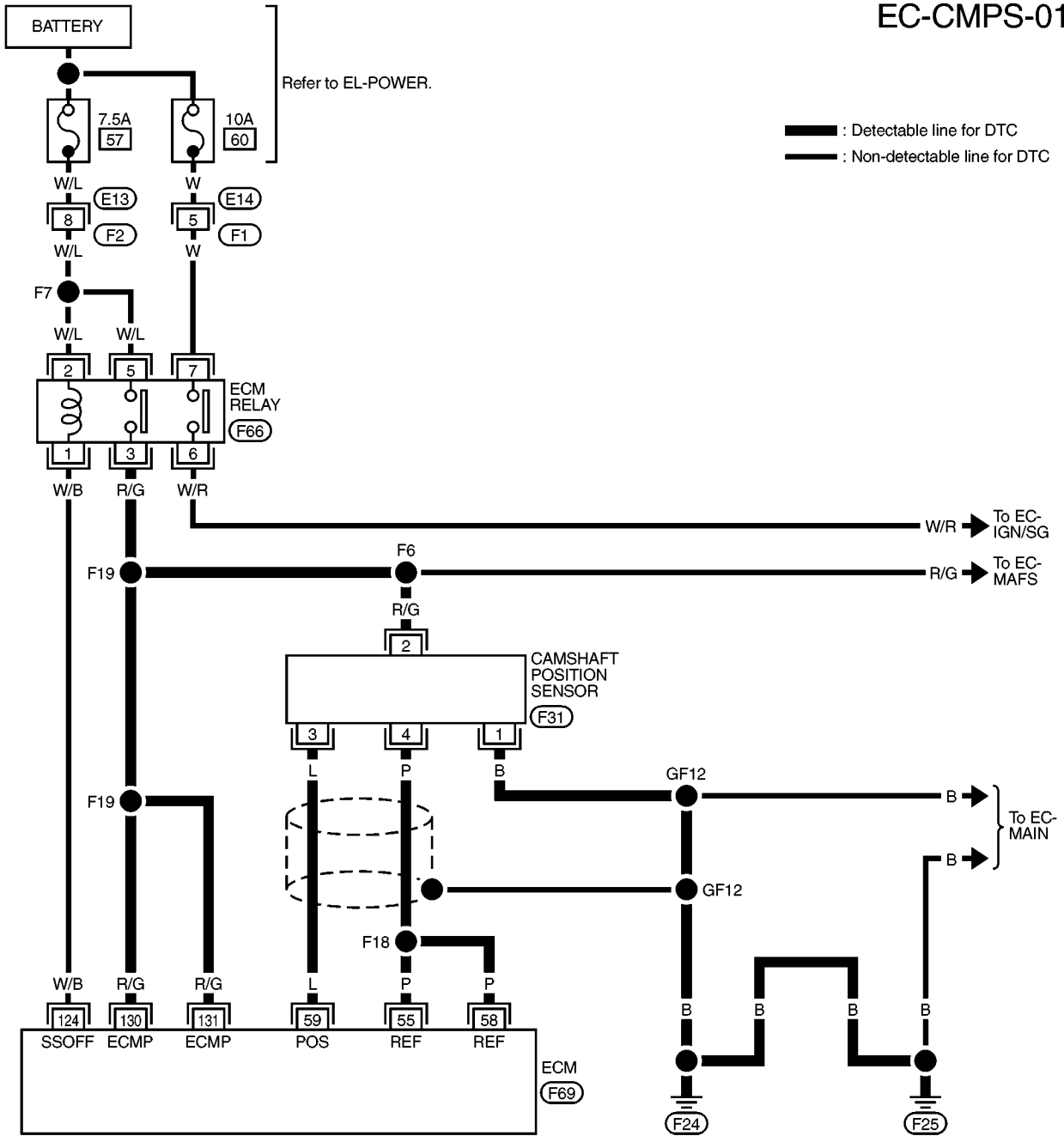
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TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd)

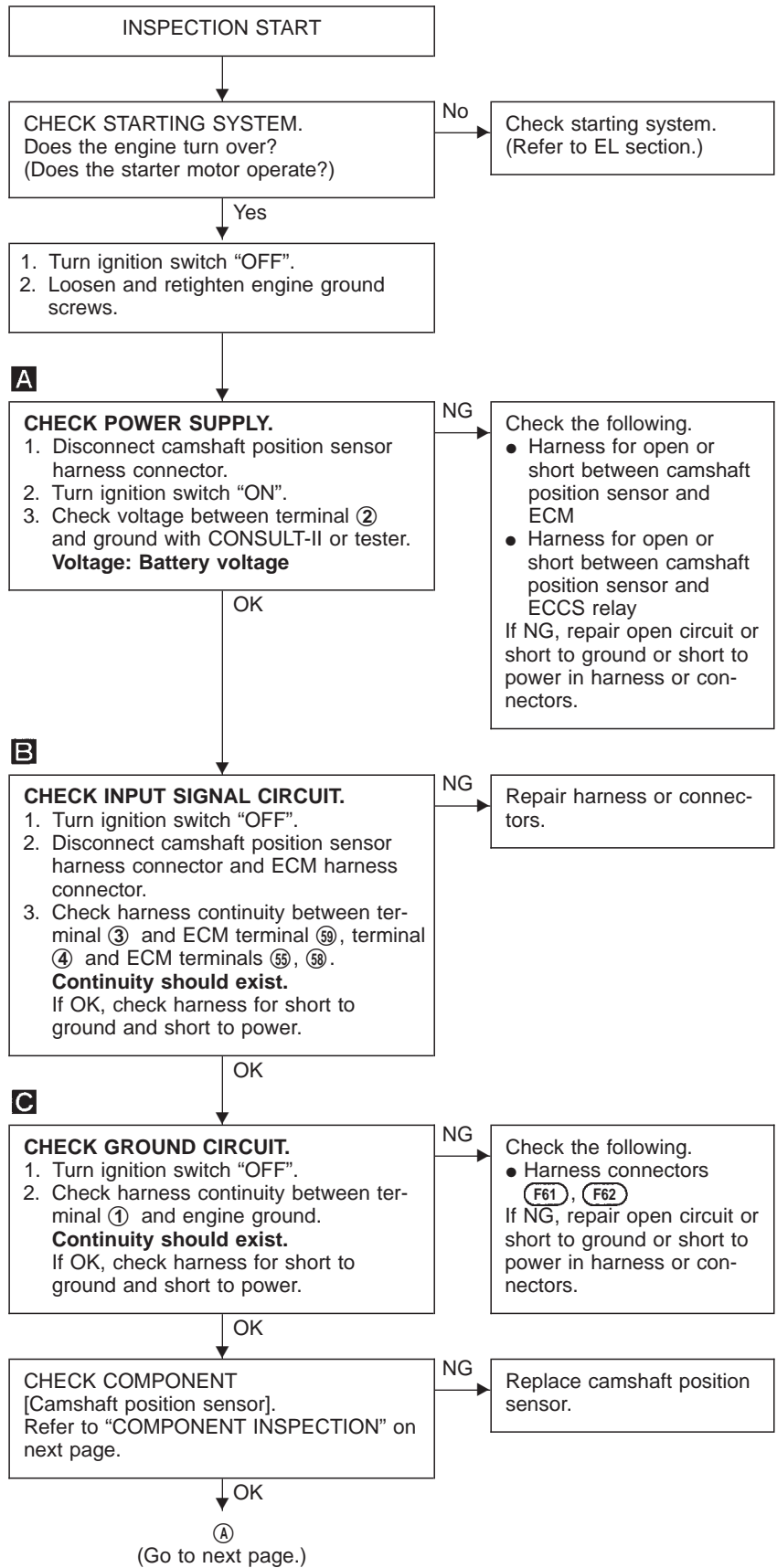
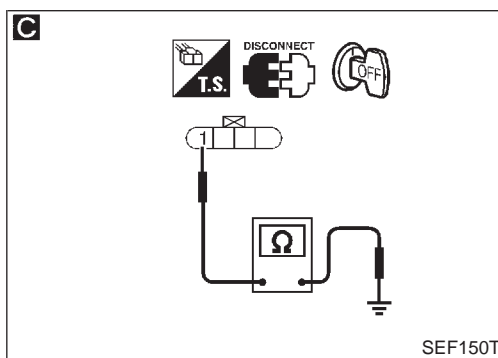
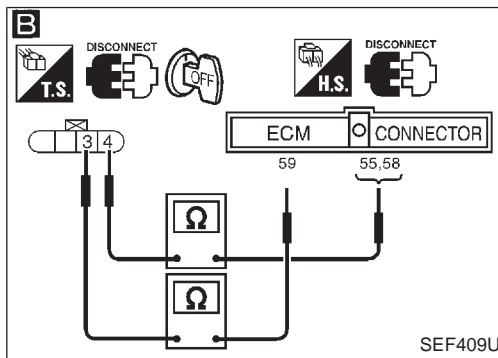
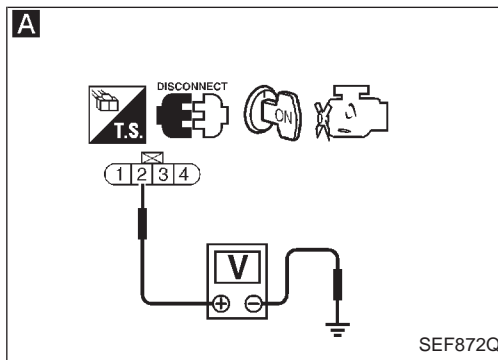
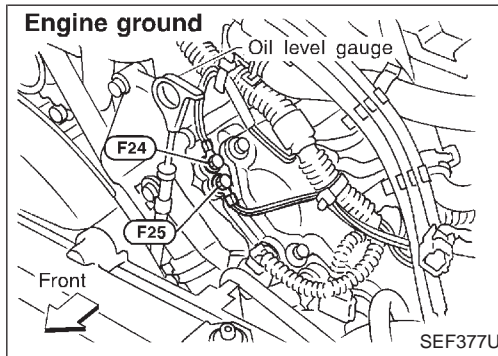
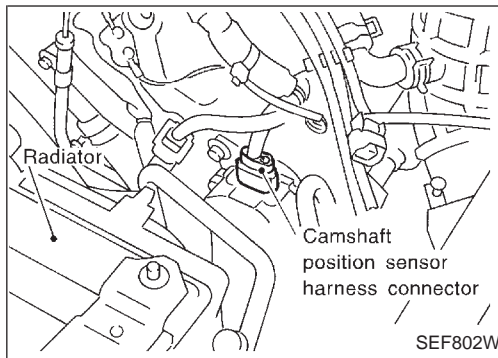
EC-CMPS-01



TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd)

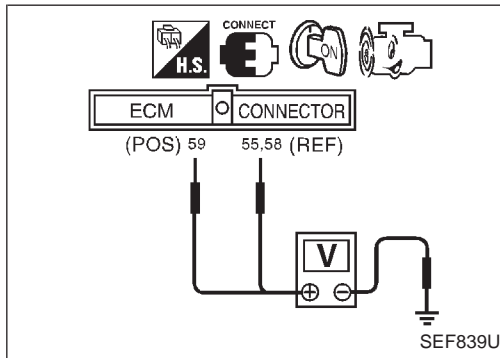
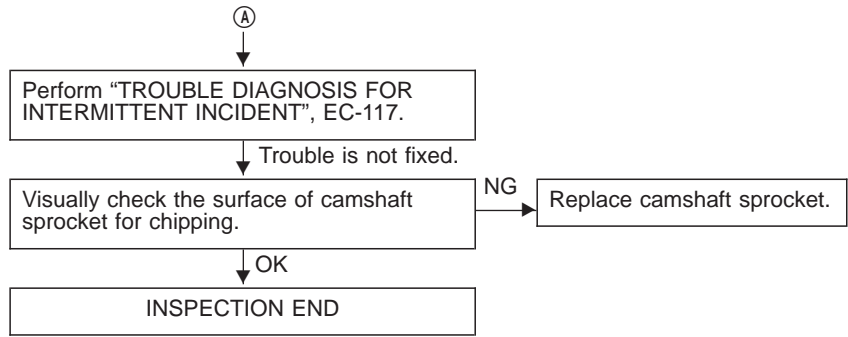
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS) (Cont'd)



COMPONENT INSPECTION

Camshaft position sensor

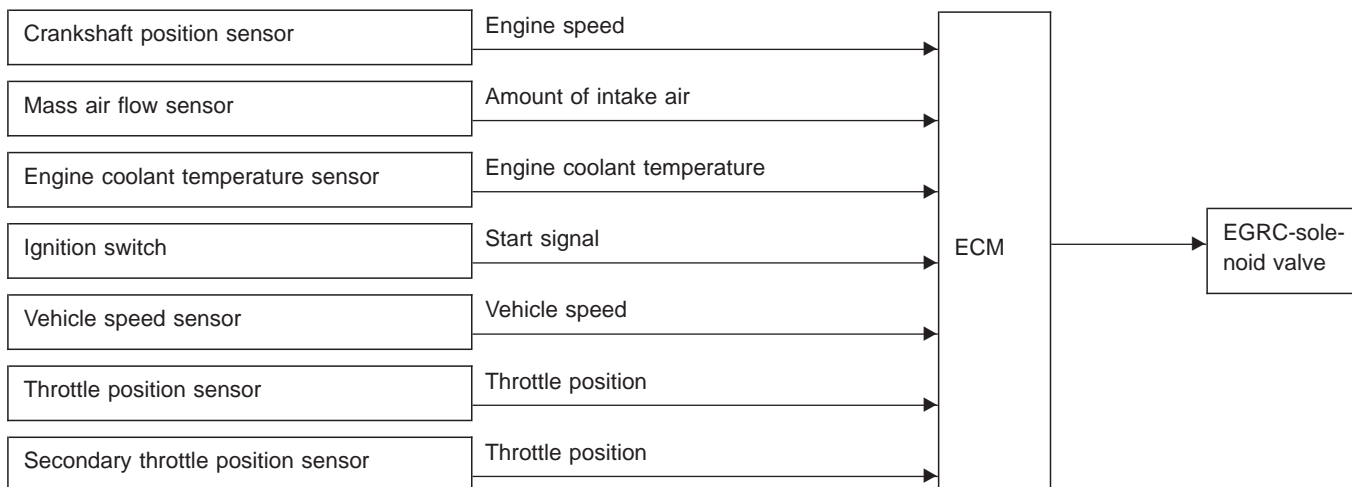
1. Start engine and warm it up to the normal operating temperature.
2. Check voltage between ECM terminals ⑤⑨ (POS) or ⑤⑤, ⑤⑧ (REF) (ECM terminal) and ground with DC range.

Condition	Terminals	Voltage
Engine running at idle	⑤⑨ and ground (POS)	Approx. 2.5V
	⑤⑤, ⑤⑧ and ground (REF)	Approx. 0.7 - 1.2V
Engine at 2,000 rpm	⑤⑨ and ground (POS)	
	⑤⑤, ⑤⑧ and ground (REF)	

If NG, replace camshaft position sensor.

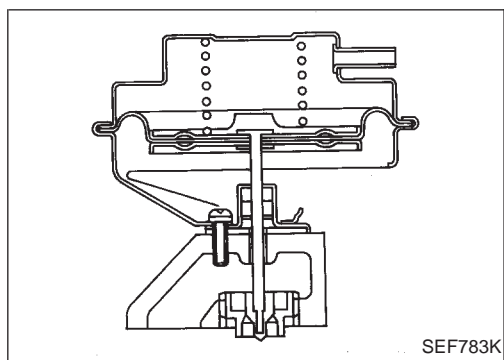
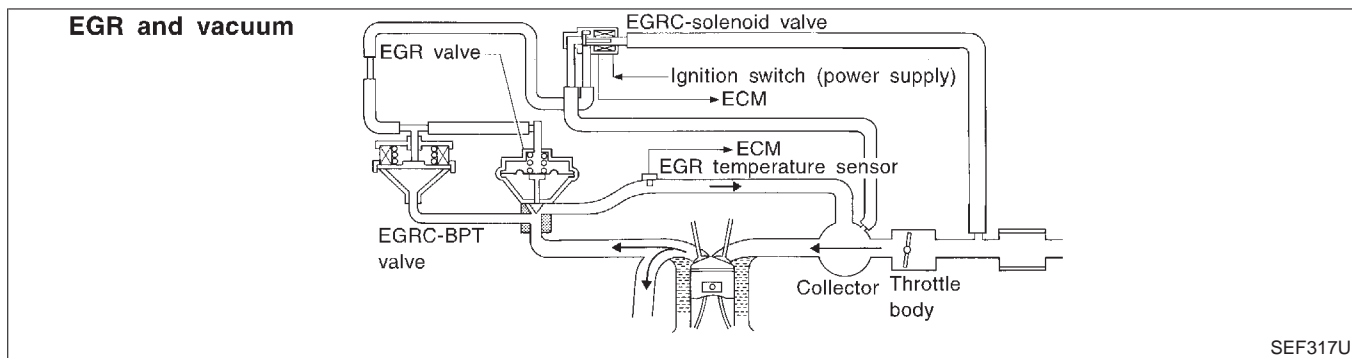
EGR Function (Close)

SYSTEM DESCRIPTION



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 port vacuum to be discharged into the atmosphere. The EGR valve remain closed.

- Low engine coolant temperature
- Engine starting
- Engine stopped
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low vehicle speed or high vehicle speed
- TCS is operating



COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

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. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

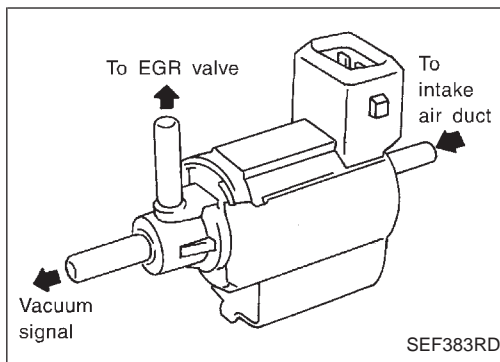
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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

EGRC-solenoid valve

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 signal reaches to the EGR valve. When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

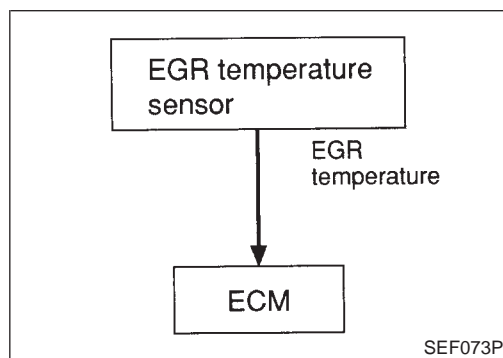
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	<ul style="list-style-type: none"> Engine: After warming up 		Less than 4.5V
EGRC SOL/V	<ul style="list-style-type: none"> Lift up drive wheels Engine: After warming up Air conditioner switch: "OFF" Shift lever: "D" No-load 	Idle	OFF
		Revvng engine up from idle to 3,000 rpm	ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
75	W	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
			Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
10	L/Y	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Lift up drive wheels and rev engine up from idle to 3,000 rpm in "D" position.	0 - 0.7V
			Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)



ON BOARD DIAGNOSIS LOGIC

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.

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	<ul style="list-style-type: none"> No EGR flow is detected under conditions that call for EGR. 	<ul style="list-style-type: none"> EGR valve stuck closed EGRC-BPT valve Vacuum hose EGRC-solenoid valve EGR passage EGR temperature sensor Exhaust gas leaks

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EGR SYSTEM P0400	
OUT OF CONDITION	
MONITOR	
CMPS~RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF603W

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If "DIAGNOSTIC TROUBLE CODE 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 in the "SELF-DIAG RESULTS" mode with CONSULT-II even though the DTC work support test result is "NG".

TESTING CONDITION:

For best results, perform at a temperature above 5°C (41°F).



- Turn ignition switch "ON"
- Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. Confirm COOLAN TEMP/S value is within the range listed below.

COOLANT 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 coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine (TCS switch "OFF") and let it idle. When the engine coolant temperature reaches 70°C (158°F), immediately go to the next step.
- Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle. If "COMPLETED" with "OK" appears on CONSULT-II screen, go to step 9). If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
- Check the output voltage of "THRTL POS SEN" at closed throttle position.
- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds or more.)

CMPS-RPM (POS): 1,200 - 2,000 rpm
Vehicle speed: 10 km/h (6 MPH) or more
B/FUEL SCHDL: 3.3 - 4.5 msec

EGR SYSTEM P0400	
TESTING	
MONITOR	
CMPS~RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF604W

EGR SYSTEM P0400	
COMPLETED	

PEF785U

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

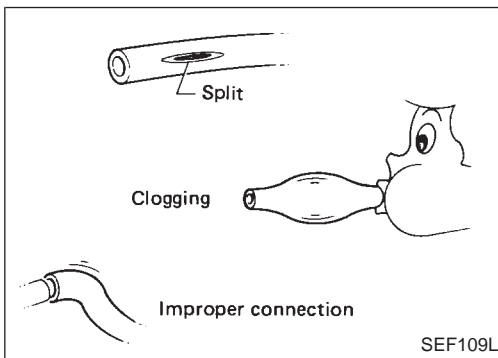
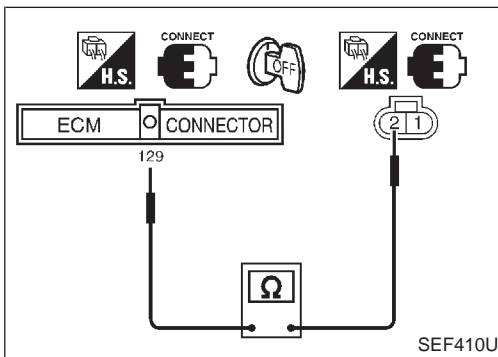
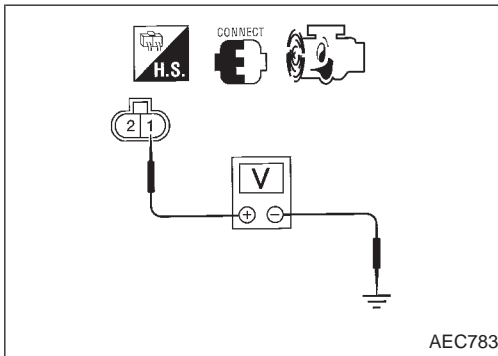
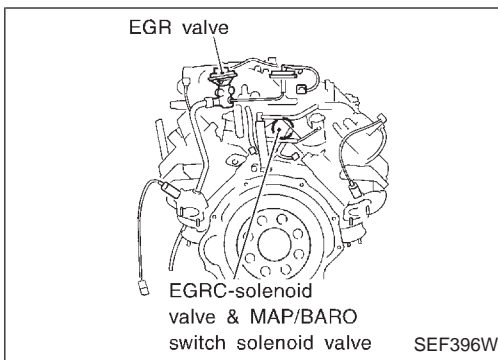
THRTL POS SEN: $X - (X + 0.53) V$

$X =$ 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-284.



OVERALL FUNCTION CHECK

Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

- 1) Lift up drive wheels.
Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 2) Shift to "D" position.
- 3) Check the EGR valve lifting when revving engine from idle up to 3,000 rpm.

EGR valve should lift up and down without sticking.

- 4) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.

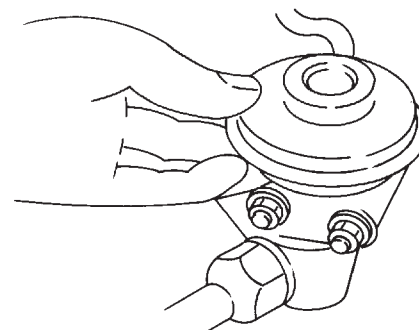
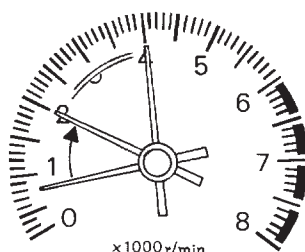
Less than 4.5V should exist.

- 5) Turn ignition switch "OFF".
- 6) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal (129).

Continuity should exist.

- 7) Perform "COMPONENTS INSPECTION", "EGR temperature sensor". Refer to EC-287.
- 8) If NG, go to "DIAGNOSTIC PROCEDURE", EC-284.

Overall function check



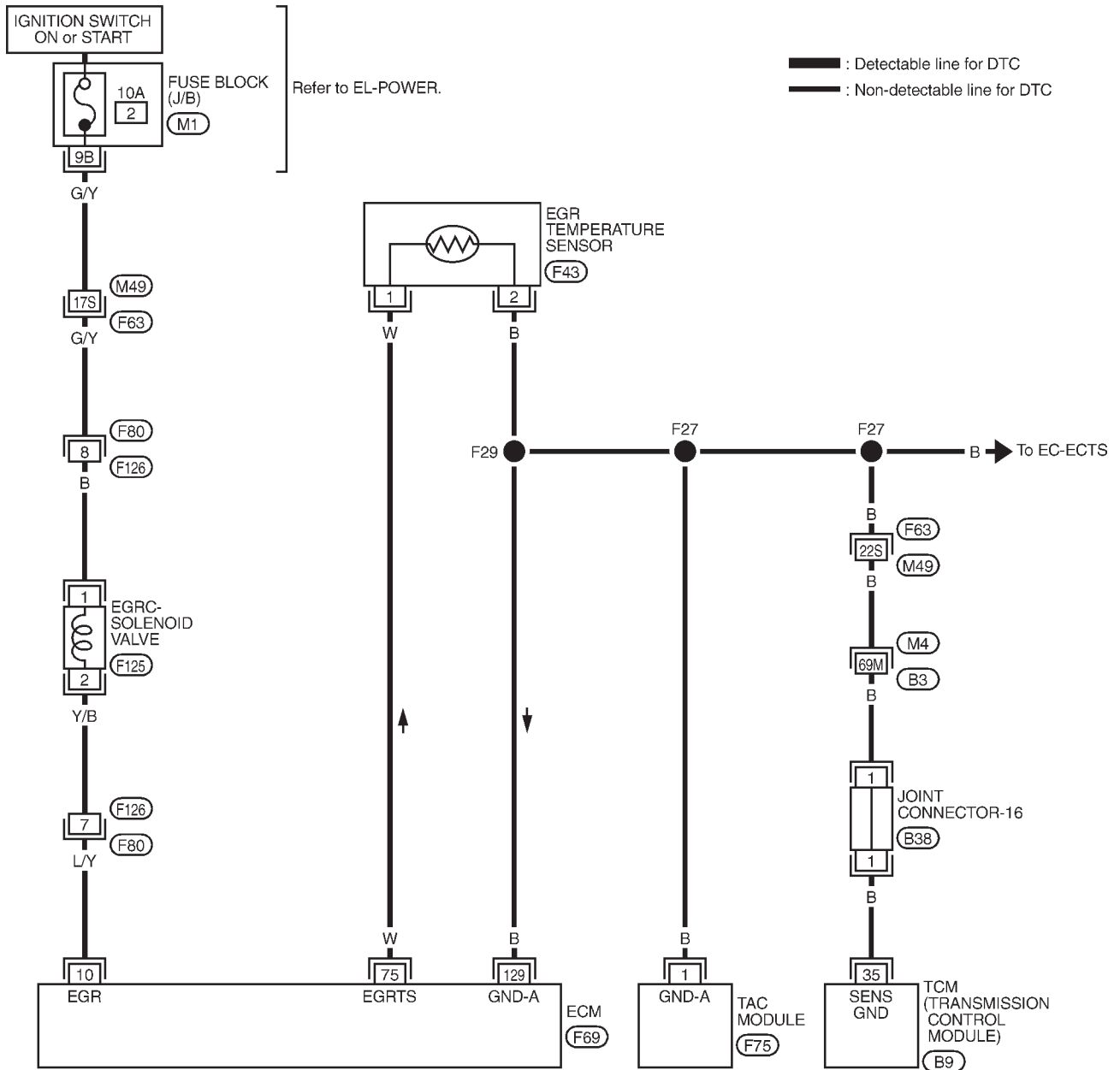
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

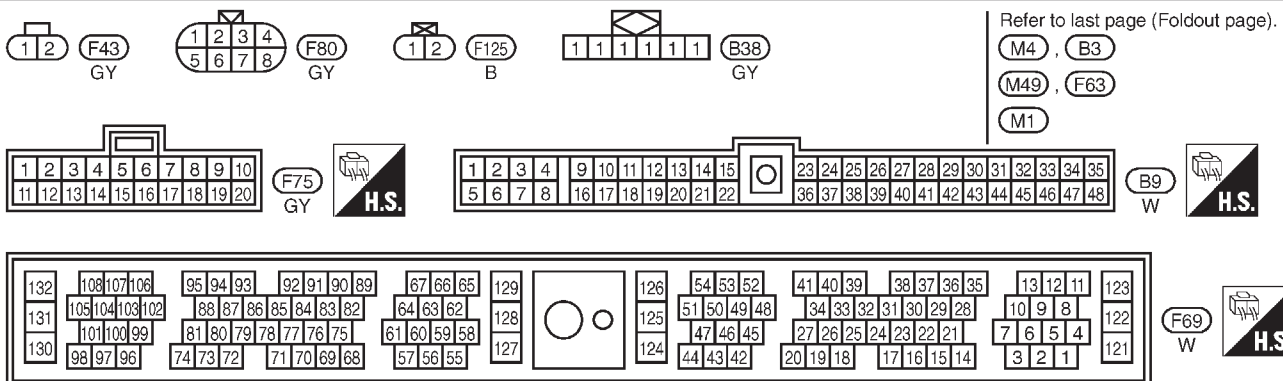
TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

EC-EGRC1-01



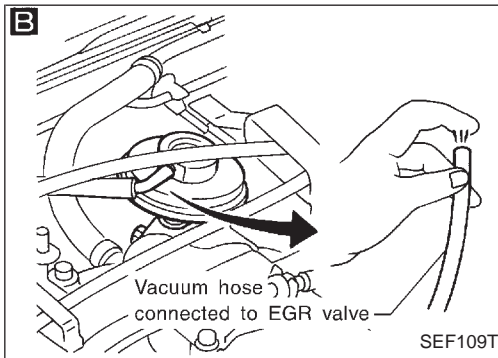
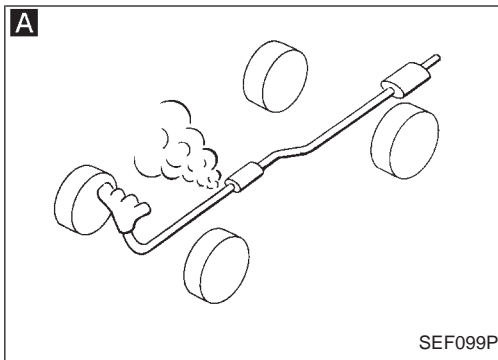
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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

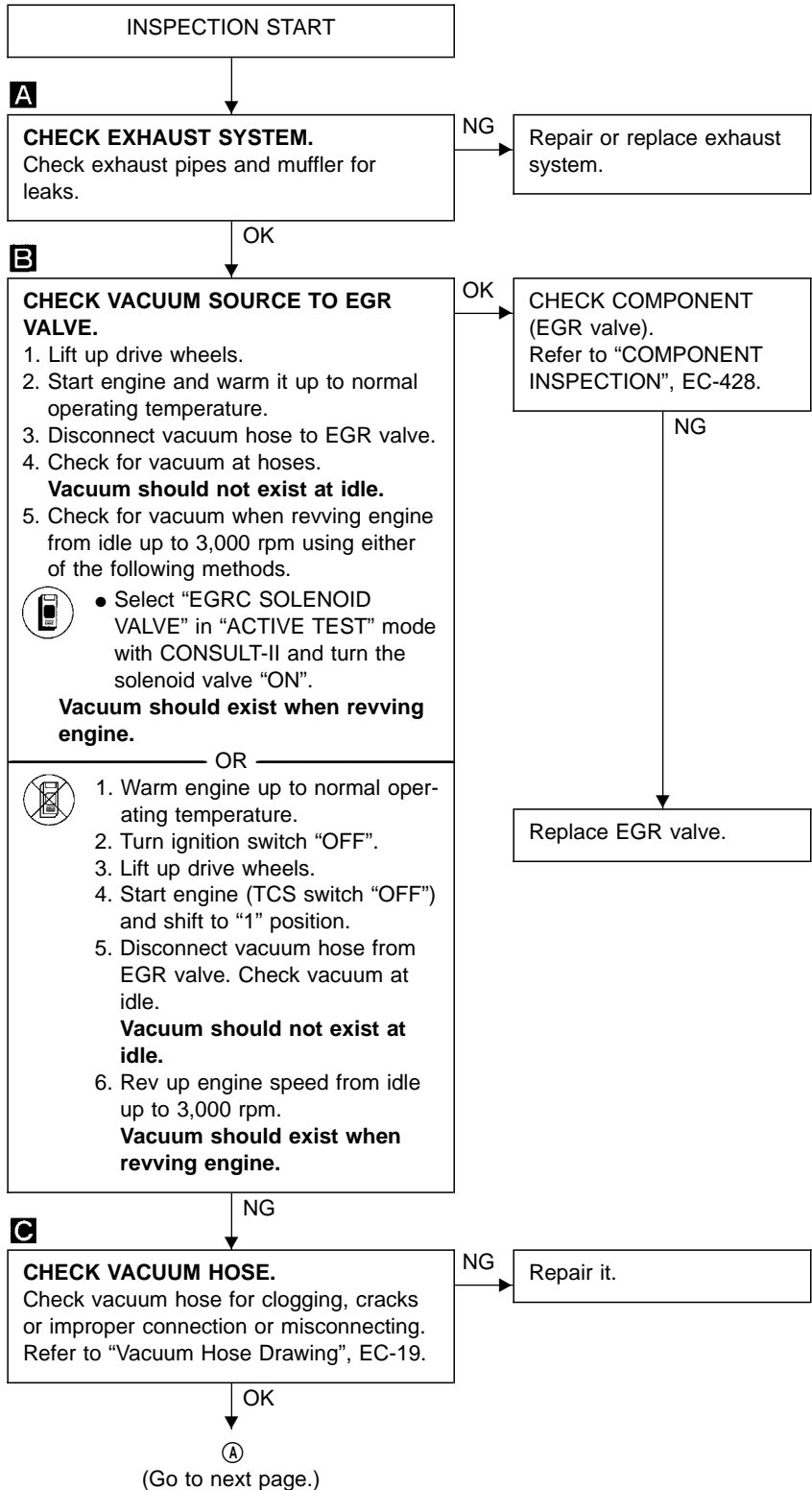
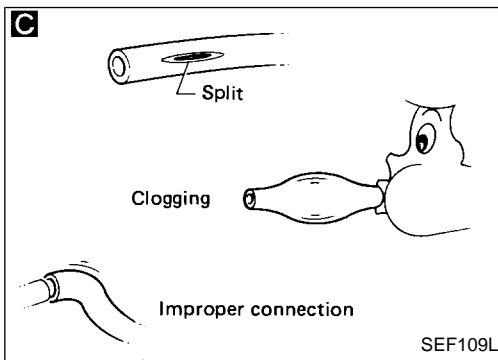
DIAGNOSTIC PROCEDURE



B

ACTIVE TEST	
EGRC SOLENOID VALVE	ON FLOW
MONITOR	
CMPS-RPM(POS)	XXX rpm

SEF764X



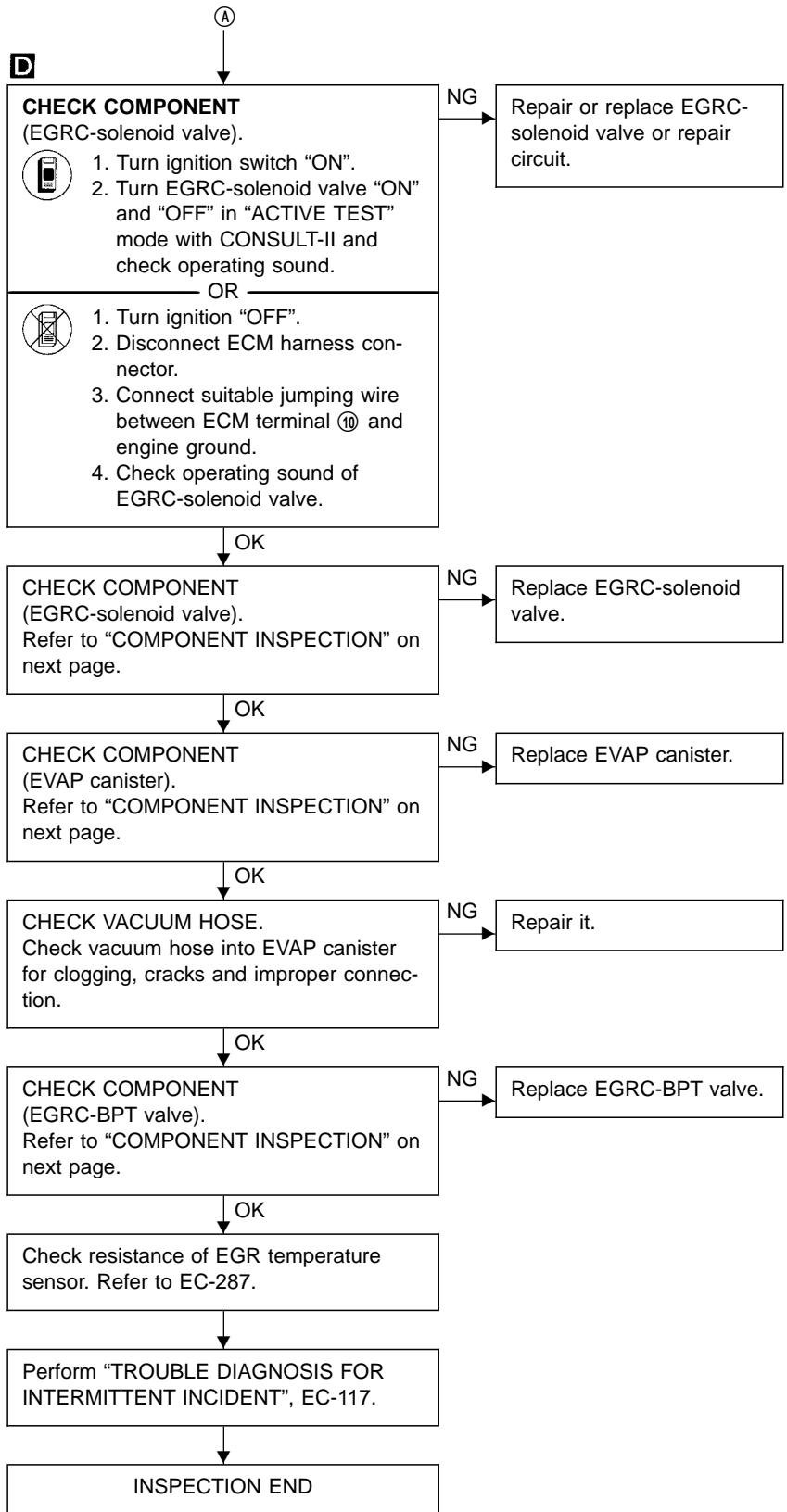
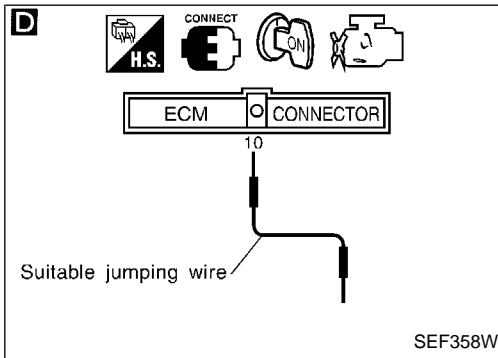
TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

D

ACTIVETEST	
EGRC SOLENOID VALVE	ON FLOW
MONITOR	
CMPS-RPM(POS)	XXX rpm

SEF764X



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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

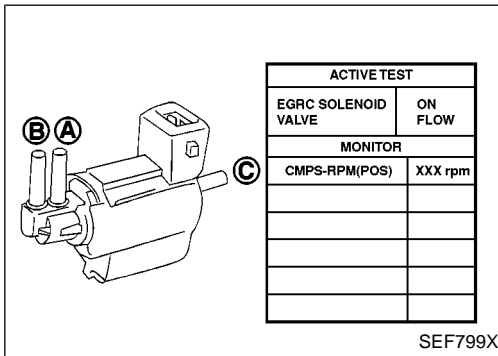
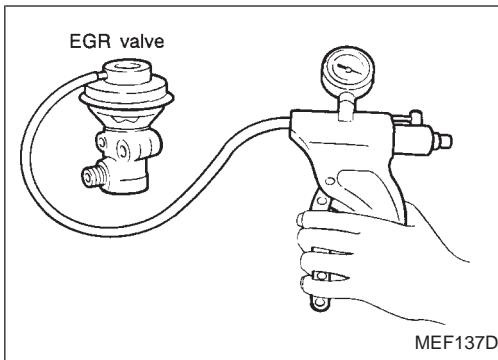
COMPONENT INSPECTION

EGR valve

- Apply vacuum to EGR valve vacuum port with a hand vacuum pump.

EGR valve spring should lift.

- Check for sticking.
If NG, repair or replace EGR valve.



EGRC-solenoid valve

Check air passage continuity.

- Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

Condition EGRC SOLENOID VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

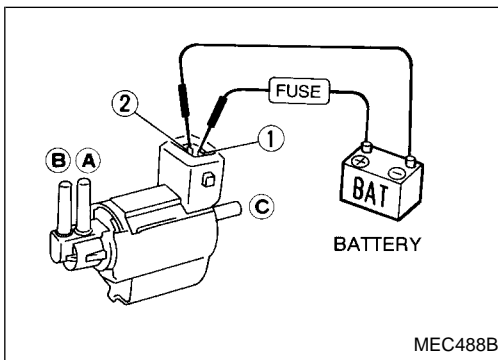
OR



Check solenoid valve, following the table as shown below:

Conditions	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace the solenoid valve.

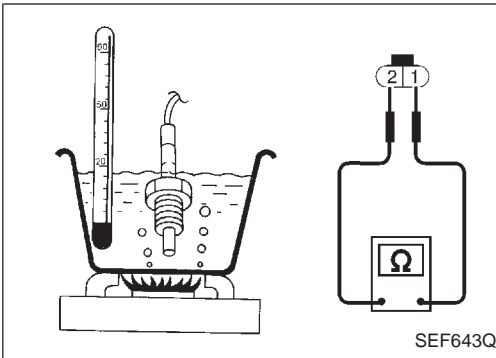


TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (Close) (Cont'd)

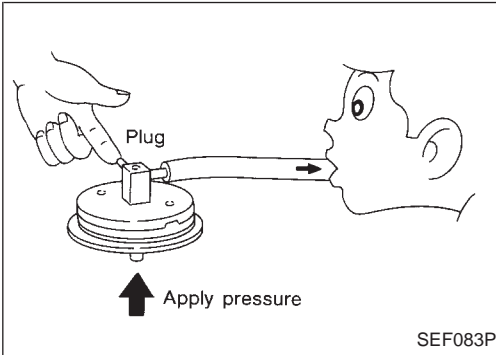
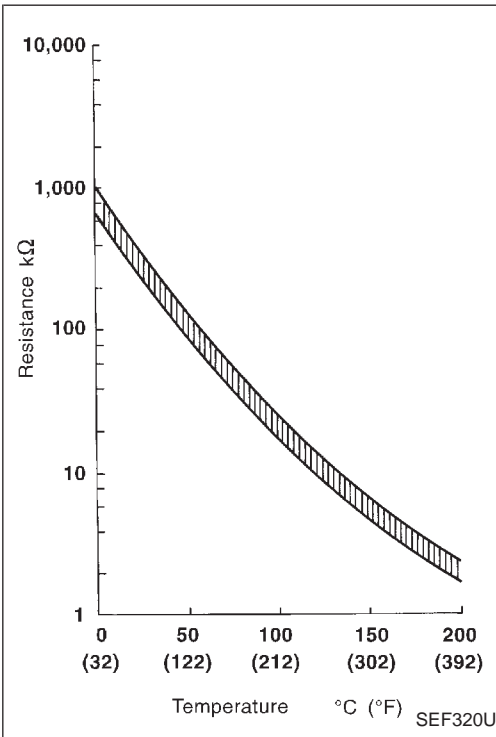
EGR temperature sensor

Check resistance change and resistance value.



EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.



EGRC-BPT valve

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 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

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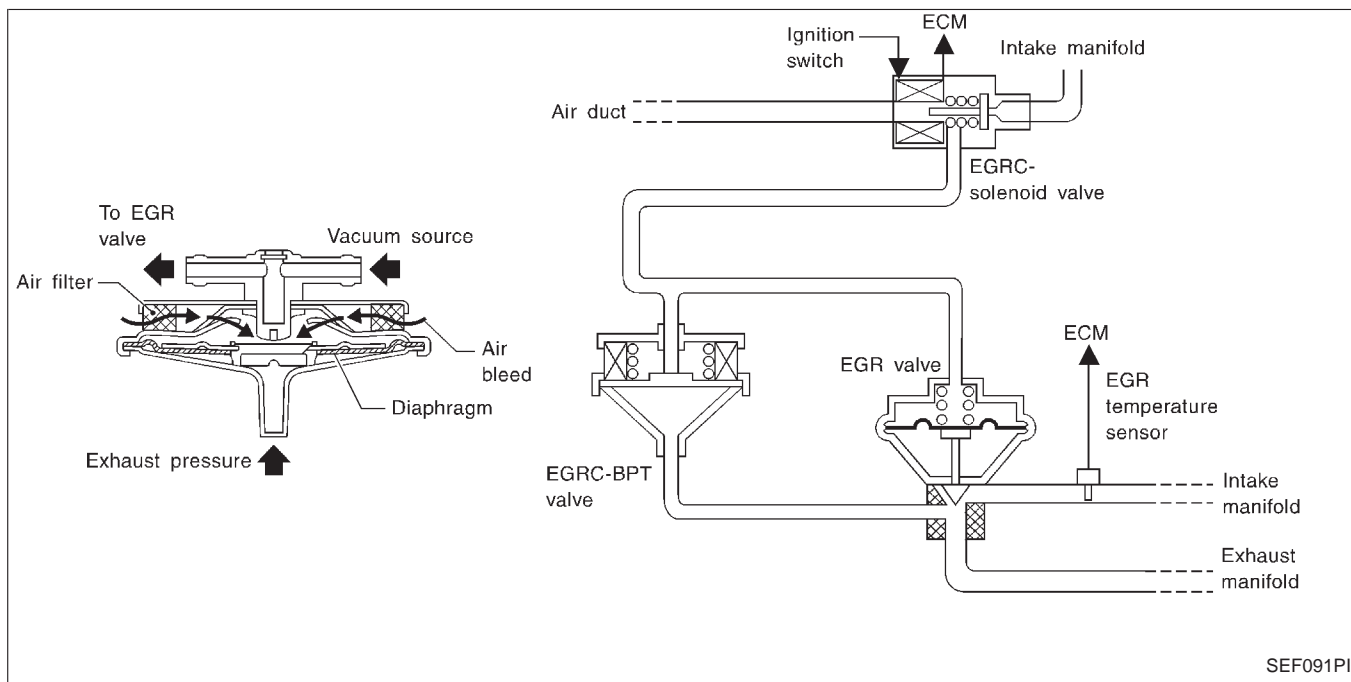
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EGRC-BPT Valve Function



SEF091PI

SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body 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

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is excessive, 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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	<ul style="list-style-type: none"> The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> 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

TROUBLE DIAGNOSIS FOR DTC P0402

EGRC-BPT Valve Function (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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 temperature above 5°C (41°F) or higher.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.



- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the figure.
- 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-II.
- 5) Start engine (TCS switch "OFF") and let it idle.
- 6) Touch "START".
- 7) Check the output voltage of "THRTL POS SEN" at closed throttle position and open throttle position.
- 8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

Selector lever: Suitable position

CMPS-RPM (POS): 1,000 - 1,600 rpm

Vehicle speed: 30 - 56 km/h (19 - 35 MPH)

B/FUEL SCHDL: 2.0 - 3.2 msec

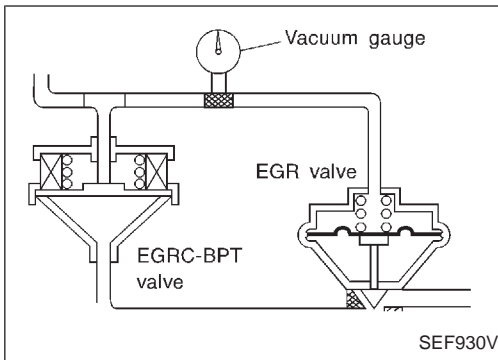
THRTL POS SEN: $X - (X + 0.89)$ V

$X =$ Voltage value measured at step 7)

- The bar chart on CONSULT-II 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-II screen, retry from step 4).

If NG, go to "DIAGNOSTIC PROCEDURE", EC-291.
If OK, go to next step.

- 9) Open engine hood.
- 10) Raise engine speed to 2,400±400 rpm under no-load and hold it. Then touch "NEXT" of the CONSULT-II screen.
- 11) Check vacuum gauge while keeping engine speed 2,400±400 rpm.
Vacuum should be 0 to -20.0 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
If NG, go to "DIAGNOSTIC PROCEDURE", EC-291.
If OK, touch "YES" in the CONSULT-II screen.



SEF930V

EGRC-BPT VLV P0402	
OUT OF CONDITION	
MONITOR	
CMPS~RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF186V

EGRC-BPT VLV P0402	
TESTING	
MONITOR	
CMPS-RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF187V

PURG FLOW P0402	
COMPLETED	

PEF868U

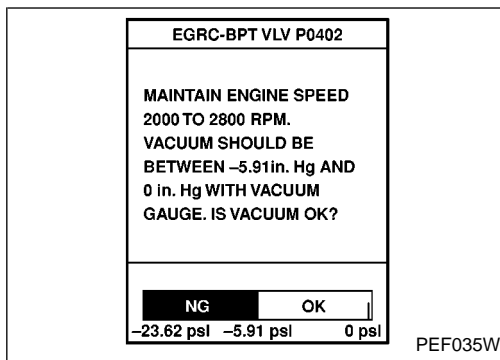
EGRC-BPT VLV P0402	
INCREASE ENGINE SPEED AND MAINTAIN BETWEEN 2000 TO 2800 RPM. TOUCH NEXT.	
2000 rpm	2400 rpm
2800 rpm	

PEF034W

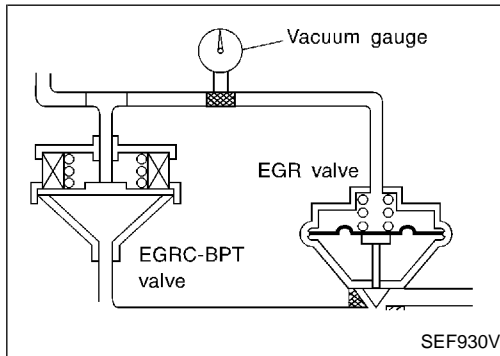
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TROUBLE DIAGNOSIS FOR DTC P0402

EGRC-BPT Valve Function (Cont'd)



- 12) Check the rubber tube between intake manifold collector, EGR valve and EGRC-BPT valve for misconnection, cracks, blockages or twisting.
If NG, repair.
If OK, touch "YES" in the CONSULT-II screen.
- 13) If CONSULT-II instructs to carry out "OVERALL FUNCTION CHECK", go to next step. If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-291.



OR

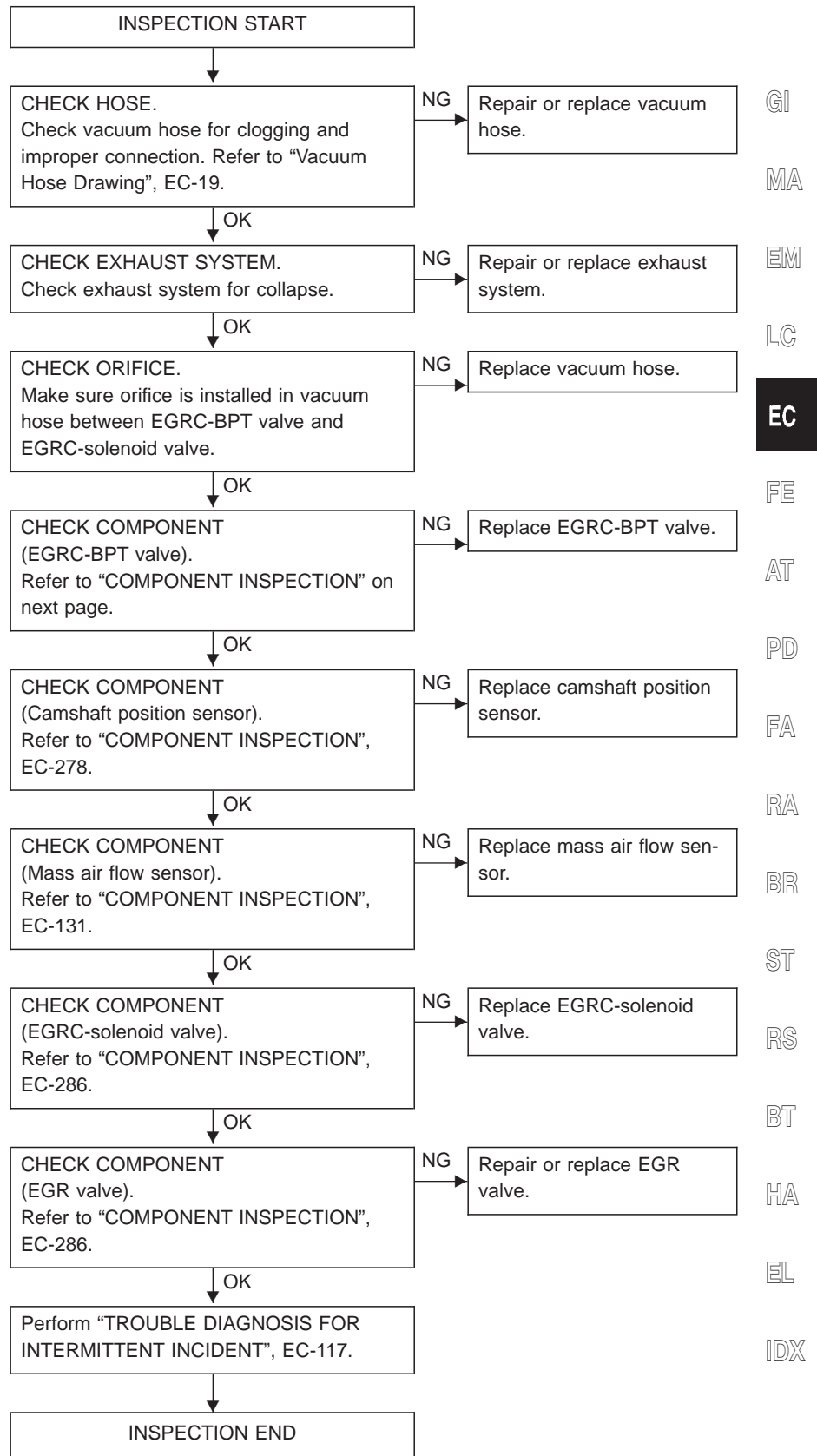
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During the check, a 1st trip DTC might not be confirmed.

- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the figure.
- 2) Lift up vehicle.
- 3) Connect the intake manifold collector and the EGRC-BPT valve with a rubber tube that has 0.5 mm (0.020 in) dia. orifice. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
- 4) Start engine and shift to 1st position.
- 5) Check vacuum gauge while keeping engine speed $2,400 \pm 400$ rpm.
Vacuum should be 0 to -20.0 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
If NG, go to "DIAGNOSTIC PROCEDURE", EC-291.
If OK, go to next step.
- 6) Check rubber tube between the intake manifold collector, EGRC-solenoid valve and EGRC-BPT valve for misconnection, cracks, blockages or twisting.
- 7) If NG, repair or replace.

TROUBLE DIAGNOSIS FOR DTC P0402

EGRC-BPT Valve Function (Cont'd) DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0402

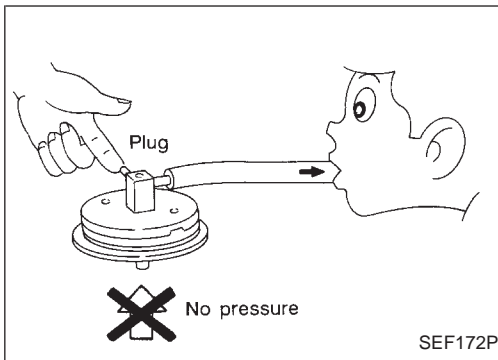
EGRC-BPT Valve Function (Cont'd)

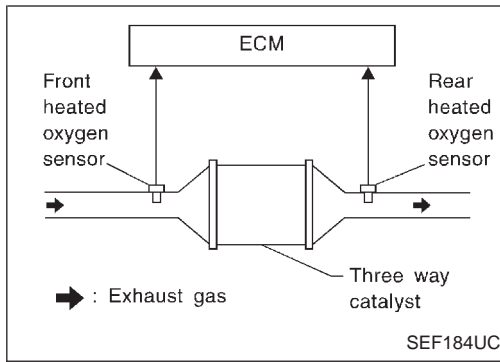
COMPONENT INSPECTION

EGRC-BPT valve

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 EGRC-BPT valve.

Leakage should exist.





Three Way Catalyst Function (P0420: Left bank), (P0430: Right bank)

ON BOARD DIAGNOSIS LOGIC

ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.

A 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 three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702 (Left bank)	<ul style="list-style-type: none"> • Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> • Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing
P0430 0703 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	XXX V
RR O2 SEN-B1	XXX V
FR O2 MNTR-B1	RICH
RR O2 MNTR-B1	RICH

SEF820X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 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-II.
- 4) Touch "RECORD" on CONSULT-II 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 =

Rear heated oxygen sensor switching frequency

Front heated oxygen sensor switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, the 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 DIAGNOSES FOR DTC P0133 first.

If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-295.

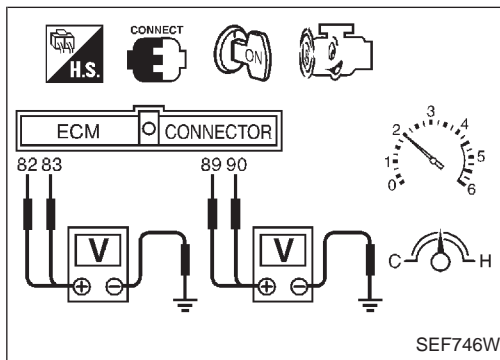
If the result is OK, go to following step.

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SENSOR	CMPLT
O2 SEN HEATER	CMPLT
EGR SYSTEM	INCMP

PEF215U

Three Way Catalyst Function (P0420: Left bank), (P0430: Right bank) (Cont'd)

- 6) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 7) Drive vehicle at a speed of approximately 84 to 96 km/h (52 to 60 MPH) with D position ("OD" ON) 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", EC-295.
- 8) Select "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
- 9) Verify that "CATALYST" is "CMPLT".
If not "CMPLT", repeat the test from step 3).
- 10) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-295.



OR

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the three way catalyst.

During this check, a DTC might not be confirmed.

- 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 ⑧② RH, ⑧③ LH (sensor signal front) and ground. ⑧⑨ RH, ⑨⑩ LH (sensor signal rear) and 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 ⑧⑨ and ground is much less than that of ECM terminals ⑧② and ground (right bank). Or ⑨⑩ and ground is much less than that of the terminals ⑧③ and ground (left bank).

Switching frequency ratio =

Rear heated oxygen sensor voltage switching frequency

Front heated oxygen sensor voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:

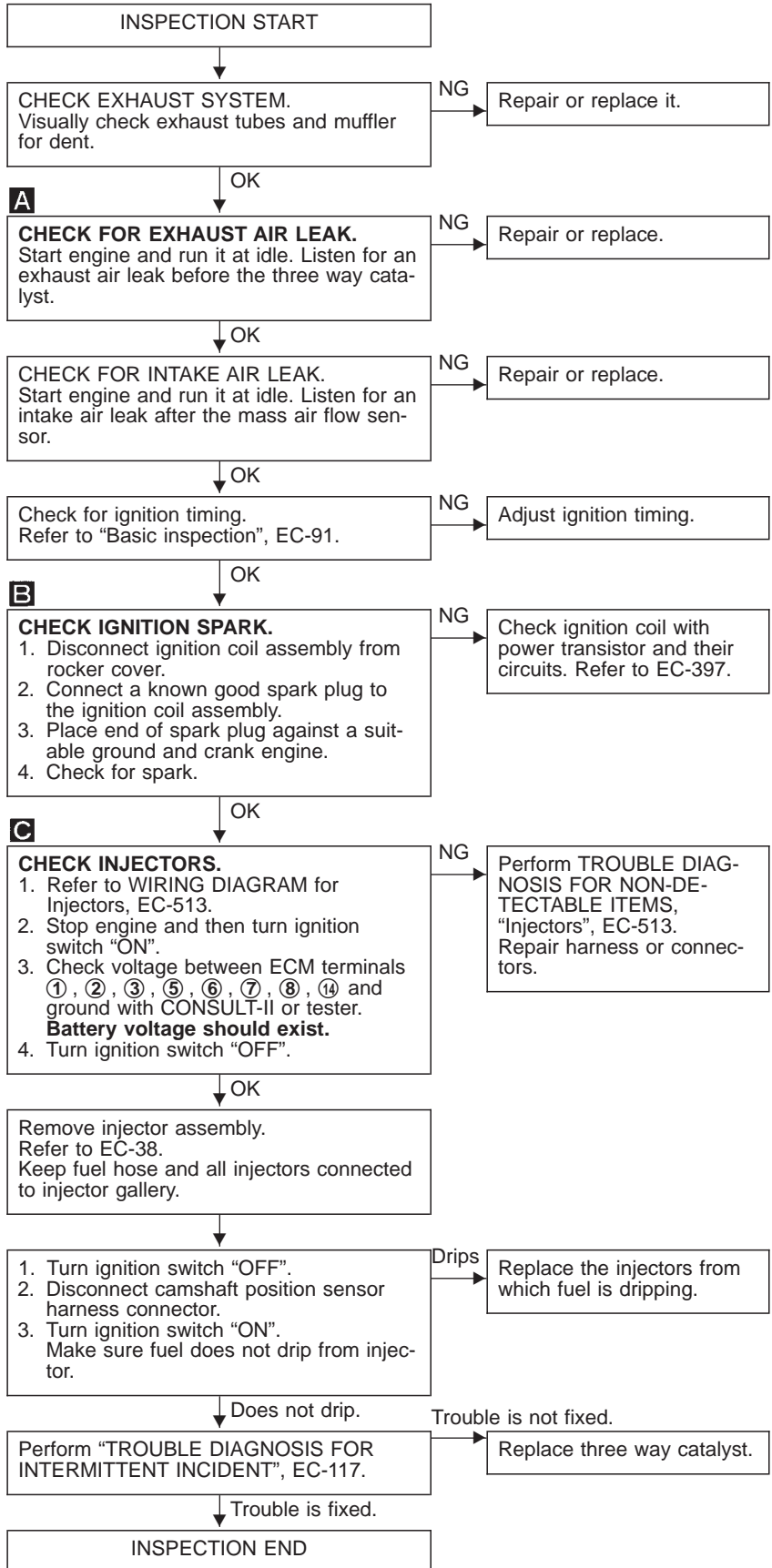
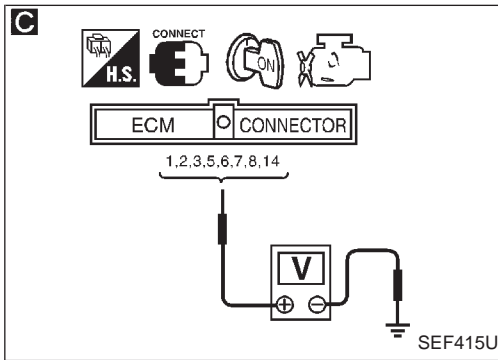
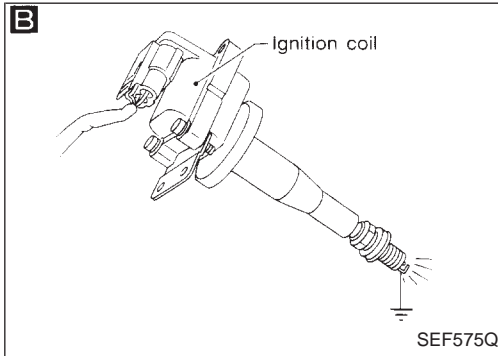
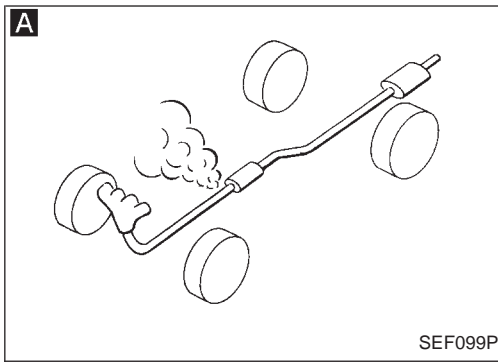
If the voltage at terminal ⑧② or ⑧③ does not switch periodically more than 5 times within 10 seconds at step 4, perform TROUBLE DIAGNOSIS FOR DTC P0130 or P0150 first, EC-166.

- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-295.

TROUBLE DIAGNOSIS FOR DTC P0420 (-B1), P0430 (-B2)

Three Way Catalyst Function (P0420: Left bank), (P0430: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



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Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure)

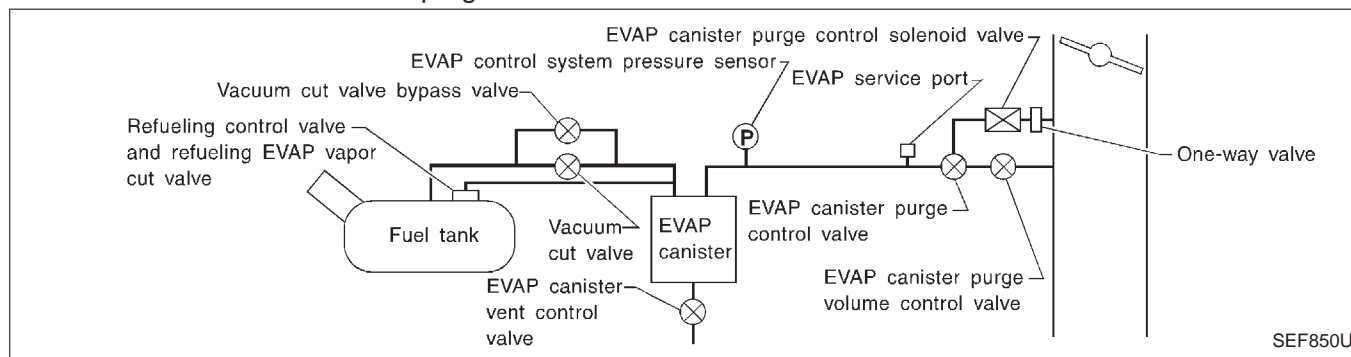
Note: If DTC P1448 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. (See EC-462.)

ON BOARD DIAGNOSIS LOGIC

This diagnosis detects leaks in the EVAP purge line using of 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 control 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 control valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control valve and EVAP canister purge control valve are opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control valve and EVAP canister purge control valve will be closed.



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0440 0705	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● 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 control 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 control valve ● EVAP canister purge volume control valve and the circuit ● EVAP canister purge control solenoid valve ● 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 ● Refueling control valve ● ORVR system leaks

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.

TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

- If DTC P1448 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. (See EC-462.)
- If “DIAGNOSTIC TROUBLE CODE 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 the flat level surface.
- It is better that fuel level is low.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- Battery voltage is more than 11V at idle.



- 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-II.
- 4) Check 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-II.
 Follow the instruction displayed.

NOTE:

- If the CONSULT-II 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.)
- 6) Make sure that “OK” is displayed.
 If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”, EC-299.

NOTE:

- Be sure to read the explanation of “Driving pattern” on EC-56 before driving vehicle.
- It is better that the fuel level is low.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).



- 1) Start engine (TCS switch “OFF”).
- 2) Drive vehicle according to “Driving pattern”, EC-56.
- 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 the driving.

- 7) Drive vehicle again according to the “Driving pattern”, EC-56.
- 8) Stop vehicle.

<p style="text-align: center;">EVAP V/S LEAK P0440</p> <p>1)PERFORM TEST AT A LOCATION OF 0-30C (32-86F) 2)OPEN ENGINE HOOD. 3)START ENGINE WITH VEHICLE STOPPED. IF ENG IS ON, STOP FOR 5 SEC. THEN RESTART. 4)TOUCH START.</p>

PEF405W

<p style="text-align: center;">EVAP SML LEAK P0440</p> <p>CAN NOT BE DIAGNOSED</p>
<p>FUEL TEMPERATURE IS TOO HIGH. RETEST AFTER FUEL HAS COOLED.</p>

PEF669U

<p style="text-align: center;">EVAP SML LEAK P0440</p> <p>WAIT 2 TO 10 MINUTES KEEP ENGINE RUNNING AT IDLE SPEED.</p>
--

PEF929V

<p style="text-align: center;">EVAP SML LEAK P0440</p> <p>OK</p>

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Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

- 9) Select "MODE 3" with GST.
 - If P1447 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1447", EC-455.
 - If P0440 is displayed on the screen, go to "DIAGNOSTIC PROCEDURE", EC-299.
 - If P1440 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1440", EC-430.
 - If P0440 and P1440 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).

OR

NOTE:

- **Be sure to read the explanation of "Driving pattern" on EC-56 before driving vehicle.**
- **It is better that the fuel level is low.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**



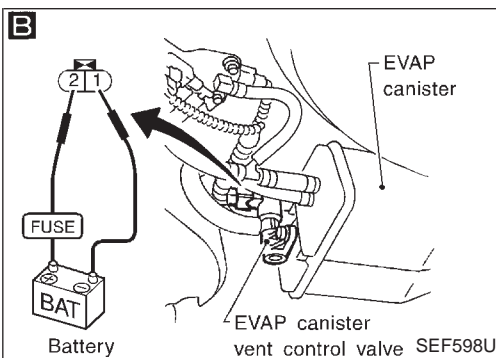
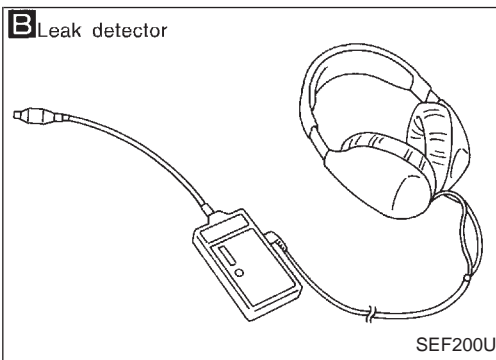
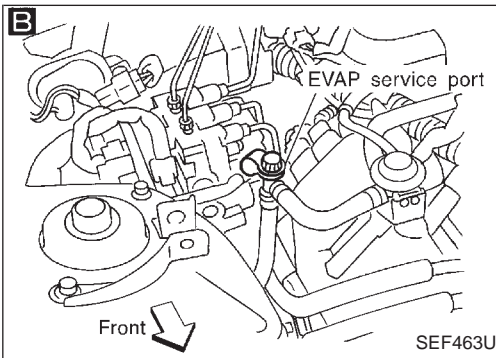
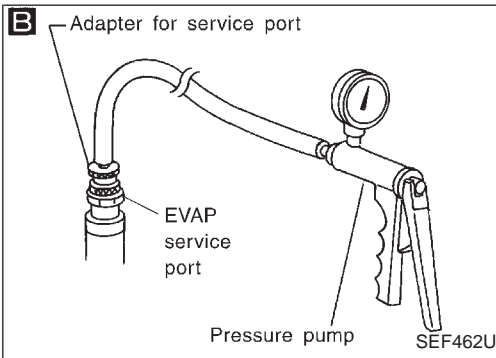
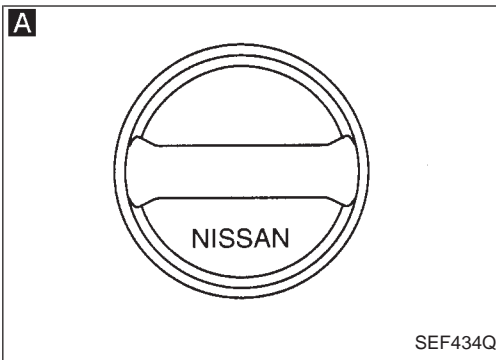
- 1) Start engine (TCS switch "OFF").
- 2) Drive vehicle according to "Driving pattern", EC-56.
- 3) Stop vehicle.
- 4) Turn ignition switch "OFF" and wait at least 5 seconds.
- 5) Turn ignition switch "ON" and perform "Diagnostic Test Mode (Self-diagnostic results)" with ECM.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-299.

TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START



A

CHECK FUEL FILLER CAP.

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.
3. Check for air releasing sound while opening the fuel filler cap. If the air releasing sound is heard, go to **B**.

If the air releasing sound is not heard, check the following.

Was the cap tightened properly?

If Yes, check fuel filler cap vacuum relief valve. Refer to "EVAPORATIVE EMISSION SYSTEM", EC-27.

If No, open fuel filler cap, then clean cap and filler neck thread using air blower. Retighten until ratcheting sound is heard.

NG → If genuine NISSAN fuel filler cap is not used, replace with NISSAN fuel filler cap.

B

CHECK FOR EVAP LEAK.

- Never use compressed air or a high pressure pump.
- Improper installation of adapter to the service port may cause a leak.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

To locate the EVAP leak, do the following.

1. Install the EVAP service port adapter and the pressure pump securely.
2. Turn ignition switch "ON". Select "EVAP SYSTEM CLOSE" or "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure to the EVAP line until the pressure indicator reaches the middle of the bar graph.
4. Using EVAP leak detector, locate the leak. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

NG → Repair or replace.

B

CHECK FOR EVAP LEAK.

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4. Using EVAP leak detector, locate the leak. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

OR

2. Turn ignition switch "OFF".
3. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
4. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)
5. 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 service port adapter.
6. Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

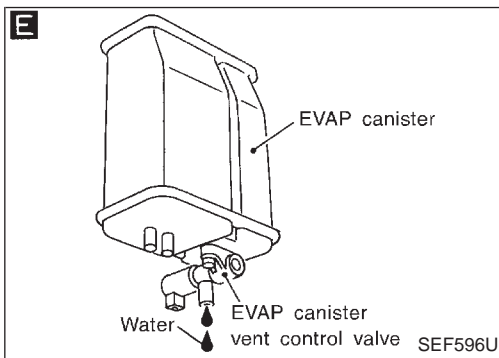
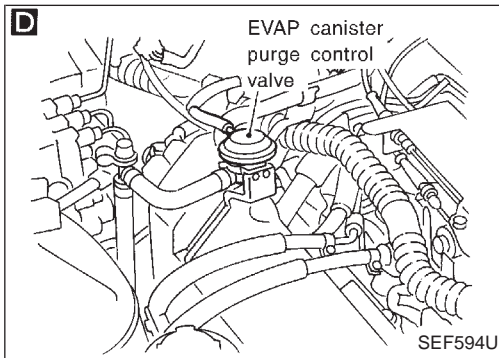
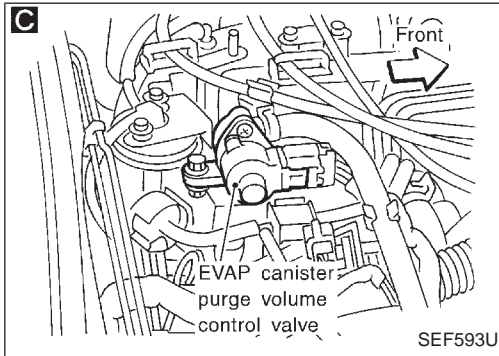
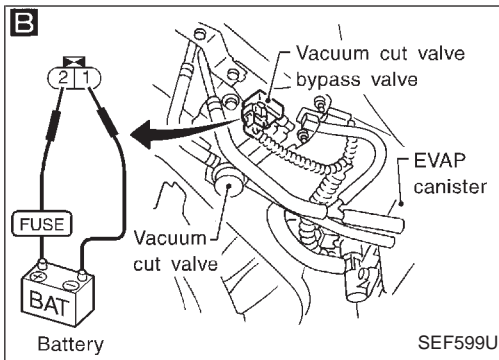
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TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)



F

ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

Reference: SEF765X

A

C **CHECK COMPONENT** (EVAP canister purge volume control valve). Refer to "COMPONENT INSPECTION", EC-302.

NG → Replace EVAP canister purge volume control valve.

OK

D **CHECK COMPONENT** (EVAP canister purge control valve). Refer to "COMPONENT INSPECTION", EC-490.

NG → Replace EVAP canister purge control valve.

OK

CHECK COMPONENT AND CIRCUIT (EVAP canister vent control valve, O-ring and water separator). Refer to "TROUBLE DIAGNOSIS FOR P0446" for circuit, EC-313 and "COMPONENT INSPECTION", EC-304.

NG → Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.

OK

E **CHECK IF EVAP CANISTER IS SATURATED WITH WATER.**

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister. If it will, weigh the EVAP canister with the vent control valve attached. If the weight is:
More than 1.8 kg (4.0 lb) → NG
Less than 1.8 kg (4.0 lb) → OK

NG → Replace EVAP canister and check the following.

1. Check hose connections to the EVAP canister and water separator for clogging and poor connection.
2. Check water separator. Refer to "COMPONENT INSPECTION", EC-304.

OK

F **CHECK COMPONENT** (EVAP canister purge control solenoid valve).

1. Disconnect vacuum hose to EVAP canister purge control solenoid valve.
2. Start engine.
3. Perform "PURG CONT S/V" in "ACTIVE TEST" mode.
4. Select "ON" on CONSULT-II screen to turn on "PURG CONT S/V".
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
Vacuum should exist.

OR

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge control solenoid valve.
4. Start engine and let it idle for at least 60 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
Vacuum should exist.

NG → Check the following.

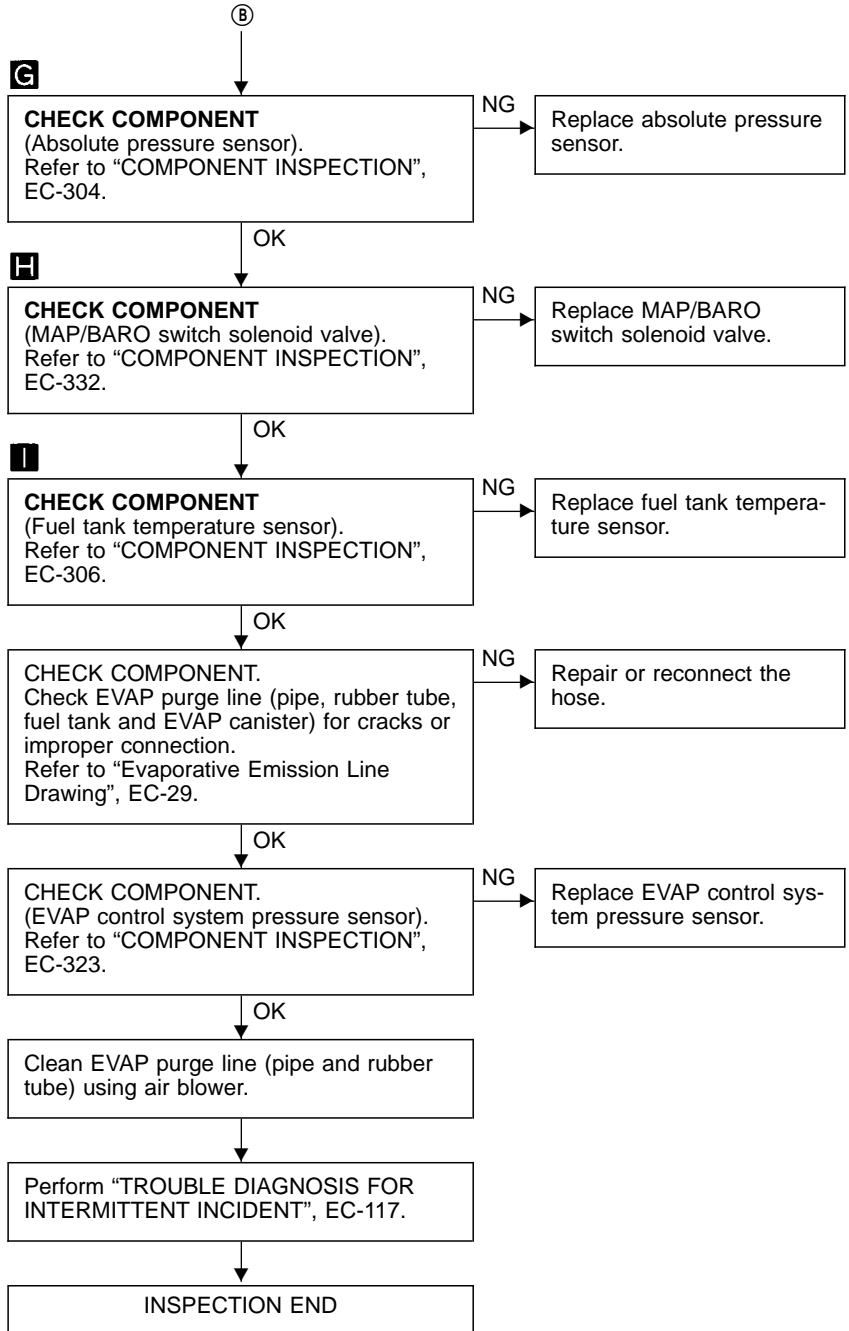
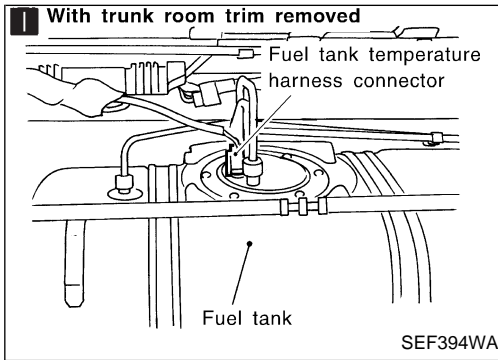
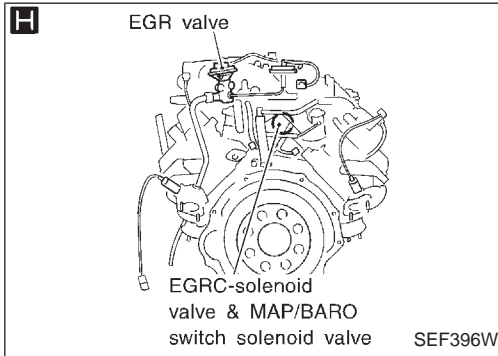
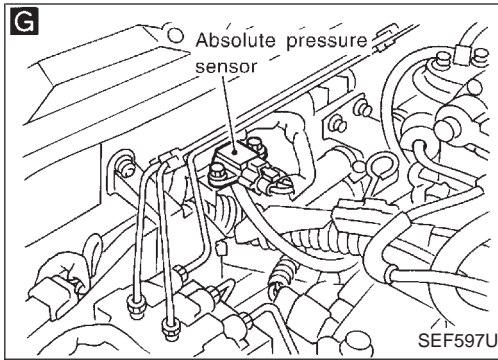
- EVAP canister purge control solenoid valve. Refer to "COMPONENTS INSPECTION", EC-438 and "P1492 EVAP canister purge control solenoid valve" for circuit, EC-303.
- Vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-19.

OK

B
(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
If NG, replace the EVAP canister purge volume control valve.

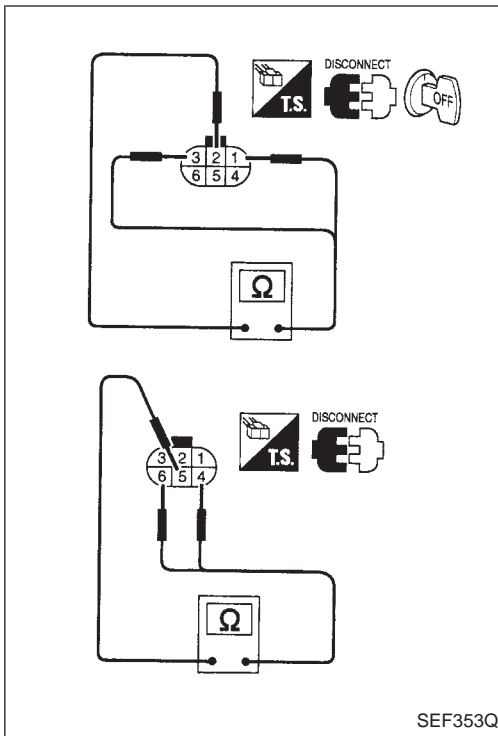
OR

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

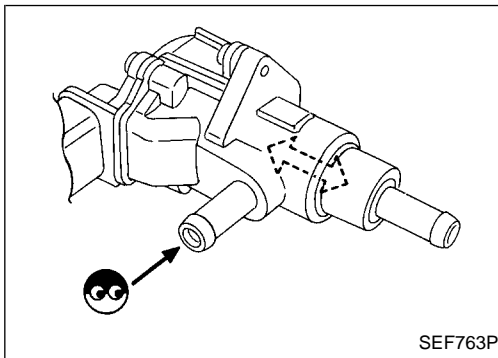
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
If NG, replace the EVAP canister purge volume control valve.



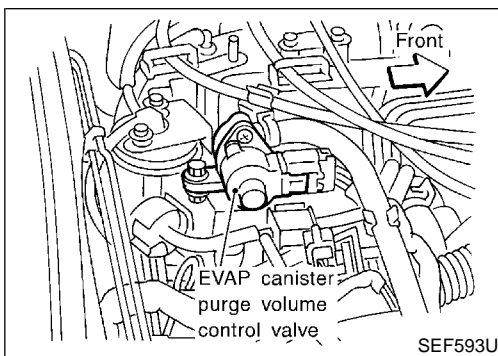
SEF353Q

ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF766X



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TROUBLE DIAGNOSIS FOR DTC P0440

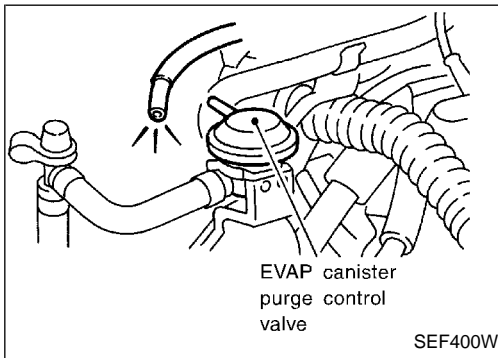
Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

EVAP canister purge control solenoid valve

1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Disconnect vacuum hose at EVAP canister purge control valve.
5. Touch "ON" and "OFF" and check for vacuum passing through the hose.

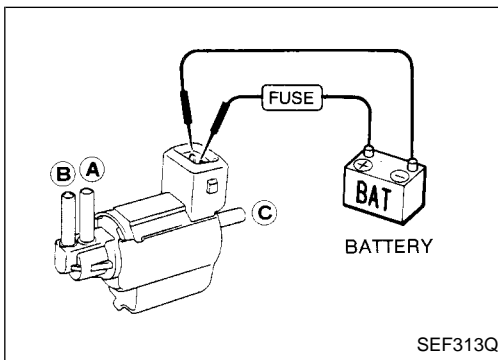
ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

SEF765X



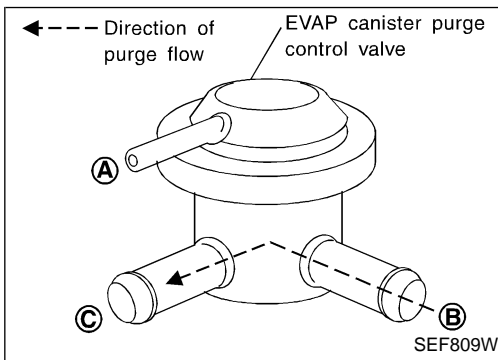
Condition	Vacuum
Idle	Not exist
2,000 rpm	Exist

- OR
1. 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	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

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

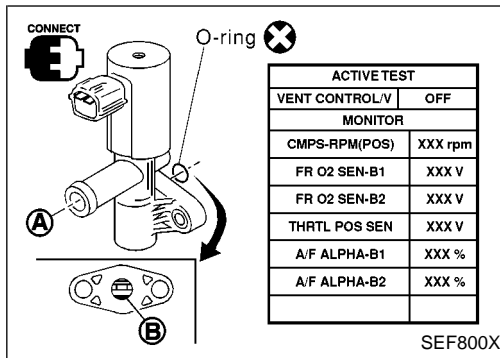
TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

EVAP canister vent control valve

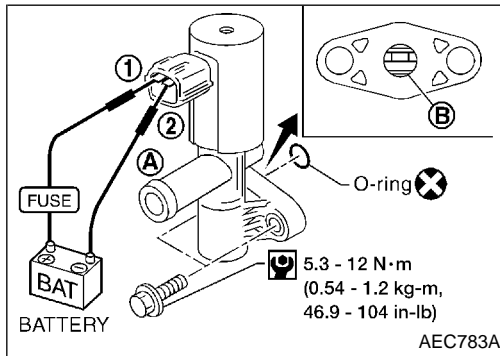
Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V	
ON	No
OFF	Yes

OR

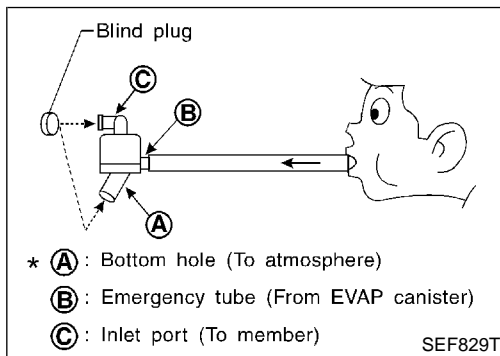


Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals (1) and (2)	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion (B) is rusted, replace control valve.

Make sure new O-ring is installed properly.

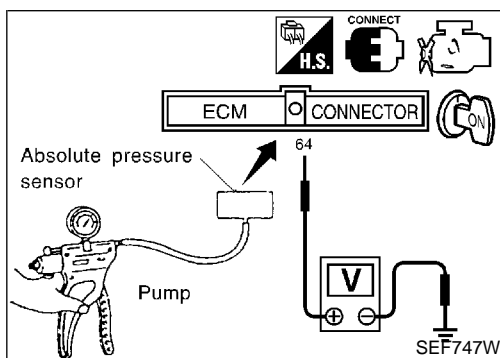


Water separator

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.



Absolute pressure sensor

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 terminal (64) and ground.

The voltage should be 3.2 to 4.8V.

TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

- 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 1.4 V** 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. Doing so will damage the absolute pressure sensor.
- If NG, replace absolute pressure sensor.

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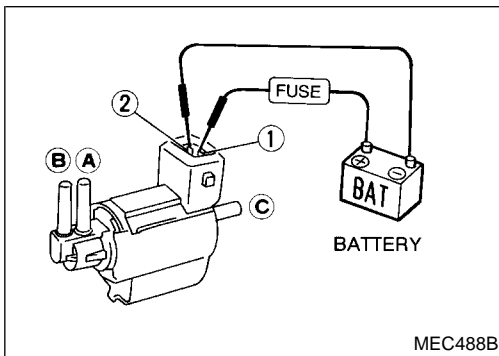
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ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

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ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF768X



MAP/BARO switch solenoid valve

- Start engine and warm it up to normal operating temperature.
- Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
- Check the following.
 - Condition: At idle under no-load.
 - CONSULT-II display

MAP/BARO SW/V	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	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

- If NG, check solenoid valve as shown below.

OR

- Remove MAP/BARO switch solenoid valve.
- 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

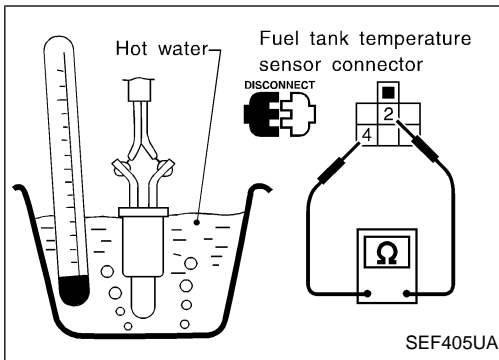
- If NG or operation takes more than 1 second, replace solenoid valve.

TROUBLE DIAGNOSIS FOR DTC P0440

Evaporative Emission (EVAP) Control System (Small Leak) (Negative Pressure) (Cont'd)

Fuel tank temperature sensor

Check resistance by heating with hot water or heat gun as shown in the figure.

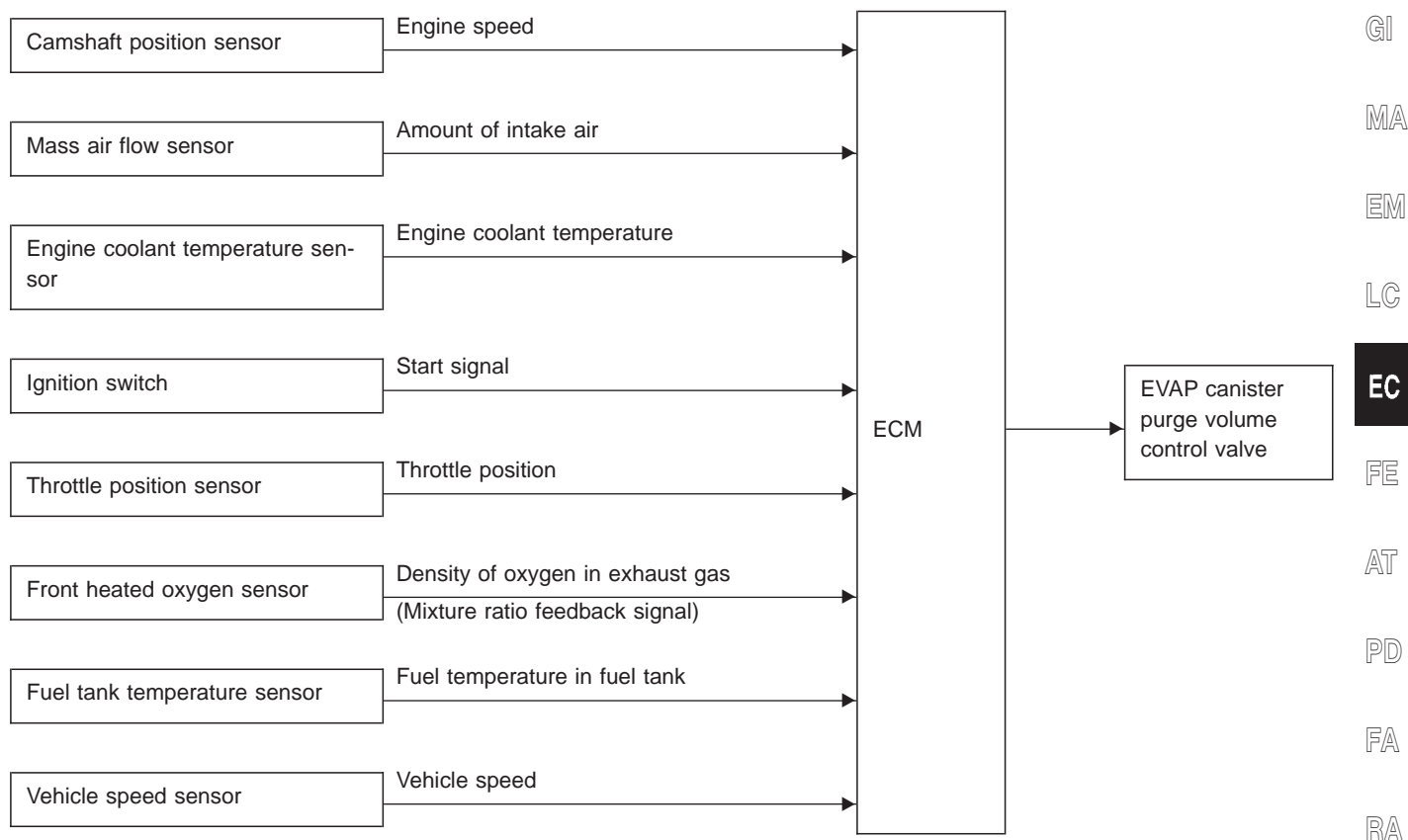


Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

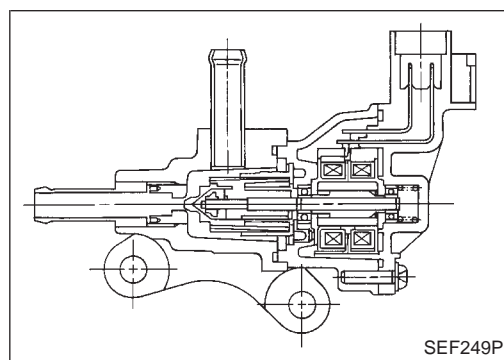
If NG, replace fuel tank temperature sensor.

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit)

SYSTEM DESCRIPTION



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 valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

The EVAP canister purge volume control valve uses a step motor to control the flow rate of fuel vapor from the EVAP canister. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

TROUBLE DIAGNOSIS FOR DTC P0443

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit) (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" 	Idle
	Vehicle running (Shift lever "1")	0 step
		—

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	W/B	ECCS relay (Self-shutoff)	Engine is running.	0 - 1V
			Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
130	R/G	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
131				
123	W/L	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
28	BR/Y	EVAP canister purge volume control valve	Engine is running.	0 - 0.4V or BATTERY VOLTAGE (11 - 14V)
29	G		└ Idle speed	
35	G/OR	EVAP canister purge volume control valve	Engine is running.	0 - 0.4V or BATTERY VOLTAGE (11 - 14V)
36	L/B		└ Idle speed	

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 1008	<ul style="list-style-type: none"> ● An improper voltage signal is sent to ECM through the valve. 	<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control valve

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
PRUG VOL C/V	0step

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Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE 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 ignition switch “ON”.

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-311.

OR



Follow the procedure “With CONSULT-II” above.

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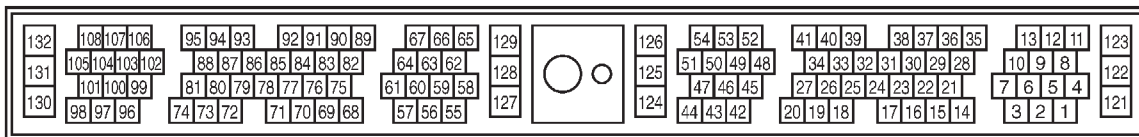
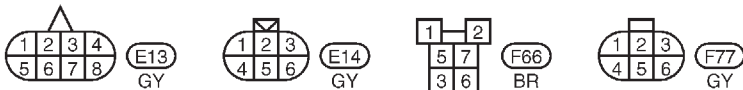
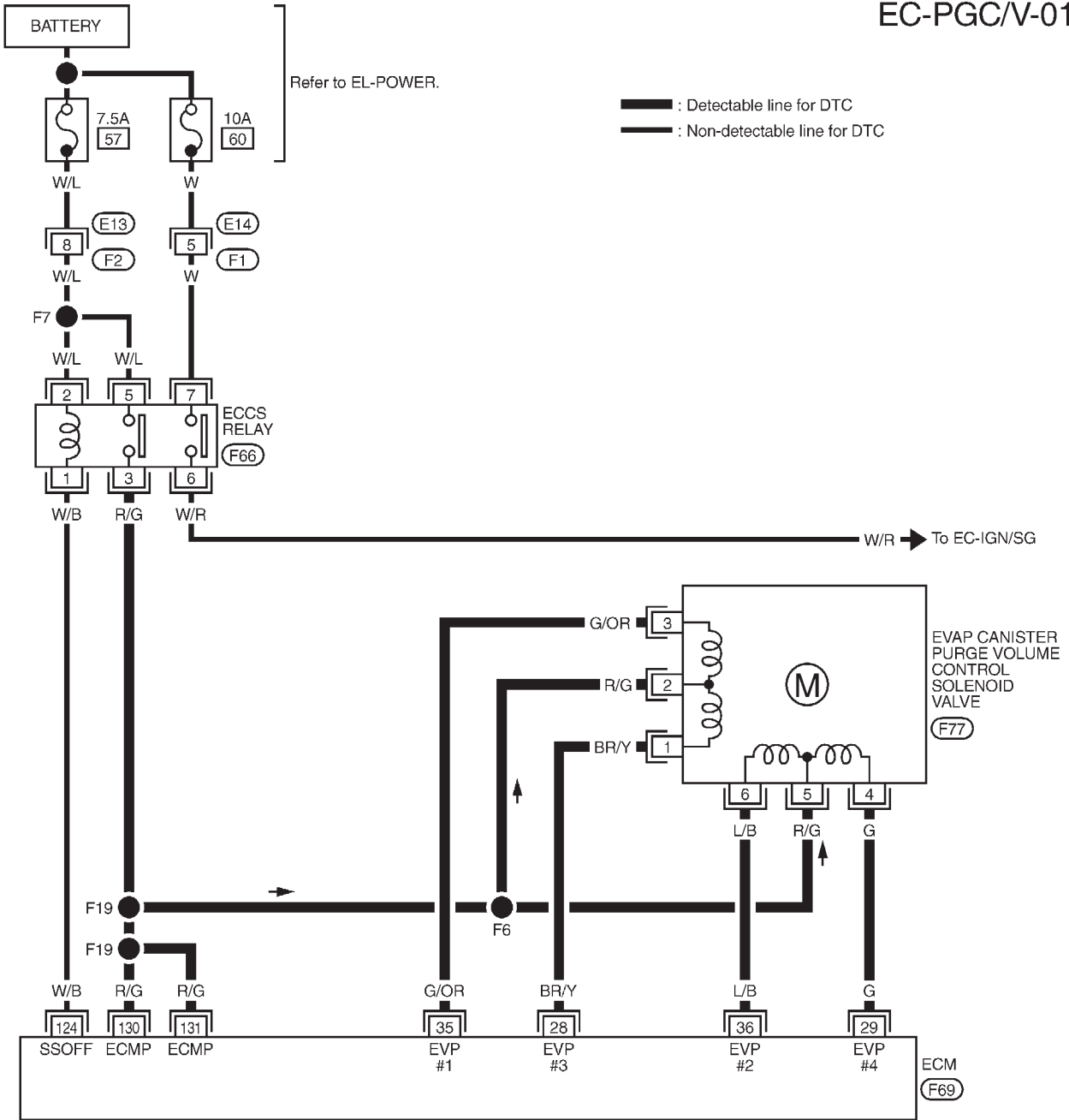
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TROUBLE DIAGNOSIS FOR DTC P0443

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit) (Cont'd)

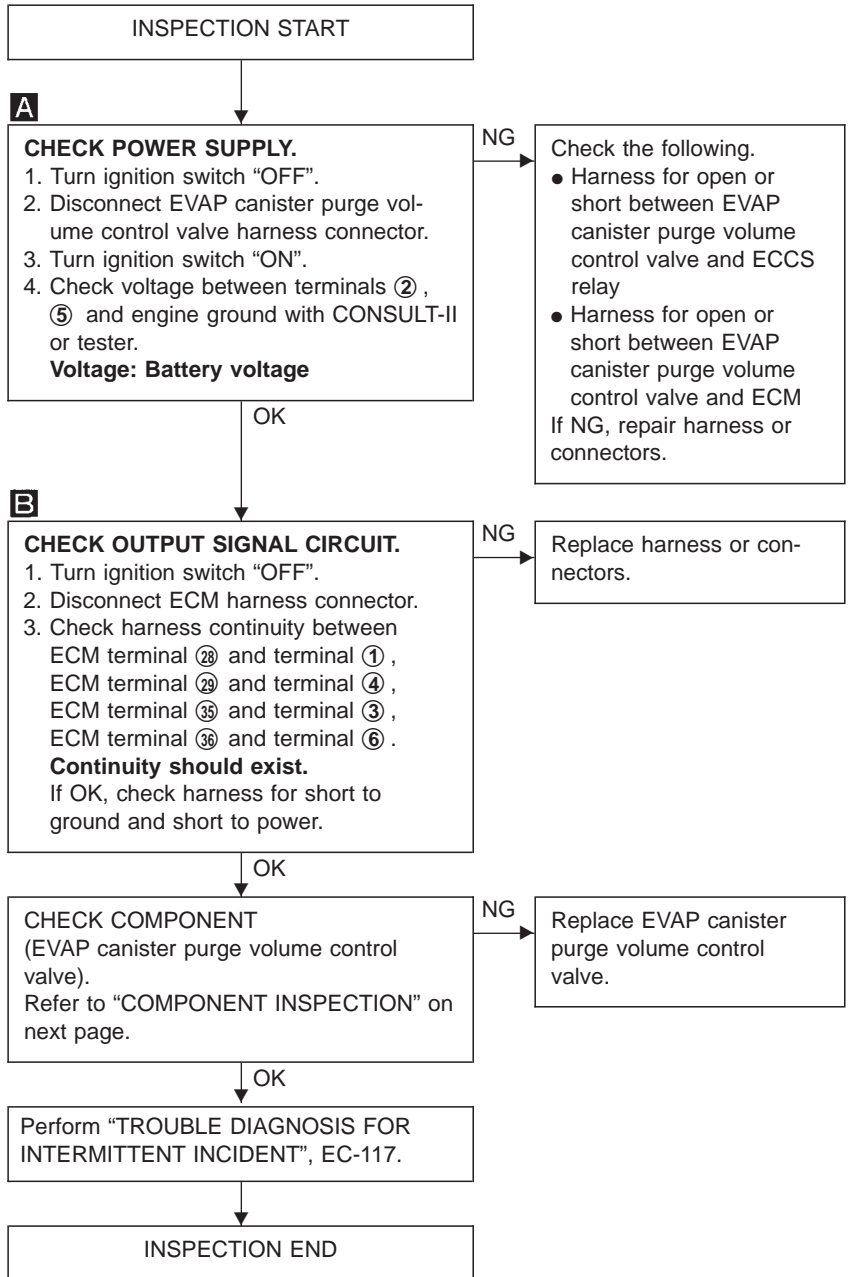
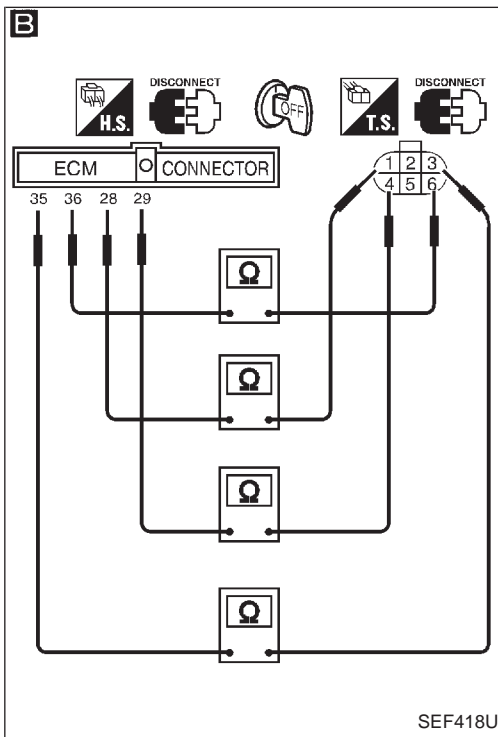
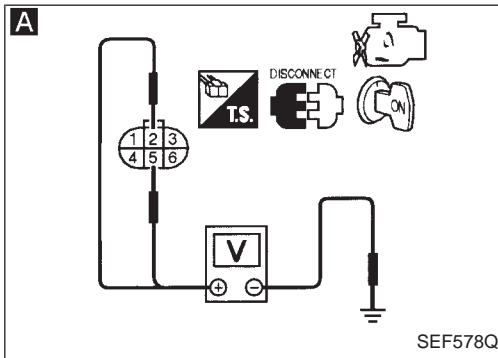
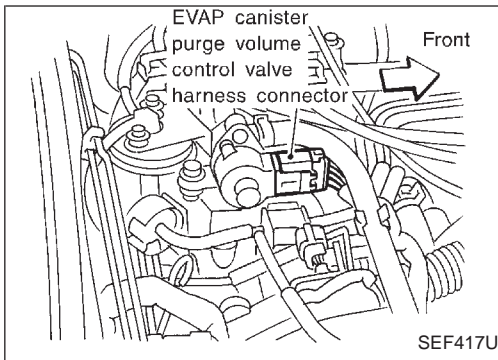
EC-PGC/V-01



TROUBLE DIAGNOSIS FOR DTC P0443

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit) (Cont'd)

DIAGNOSTIC PROCEDURE



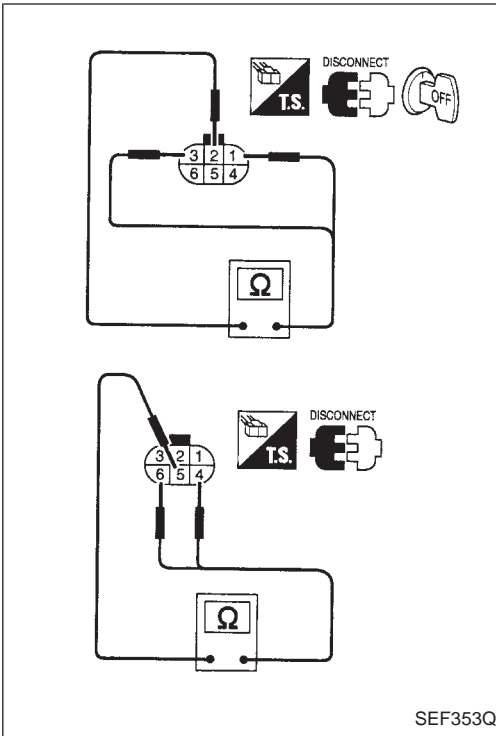
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TROUBLE DIAGNOSIS FOR DTC P0443

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Circuit) (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve



SEF353Q



1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening. If NG, replace the EVAP canister purge volume control valve.

ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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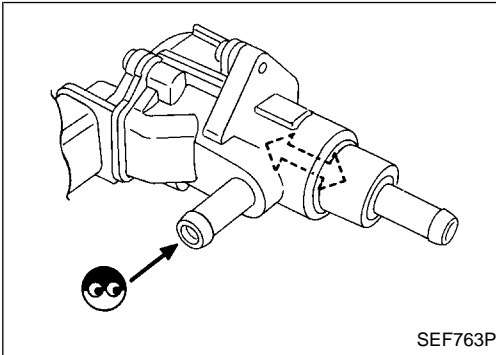
OR

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

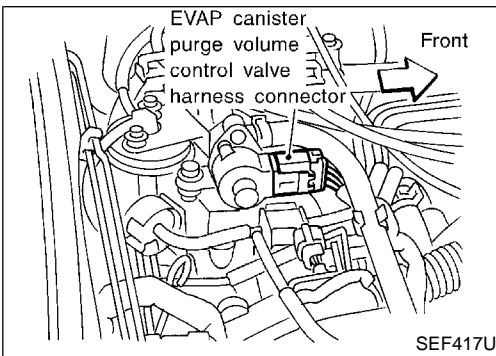
Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

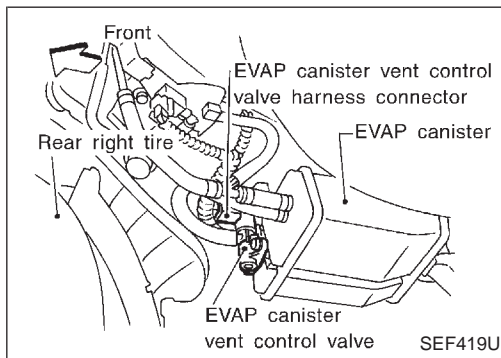
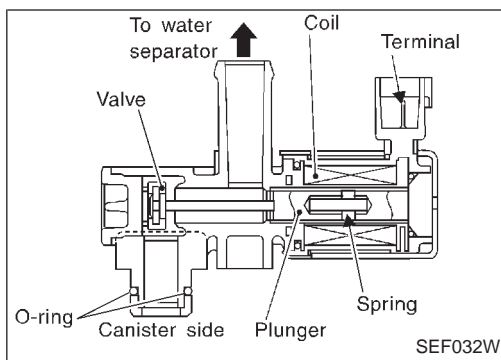
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position. If NG, replace the EVAP canister purge volume control valve.



SEF763P



SEF417U



Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit)

COMPONENT DESCRIPTION

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid (the EVAP canister vent control 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-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	P/B	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0446 0903	<ul style="list-style-type: none"> An improper voltage signal is sent to ECM through EVAP canister vent control valve. 	<ul style="list-style-type: none"> Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) EVAP canister vent control valve

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DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

SEF736X

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has just been completed, 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.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 8 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-316.

OR

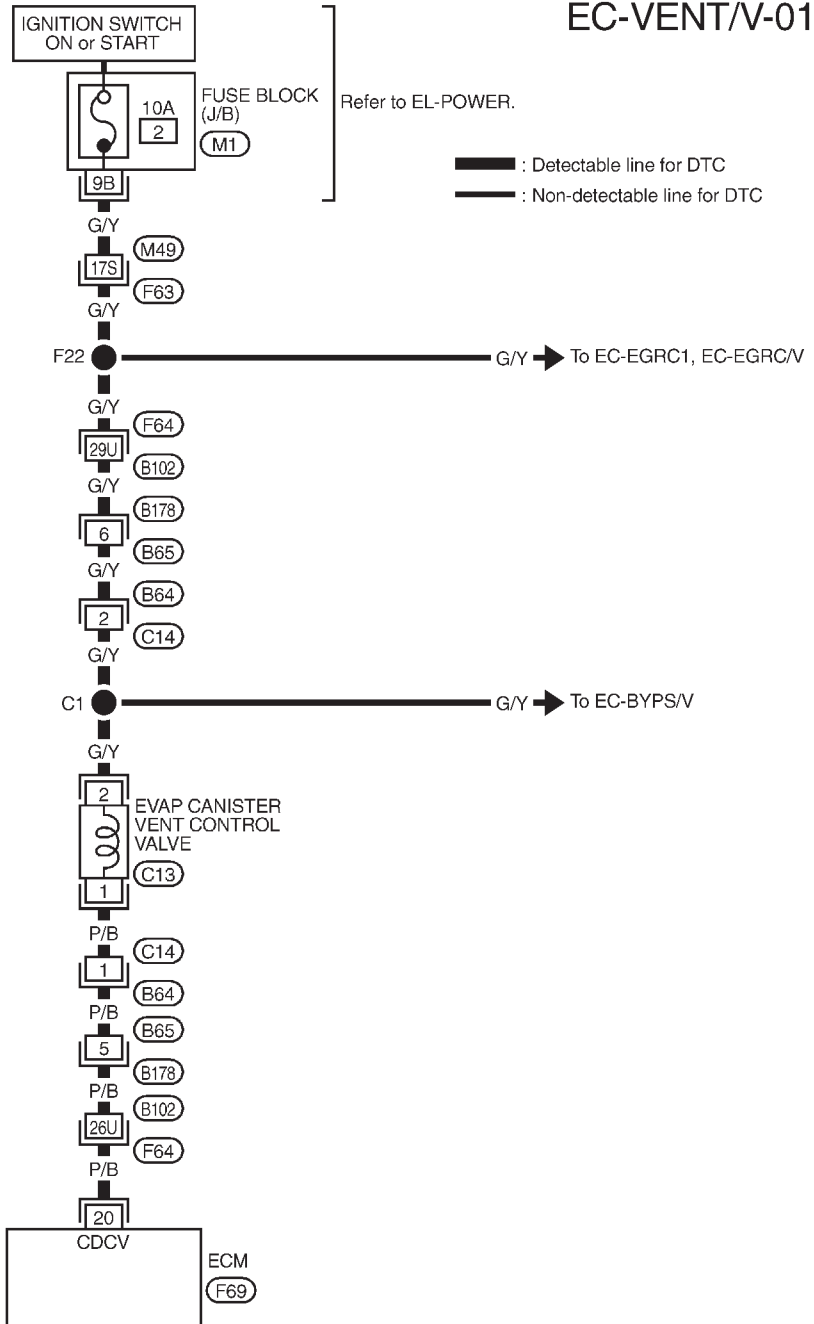


Follow the procedure "With CONSULT-II" above.

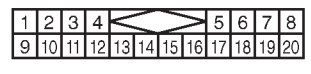
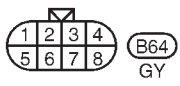
TROUBLE DIAGNOSIS FOR DTC P0446

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

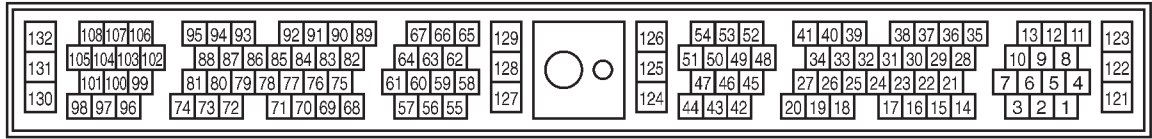
EC-VENT/V-01



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M49, F63
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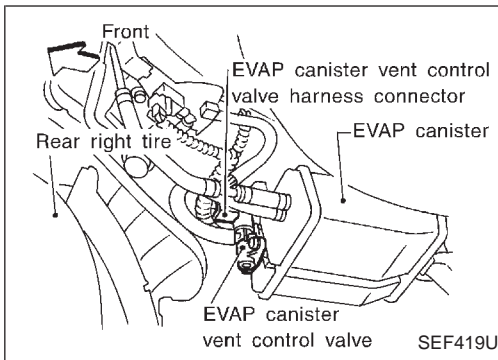


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TROUBLE DIAGNOSIS FOR DTC P0446

Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

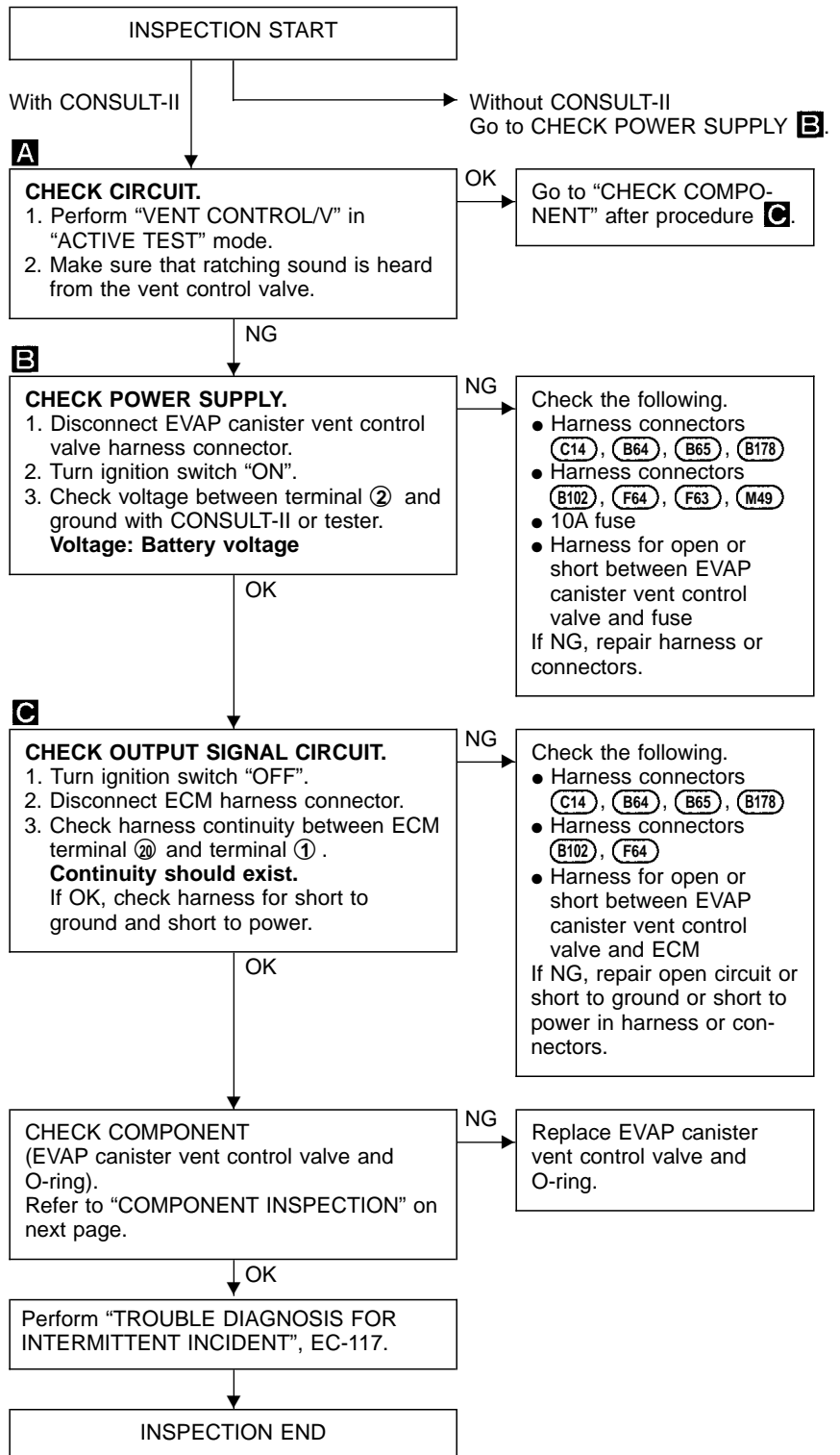
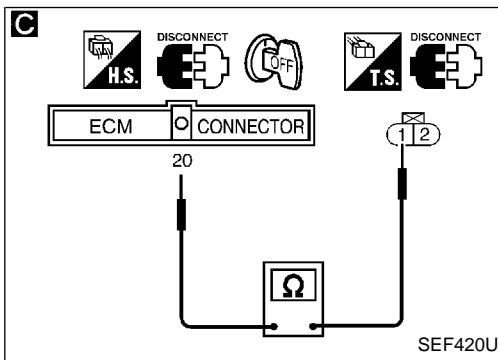
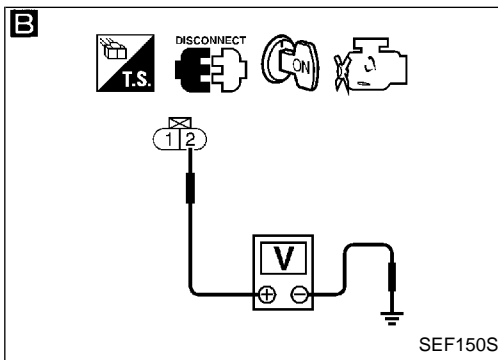
DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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TROUBLE DIAGNOSIS FOR DTC P0446

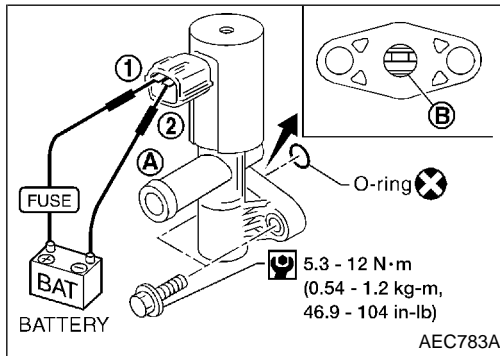
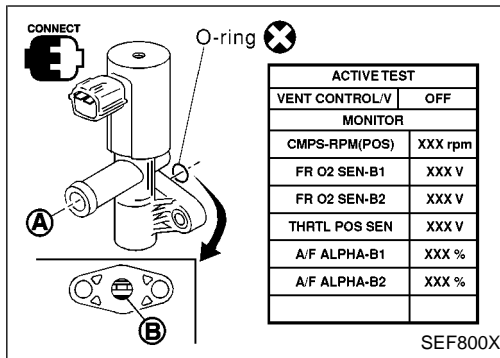
Evaporative Emission (EVAP) Canister Vent Control Valve (Circuit) (Cont'd)

COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	No
OFF	Yes

OR

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.

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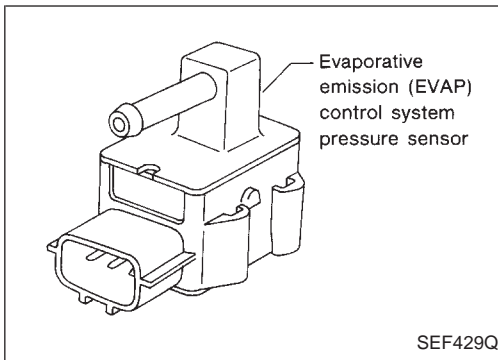
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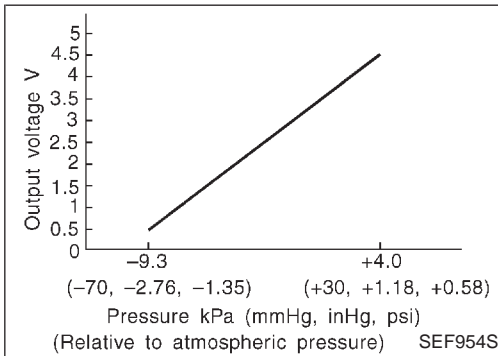
TROUBLE DIAGNOSIS FOR DTC P0450



Evaporative Emission (EVAP) Control System Pressure Sensor

COMPONENT DESCRIPTION

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-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
98	BR/W	Sensors' power supply	Ignition switch "ON"	Approximately 5V
92	W/R	EVAP control system pressure sensor	Ignition switch "ON"	Approximately 3.4V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450 0704	<ul style="list-style-type: none"> An improper voltage signal from EVAP control system pressure sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) Rubber hose to EVAP control system pressure sensor is clogged, bent, kinked, disconnected or not corrected properly. EVAP control system pressure sensor EVAP canister vent control valve (The valve is stuck open.) EVAP canister purge volume control valve EVAP canister Rubber hose from EVAP canister vent control valve to water separator

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF750X

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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 above 5°C (41°F).
- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.



- 1) Start engine and warm it at idle 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-II.
- 5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 12 seconds.
- 7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-321.

OR

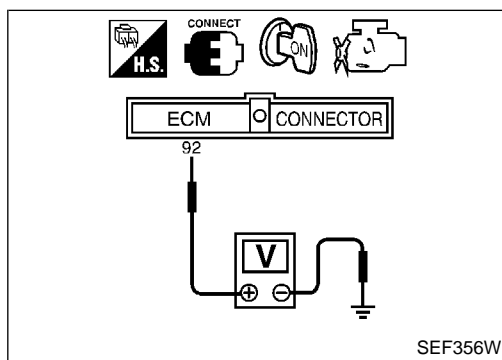


- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal ⑨② and ground is less than 4.2V.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Start engine and wait at least 12 seconds.
- 5) Select "MODE 7" with GST.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-321.

OR



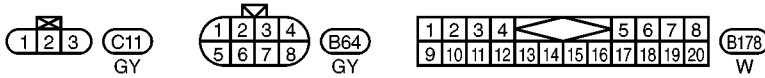
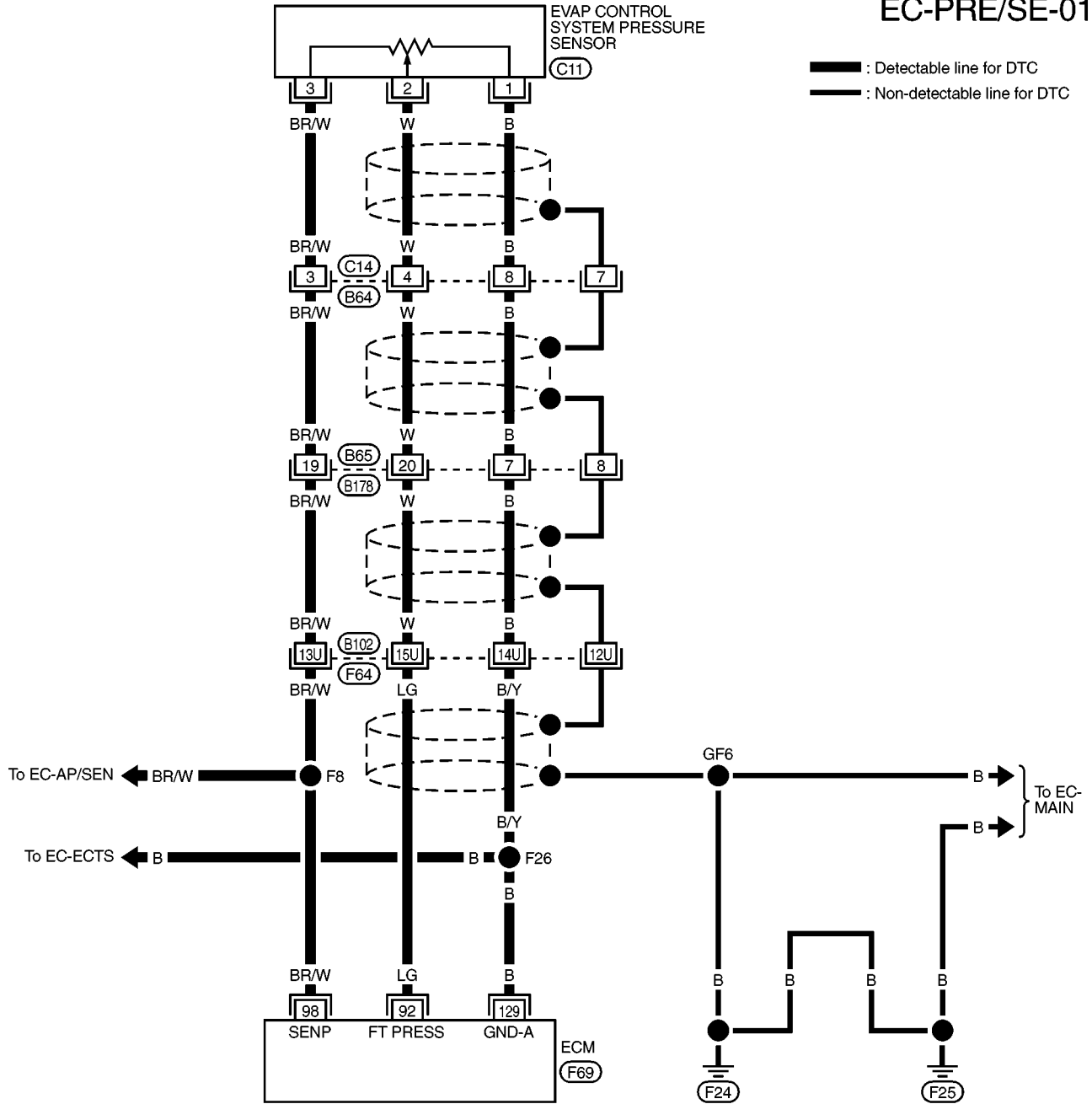
- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal ⑨② and ground is less than 4.2V.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Start engine and wait at least 12 seconds.
- 5) Turn ignition switch "OFF", wait at least 5 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-321.



TROUBLE DIAGNOSIS FOR DTC P0450

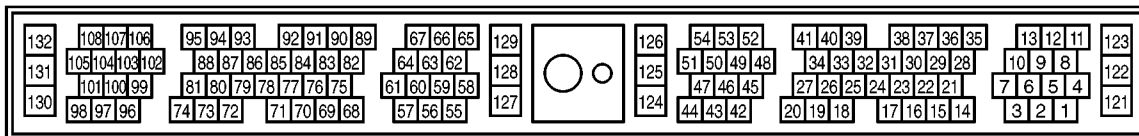
Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

EC-PRE/SE-01



Refer to last page (Foldout page).

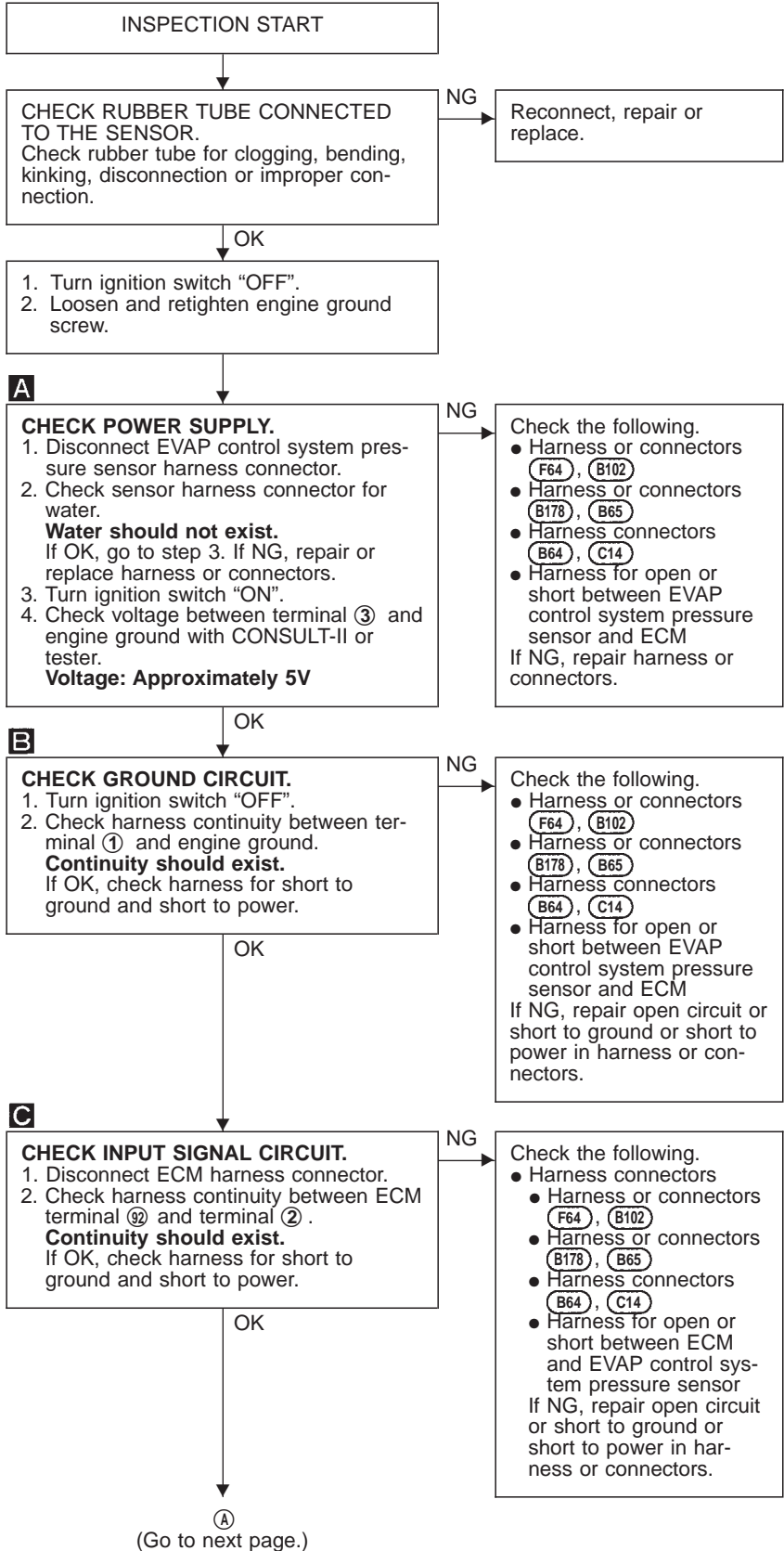
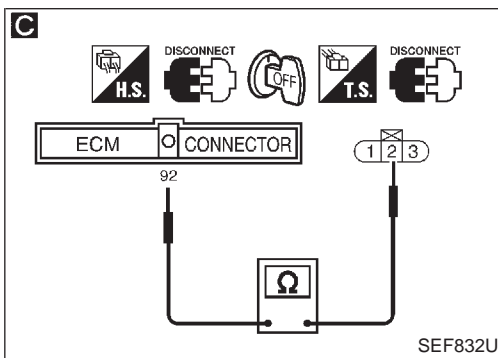
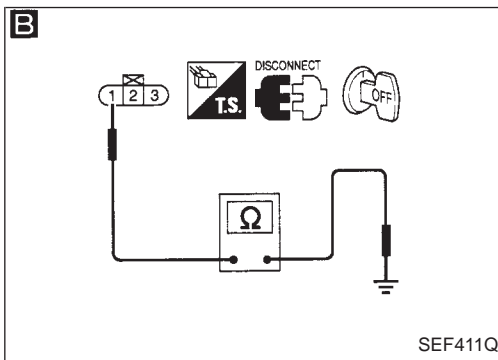
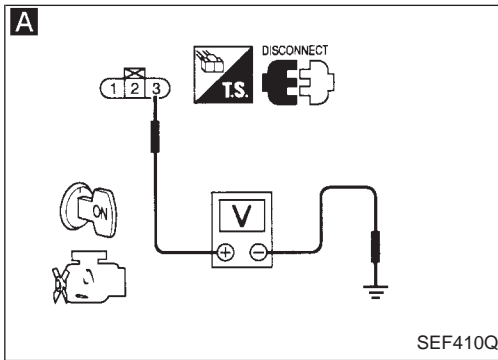
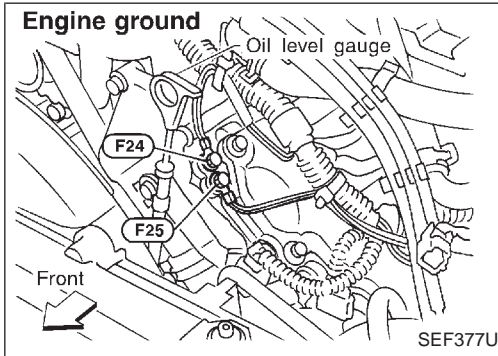
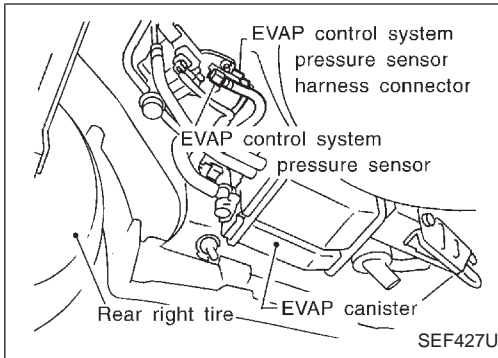
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TROUBLE DIAGNOSIS FOR DTC P0450

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

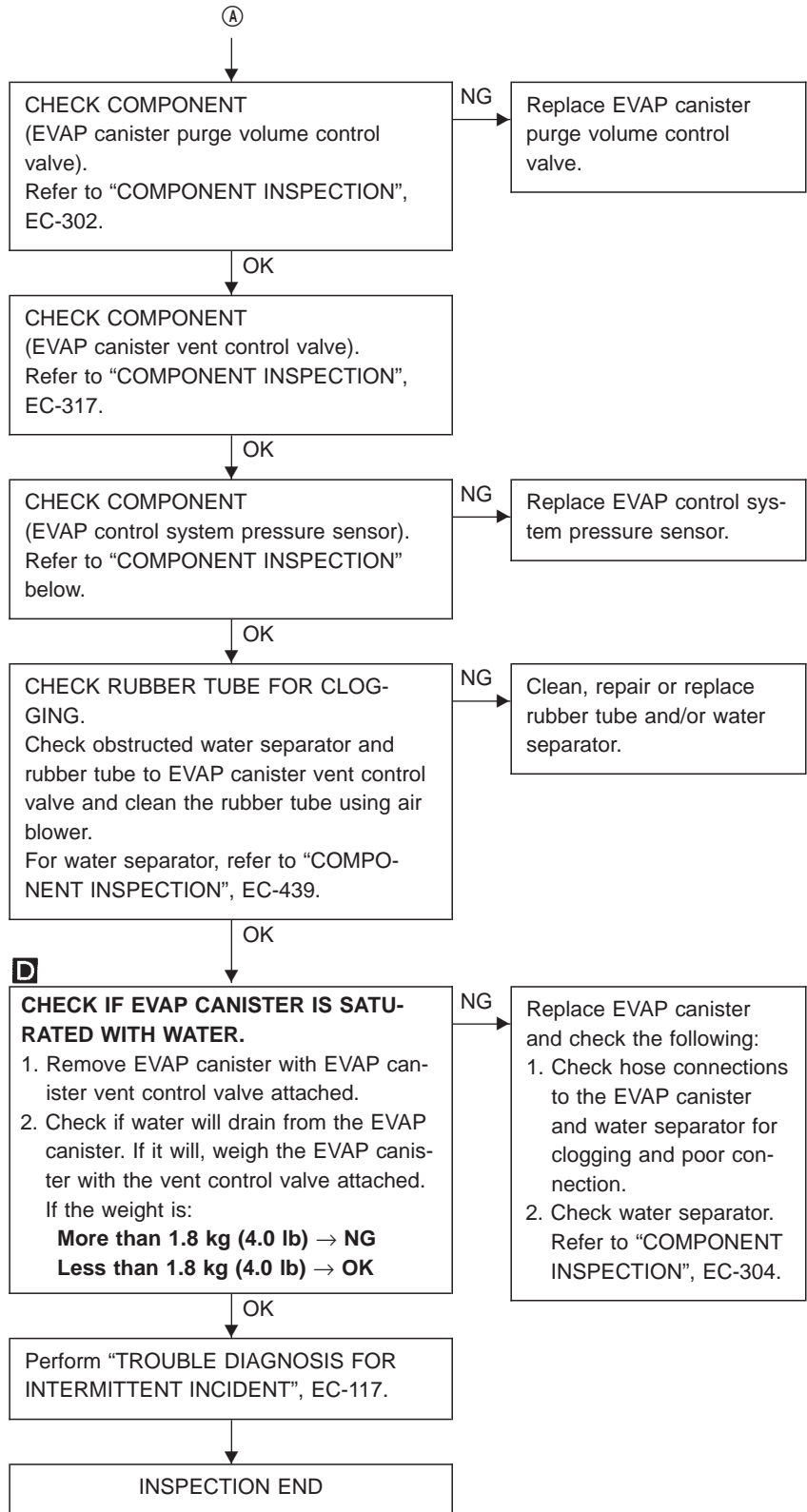
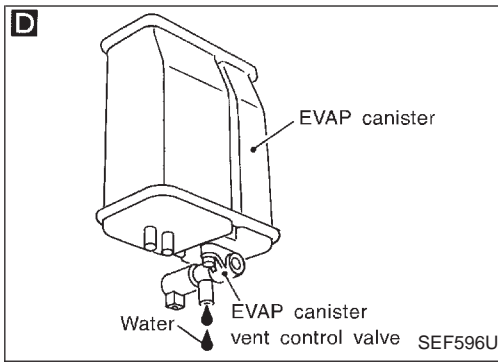
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P0450

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

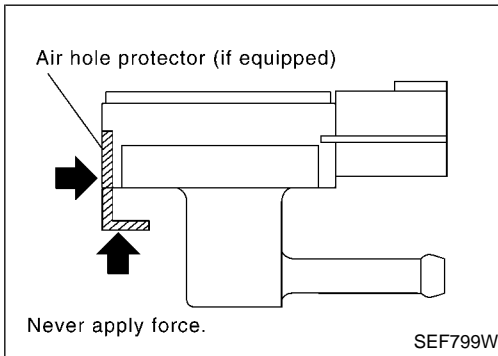
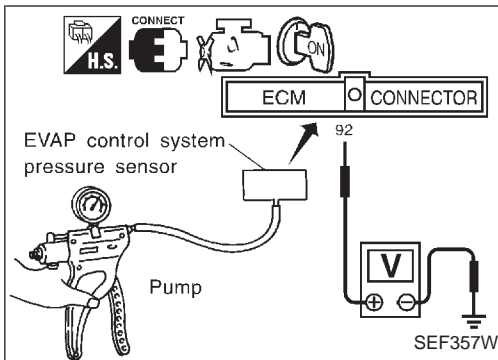


TROUBLE DIAGNOSIS FOR DTC P0450

Evaporative Emission (EVAP) Control System Pressure Sensor (Cont'd)

COMPONENT INSPECTION

EVAP control system pressure sensor



1. Remove EVAP control system pressure sensor with its harness connector.
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 output voltage between ECM terminal 92 and ground.

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.
- If NG, replace EVAP control system pressure sensor.
- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure 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.

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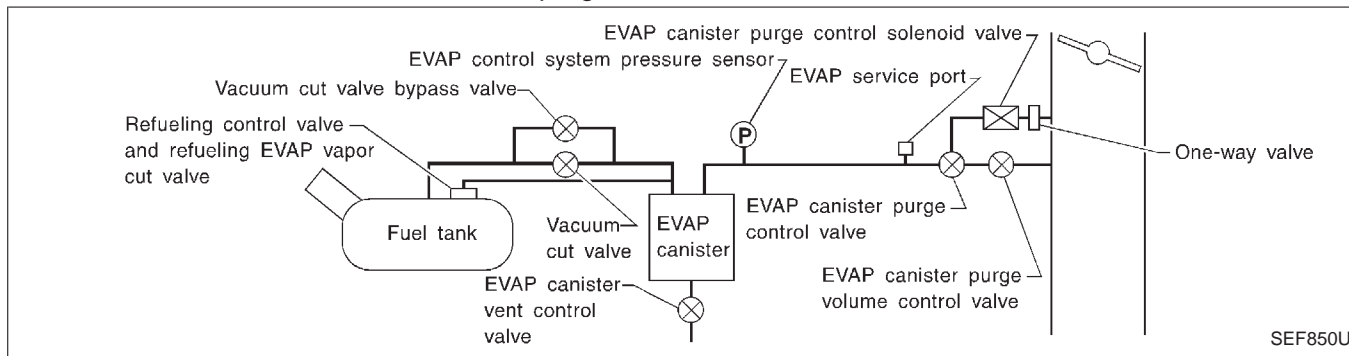
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Evaporative Emission (EVAP) Control System (Gross Leak)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge control valve.



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0440 0705	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● 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 control 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 control valve ● EVAP canister purge volume control valve and the circuit ● EVAP canister purge control solenoid valve ● 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. ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks

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.

TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

DTC CONFIRMATION PROCEDURE

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P1448 is displayed with P0455, perform TROUBLE DIAGNOSIS FOR DTC P1448 first.
- If “DIAGNOSTIC TROUBLE CODE 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 placed on the flat level surface.
- It is better that fuel level is low.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- Battery voltage is more than 11V at idle.



- 1) Tighten fuel filler cap securely until ratching 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-II.
- 5) Make sure 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-II.
 Follow the instruction displayed.

NOTE:

- If the engine cannot be maintained within the range on CONSULT-II screen, go to “Basic Inspection”, EC-91.
- Make sure that EVAP hoses are connected EVAP canister purge volume control solenoid valve properly.
- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to “Diagnostic Procedure”, EC-327. If P0440 is displayed, perform “Diagnostic Procedure” for P0440.

OR

NOTE:

Be sure to read the explanation of “Driving pattern” on EC-56 before driving vehicle.



- 1) Start engine. (TCS switch “OFF”)
- 2) Drive vehicle according to “Driving pattern”, EC-56.
- 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.

<p>EVAP V/S LEAK P0440</p> <p>1)PERFORM TEST AT A LOCATION OF 0-30C (32-86F) 2)OPEN ENGINE HOOD. 3)START ENGINE WITH VEHICLE STOPPED. IF ENG IS ON, STOP FOR 5 SEC. THEN RESTART. 4)TOUCH START.</p>
--

PEF405W

<p>EVAP SML LEAK P0440</p> <p>CAN NOT BE DIAGNOSED</p>
<p>FUEL TEMPERATURE IS TOO HIGH. RETEST AFTER FUEL HAS COOLED.</p>

PEF669U

<p>EVAP SML LEAK P0440</p> <p>WAIT 2 TO 10 MINUTES KEEP ENGINE RUNNING AT IDLE SPEED.</p>
--

PEF929V

<p>EVAP SML LEAK P0440</p> <p>OK</p>

PEF297U

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Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

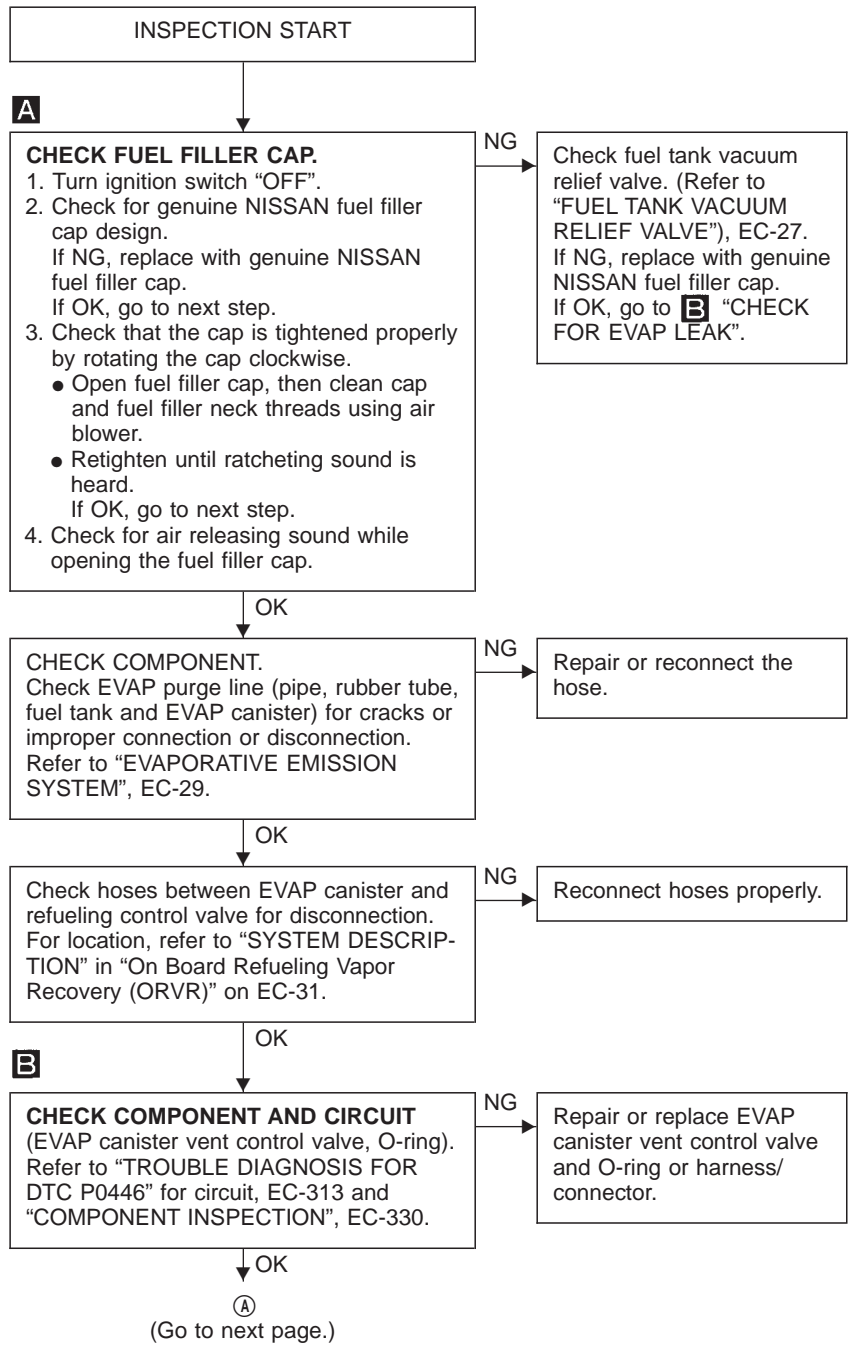
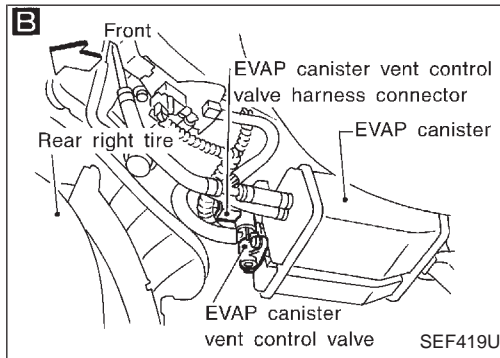
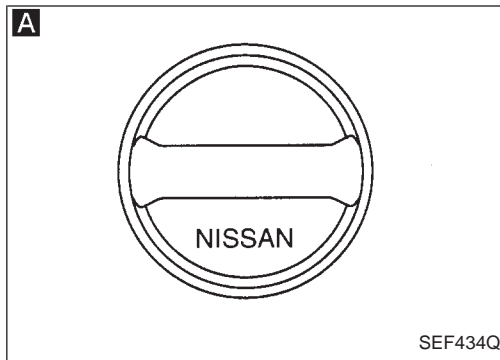
It is not necessary to cool engine down before driving.

- 7) Drive vehicle again according to the "Driving pattern".
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P1447 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1447", EC-455.
 - If P0440 is displayed on the screen, go to "DIAGNOSTIC PROCEDURE", EC-299.
 - If P1440 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1440", EC-430.
 - If P0440 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).

TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

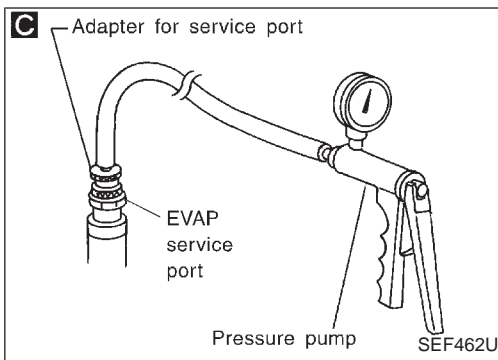
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P0455

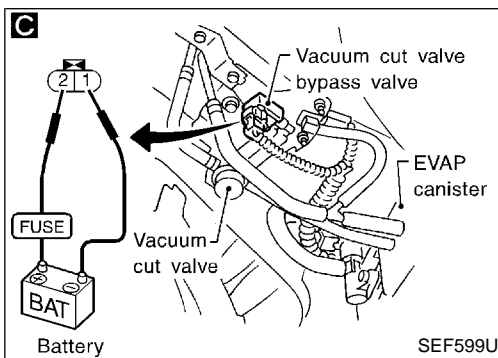
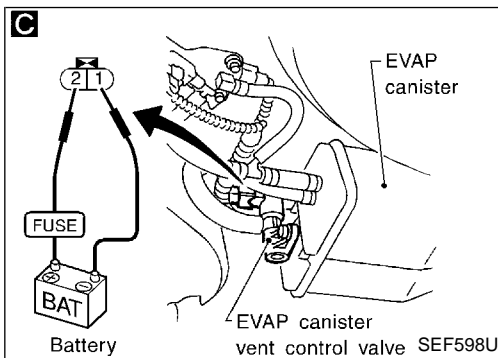
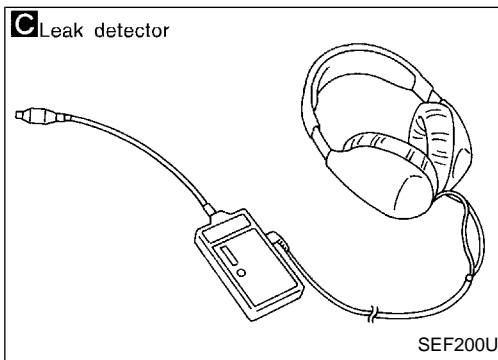
Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)



EVAP SYSTEM CLOSE

APPLY PRESSURE TO EVAP SYSTEM FROM SERVICE PORT USING HAND PUMP WITH PRESSURE GAUGE AT NEXT SCREEN. NEVER USE COMPRESSED AIR OR HIGH PRESSURE PUMP! DO NOT START ENGINE. TOUCH START.

PEF658U



CHECK FOR EVAP LEAK.

- Never use compressed air or high pressure pump.
- Improper installation of service port may cause leaking.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

To locate EVAP leak portion, proceed with the following steps.

- Install the EVAP service port adapter and the pressure pump securely.
- Turn ignition switch "ON". Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
- Touch "START" and apply vacuum into the EVAP line until the pressure indicator reaches the middle of bar graph.
- Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "Evaporative Emission Line Drawing", EC-29.

NG → Repair or replace.

OR

- Turn ignition switch "OFF".
- Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
- Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)
- Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
- Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

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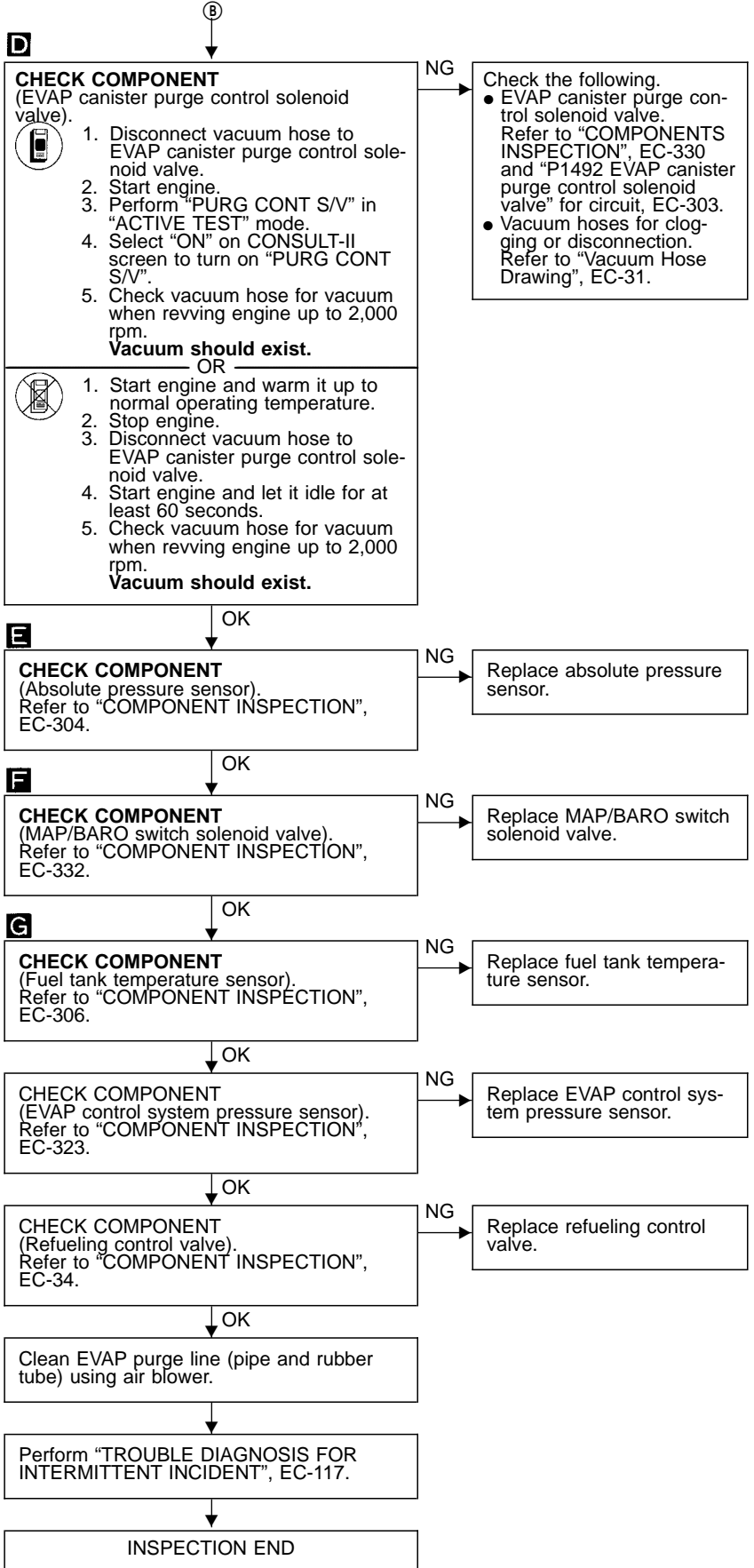
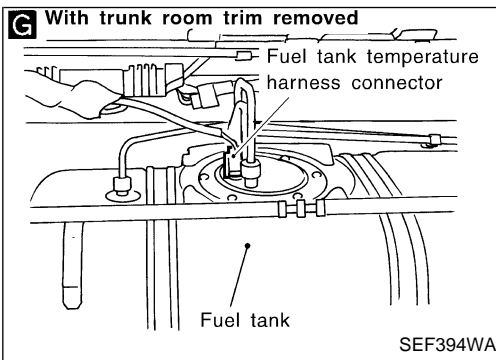
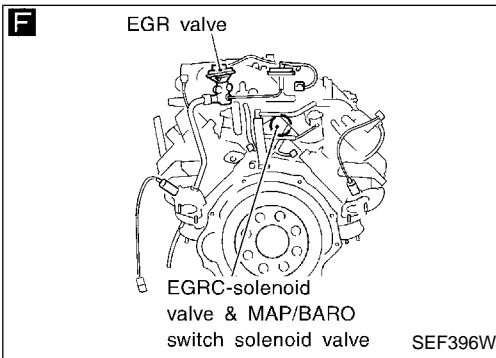
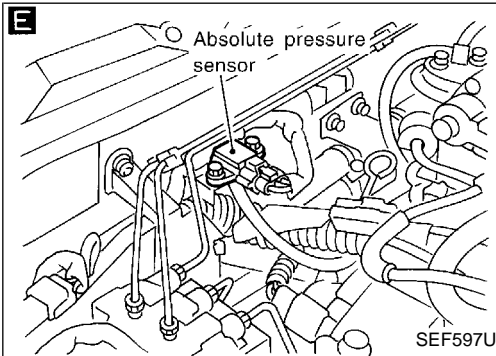
TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

D

ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

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TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve



1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening.
If NG, replace the EVAP canister purge volume control valve.

OR

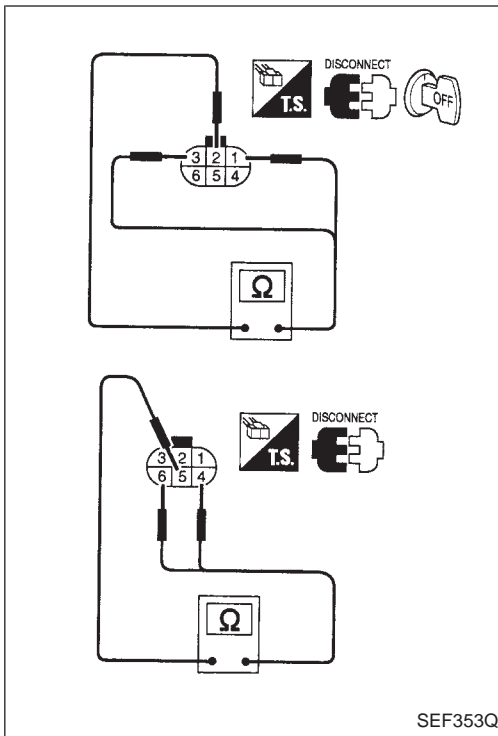


1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

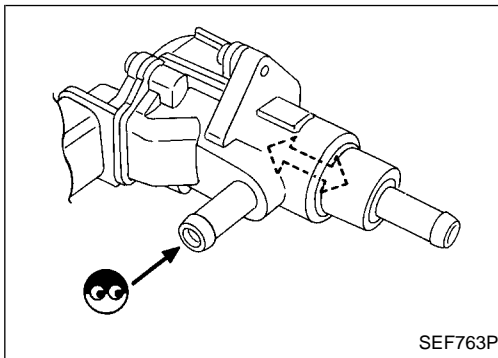
3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
If NG, replace the EVAP canister purge volume control valve.



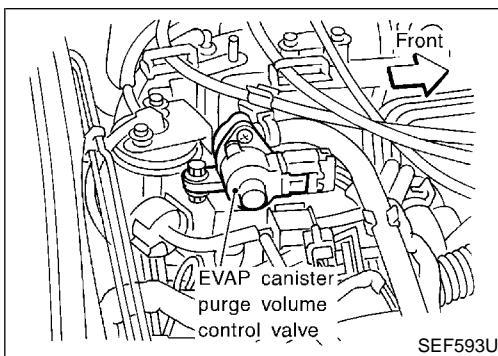
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ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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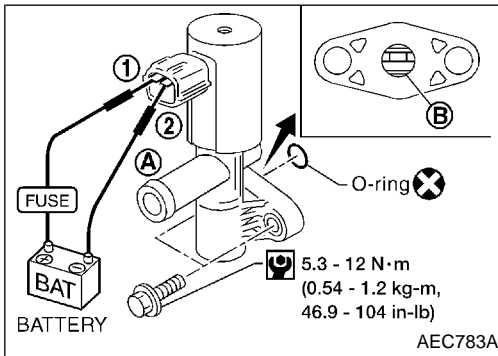
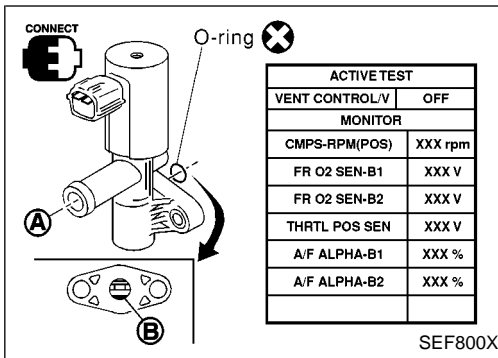
TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



Condition	Air passage continuity between (A) and (B)
ON	No
OFF	Yes

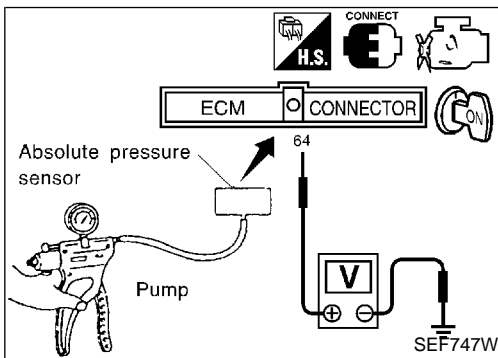
OR

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.



Absolute pressure sensor

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 (64) 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 vacuum below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
5. If NG, replace absolute pressure sensor.

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TROUBLE DIAGNOSIS FOR DTC P0455

Evaporative Emission (EVAP) Control System (Gross Leak) (Cont'd)

MAP/BARO switch solenoid valve



1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
 - Condition: At idle under no-load.
 - CONSULT-II display

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

SEF767X

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF768X

MAP/BARO SW/V	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

- Time for voltage to change

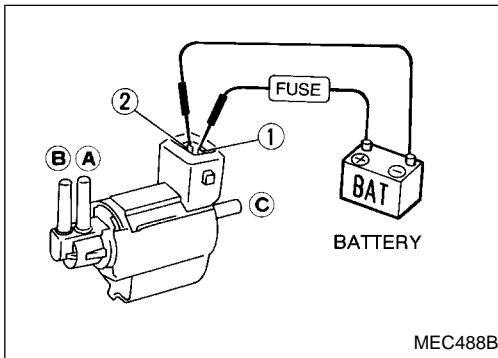
MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

4. If NG, check solenoid valve as shown below.

OR

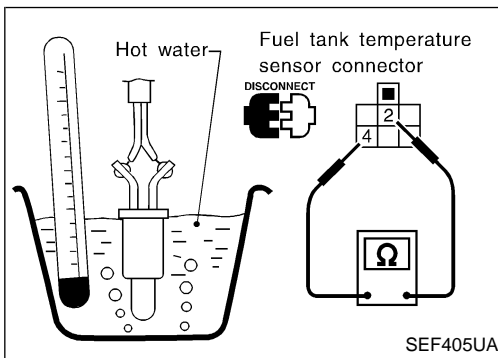


1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.



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.

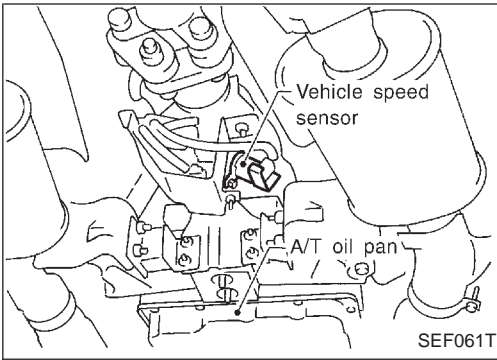


Fuel tank temperature sensor

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.



Vehicle Speed Sensor (VSS)

COMPONENT DESCRIPTION

The vehicle speed sensor is installed in the transmission. 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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
68	P/L	Vehicle speed sensor	<p>Engine is running.</p> <p>Lift up drive wheels and run engine at idle in "D" position.</p>	<p>Approximately 5.2V</p>

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0500 0104	<ul style="list-style-type: none"> The almost 0 km/h (0 MPH) signal from the vehicle speed sensor is sent to ECM even when the vehicle is driving. 	<ul style="list-style-type: none"> Harness or connector (The vehicle speed sensor circuit is open or shorted.) Vehicle speed sensor

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DATA MONITOR	
MONITORING	NO DTC
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF751X

Vehicle Speed Sensor (VSS) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Step 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.



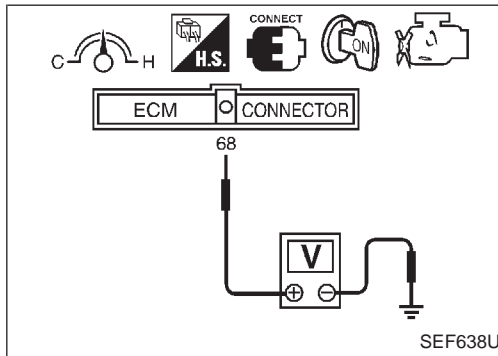
- 1) Start engine.
- 2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to "DIAGNOSTIC PROCEDURE", EC-337.
If OK, go to following step.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Warm engine up to normal operating temperature.
- 5) Maintain the following conditions for at least 10 consecutive seconds with TCS switch "OFF".
CMPS-RPM (POS): 1,300 - 2,250 rpm
COOLAN TEMP/S: More than 70°C (158°F)
B/FUEL SCHDL: 2.0 - 3.5 msec
Selector lever: Suitable position
PW/ST SIGNAL: OFF
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-337.

TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd)

FUEL SYS #1	CLOSED
FUEL SYS #2	CLOSED
CALC LOAD	19%
COOLANT TEMP	93°C
SHORT FT #1	1%
LONG FT #1	0%
SHORT FT #2	3%
LONG FT #2	0%
ENGINE SPD	2037RPM
VEHICLE SPD	12MPH
IGN ADVANCE	38.0°
INTAKE AIR	43°C

SEF568P



OR

OVERALL FUNCTION CHECK

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



- 1) Lift up drive wheels.
- 2) Start engine (TCS switch "OFF").
- 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 NG, go to "DIAGNOSTIC PROCEDURE", EC-337.

OR



- 1) Lift up drive wheels.
- 2) Start engine (TCS switch "OFF").
- 3) Read the voltage signal between ECM terminal 68 (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 previous page.
- 5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-337.

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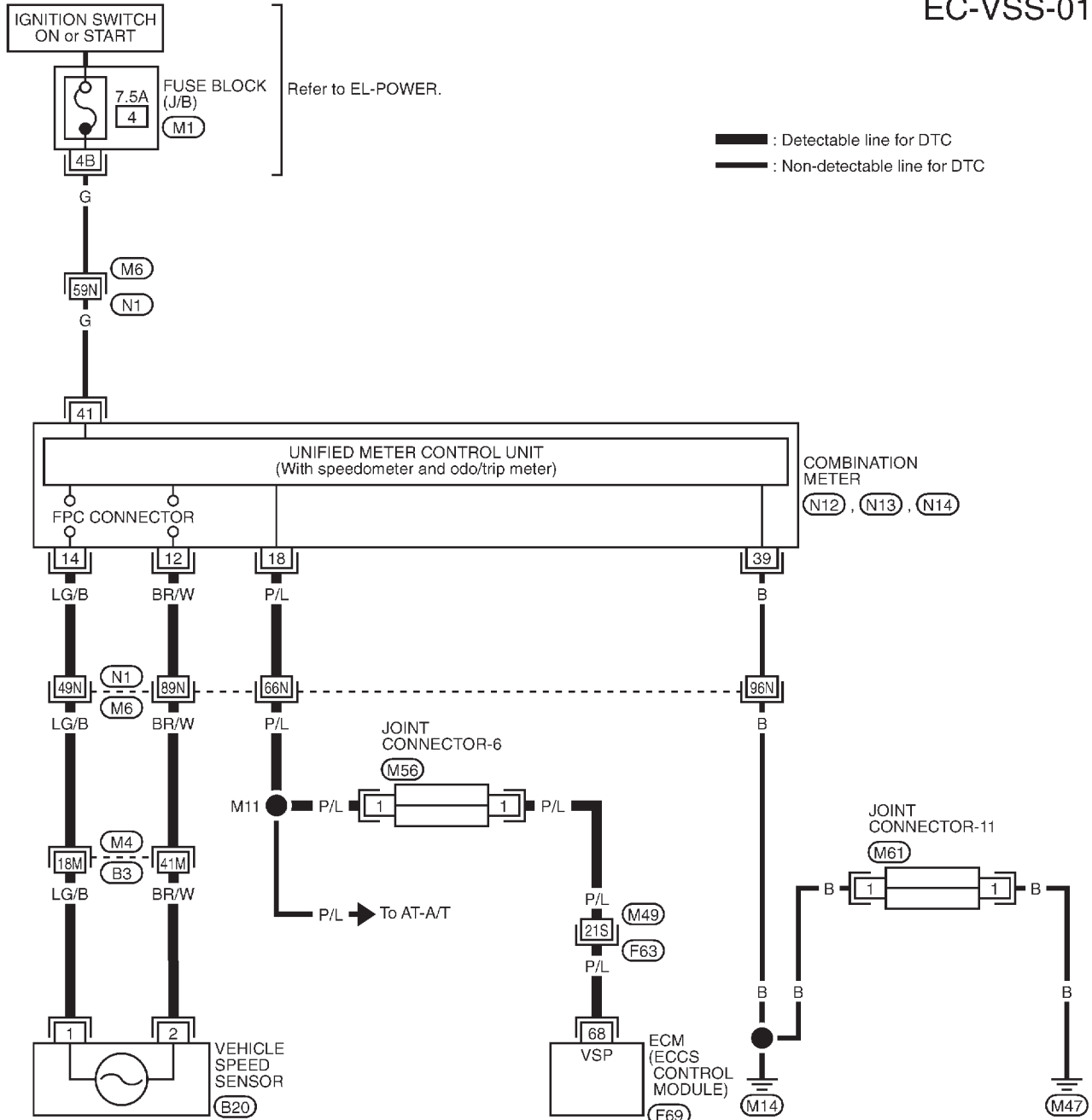
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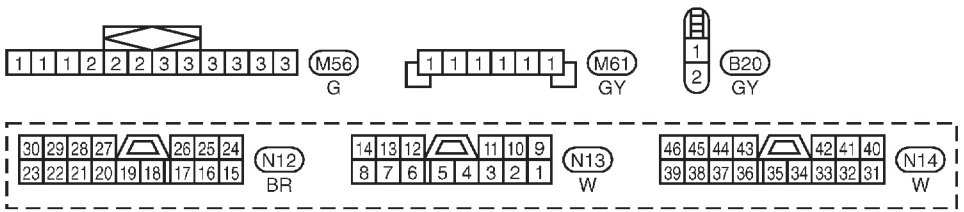
TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd)

EC-VSS-01

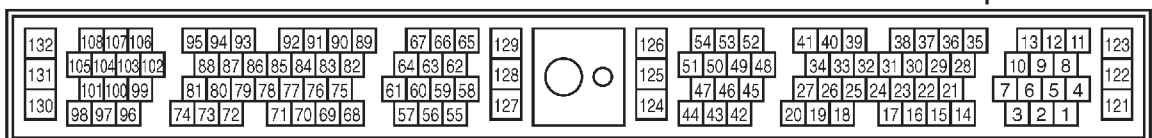


— : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to last page (Foldout page).

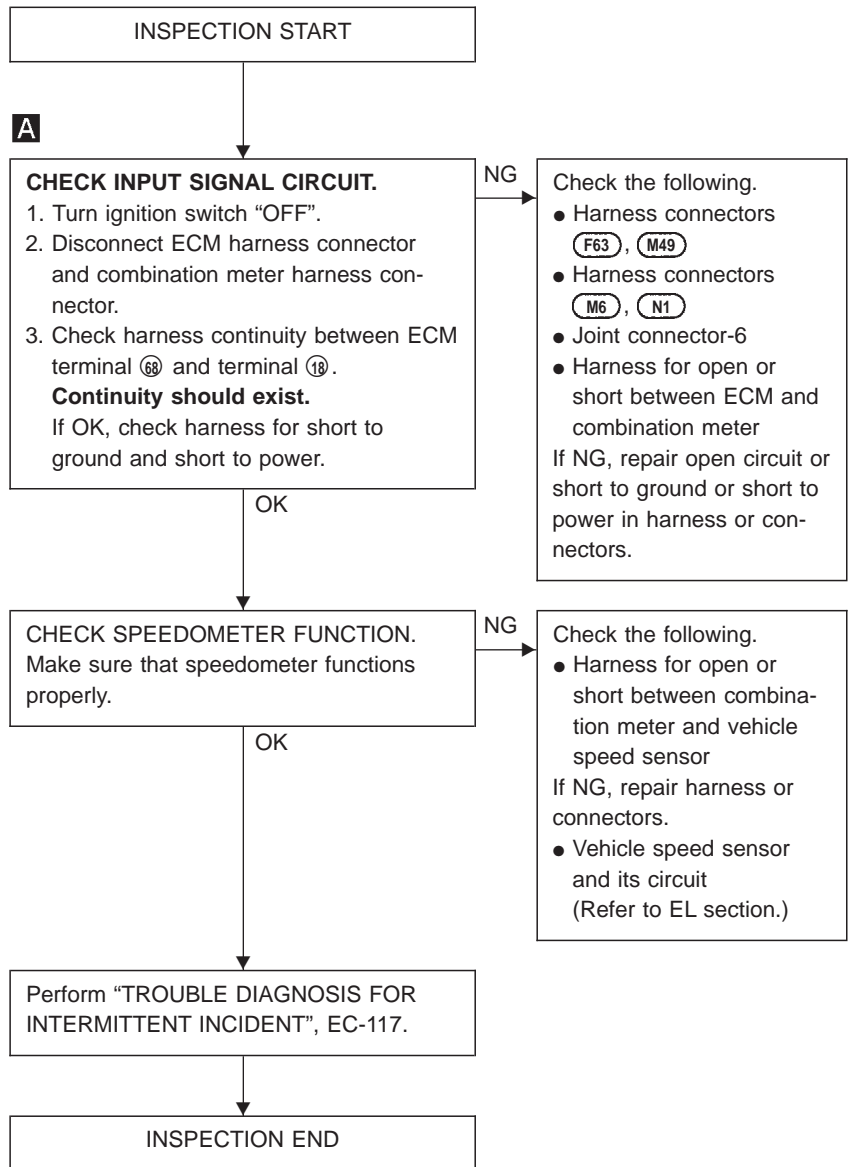
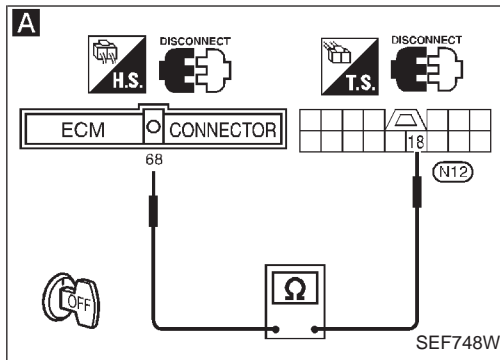
- M4 , B3
- M6 , N1
- M49 , F63
- M1



TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (Cont'd)

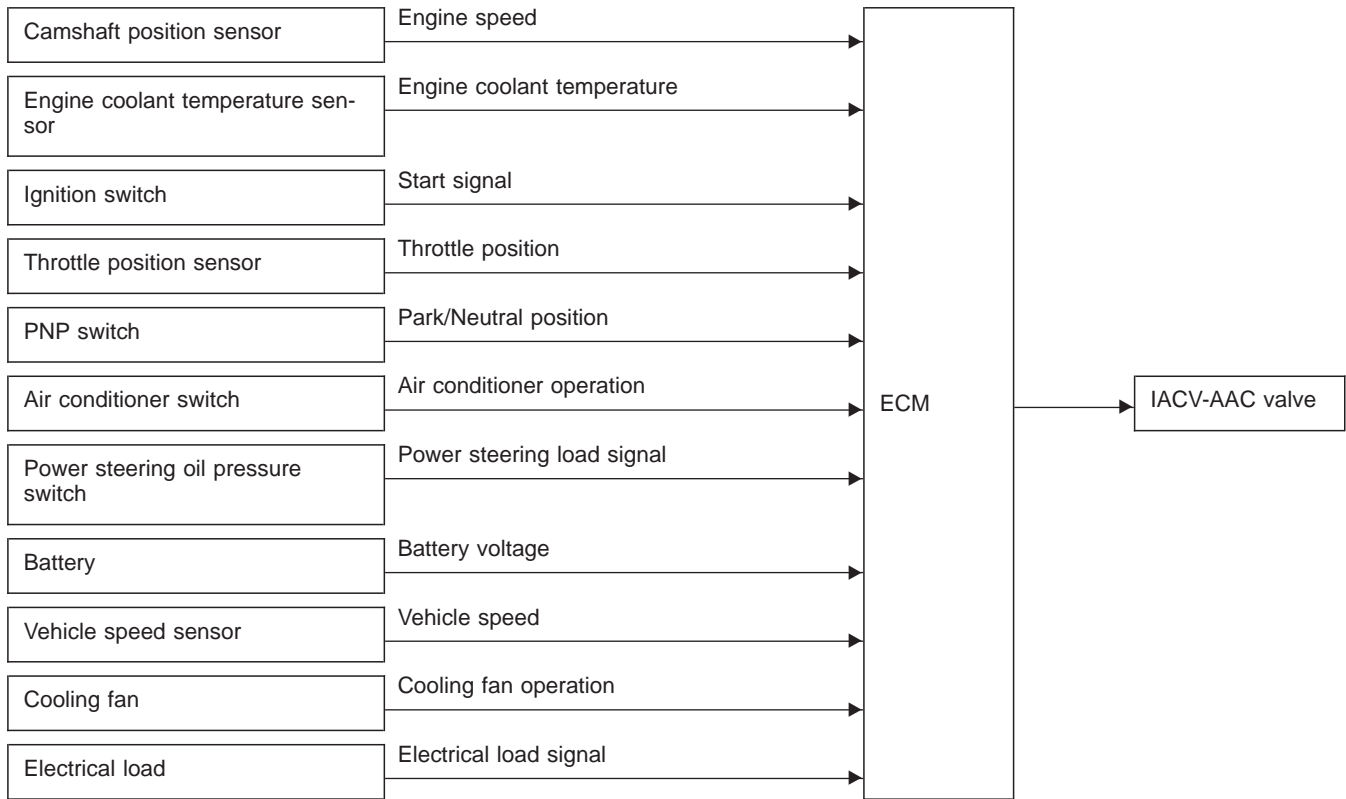
DIAGNOSTIC PROCEDURE



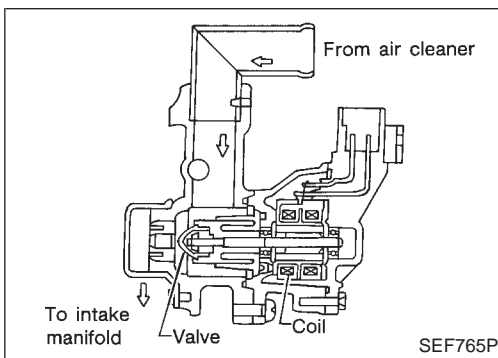
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Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve

SYSTEM DESCRIPTION



This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position 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, power steering and cooling fan operation).



COMPONENT DESCRIPTION

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	20 - 10 step
		2,000 rpm	—

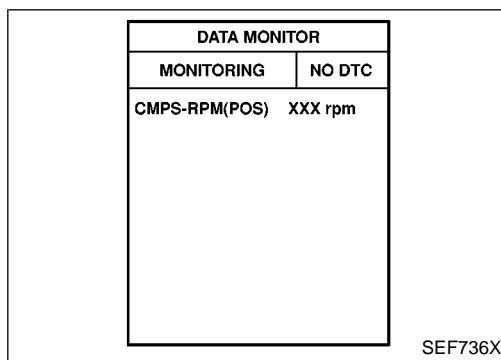
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
13	Y	IACV-AAC valve	Engine is running.	0.1 - 14V
8	GY/L		└ Idle speed	
11	PU	IACV-AAC valve	Engine is running.	0.1 - 14V
12	G/Y		└ Idle speed	

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0505 0205	A) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> Harness or connectors (The IACV-AAC valve circuit is open.) IACV-AAC valve
	B) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> Harness or connectors (The IACV-AAC valve circuit is shorted.) IACV-AAC valve



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

- If "DIAGNOSTIC TROUBLE CODE 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 a 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B".

TESTING CONDITION:

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

Procedure for malfunction A

- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and let it idle.
- Keep engine speed at 2,500 rpm for 3 seconds, then let it idle for 3 seconds.
Do not rev engine up to speeds more than 3,000 rpm.
- Perform step 4 once more.
- If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-342.

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

Procedure for malfunction B



- 1) Open engine hood.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
- 5) Start engine and run it for at least 1 minute at idle speed. (Headlamp switch, rear defogger switch: OFF)
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-342.

OR

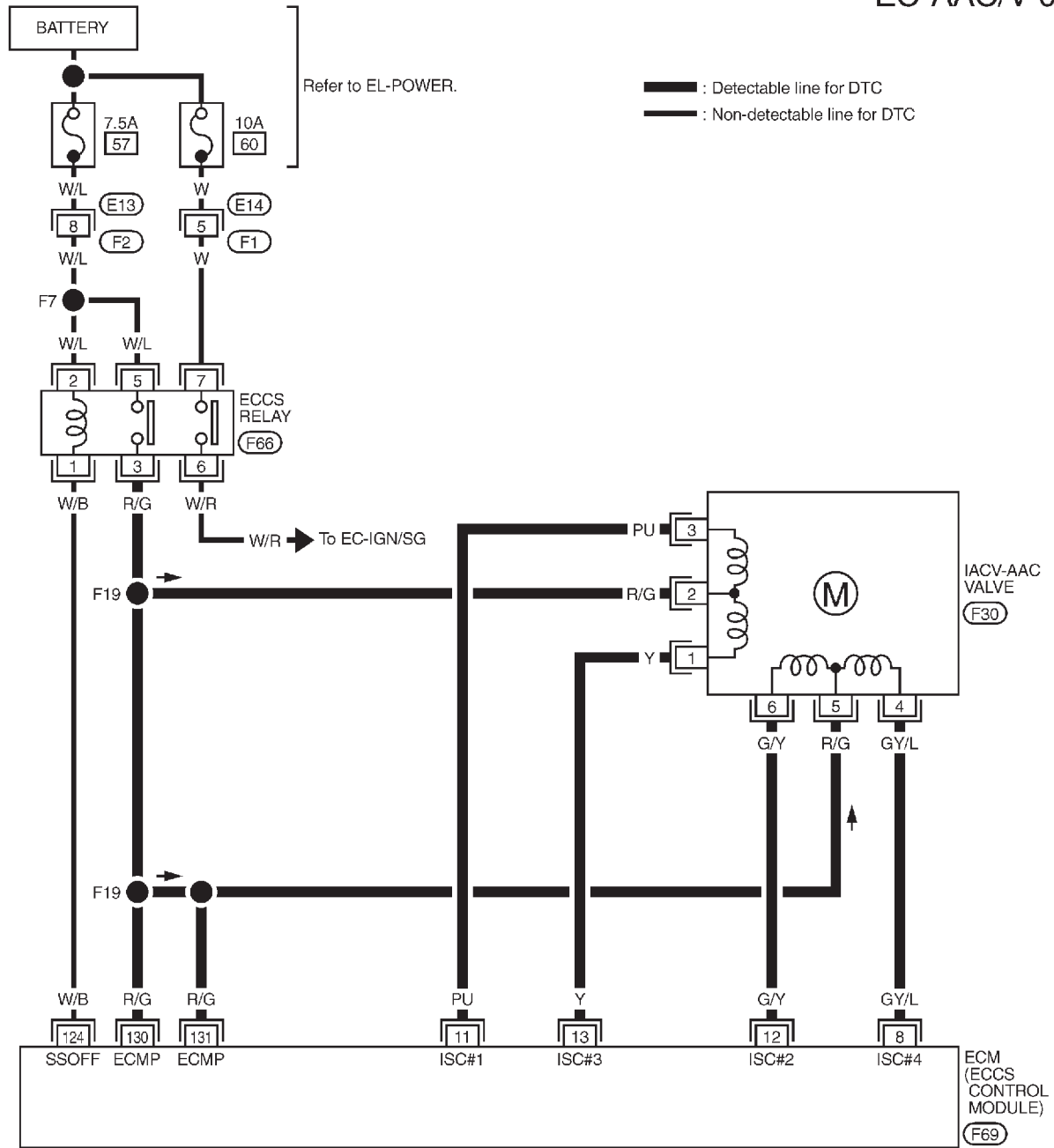


Follow the procedure "With CONSULT-II" above.

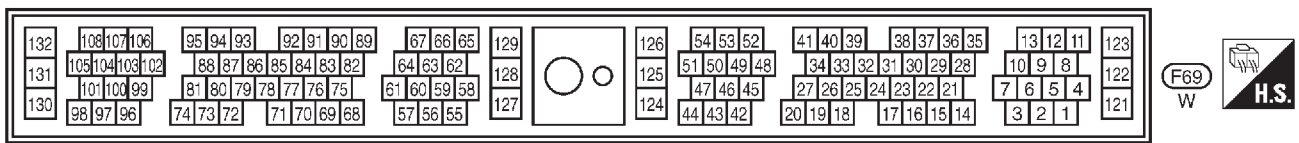
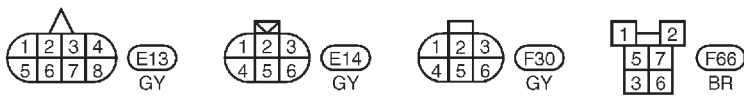
TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

EC-AAC/V-01



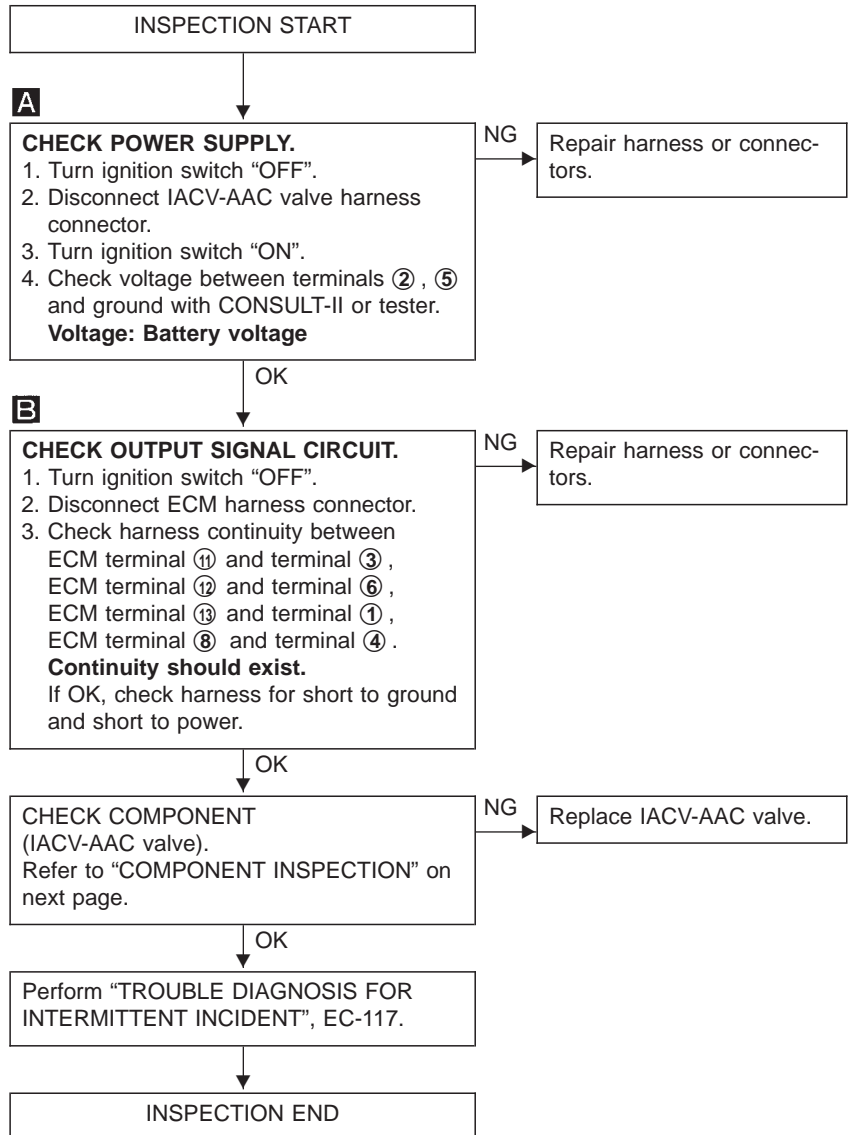
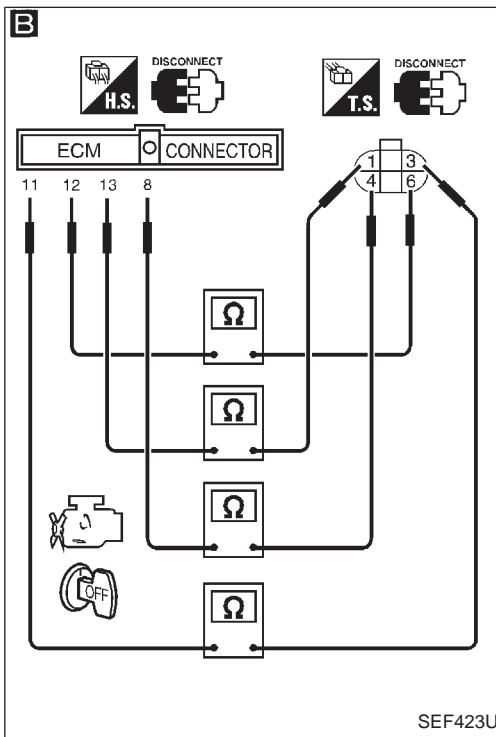
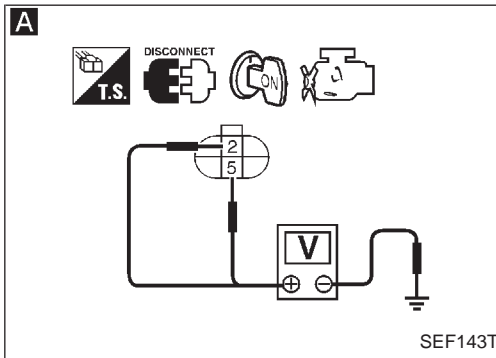
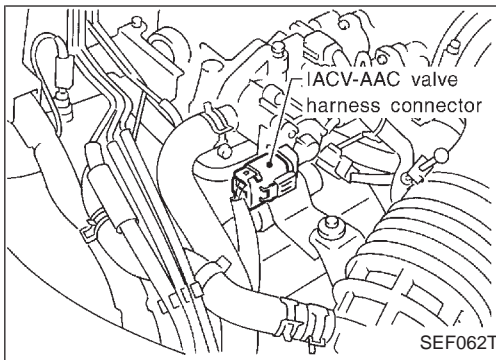
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TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (Cont'd)

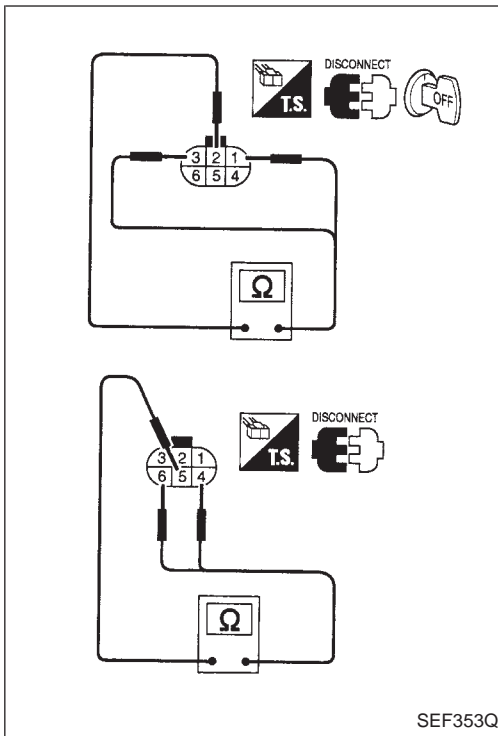
COMPONENT INSPECTION

IACV-AAC valve

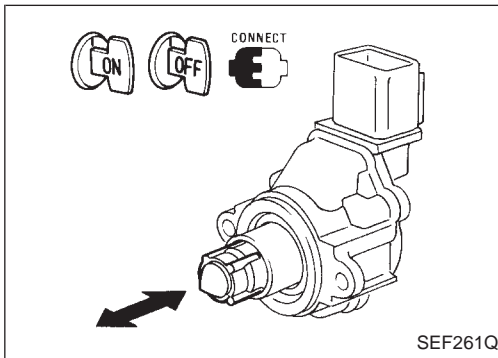
1. Disconnect IACV-AAC valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 30Ω [at 20°C (68°F)]



SEF353Q



SEF261Q

3. Reconnect IACV-AAC valve harness connector.
4. Remove idle air adjusting unit assembly (IACV-AAC valve is built-in) from engine.
(The IACV-AAC valve harness connector should remain connected.)
5. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve shaft smoothly moves forward and backward, according to the ignition switch position.
If NG, replace the IACV-AAC valve.

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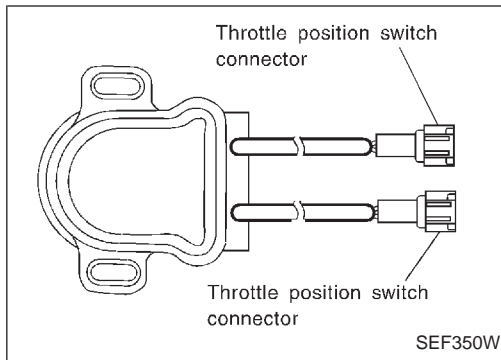
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Closed Throttle Position Switch

COMPONENT DESCRIPTION

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 control valve when the throttle position sensor is malfunctioning.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL POS	<ul style="list-style-type: none"> Engine: After warming up 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 valve: Idle position	ON
		Throttle valve: Slightly open	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	GY/L	Throttle position switch (Closed position)	Engine is running (Warm-up condition) <ul style="list-style-type: none"> Accelerator pedal fully released More than -40.0 kPa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a handy vacuum pump. 	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" <ul style="list-style-type: none"> Accelerator pedal fully depressed 	Approximately 0V

ON BOARD DIAGNOSIS LOGIC

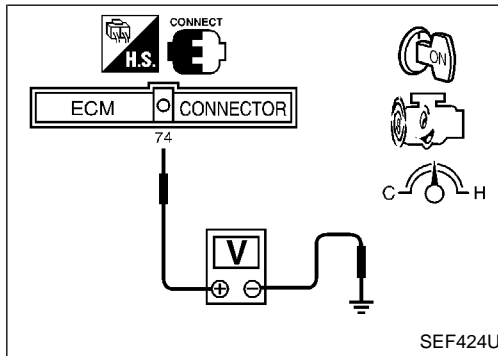
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510 0203	<ul style="list-style-type: none"> Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened. 	<ul style="list-style-type: none"> Harness or connectors (The closed throttle position switch circuit is shorted.) Closed throttle position switch Throttle position sensor

TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

DATA MONITOR	
MONITORING	NO FAIL
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRT POS SEN	XXX V

PEF329U



CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Start engine and warm it up to normal operating temperature.
- 2) Check voltage between ECM terminal 74 and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: 0 - 1V

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-347.

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II at the start of the test.
- 4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN: More than 1.8V

VHCL SPEED SE: More than 4 km/h (2 MPH)

Selector lever: Suitable position

Driving pattern: Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-347.

OR

OVERALL FUNCTION CHECK

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.



- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 74 and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

- 3) If NG, go to "DIAGNOSTIC PROCEDURE", EC-347.

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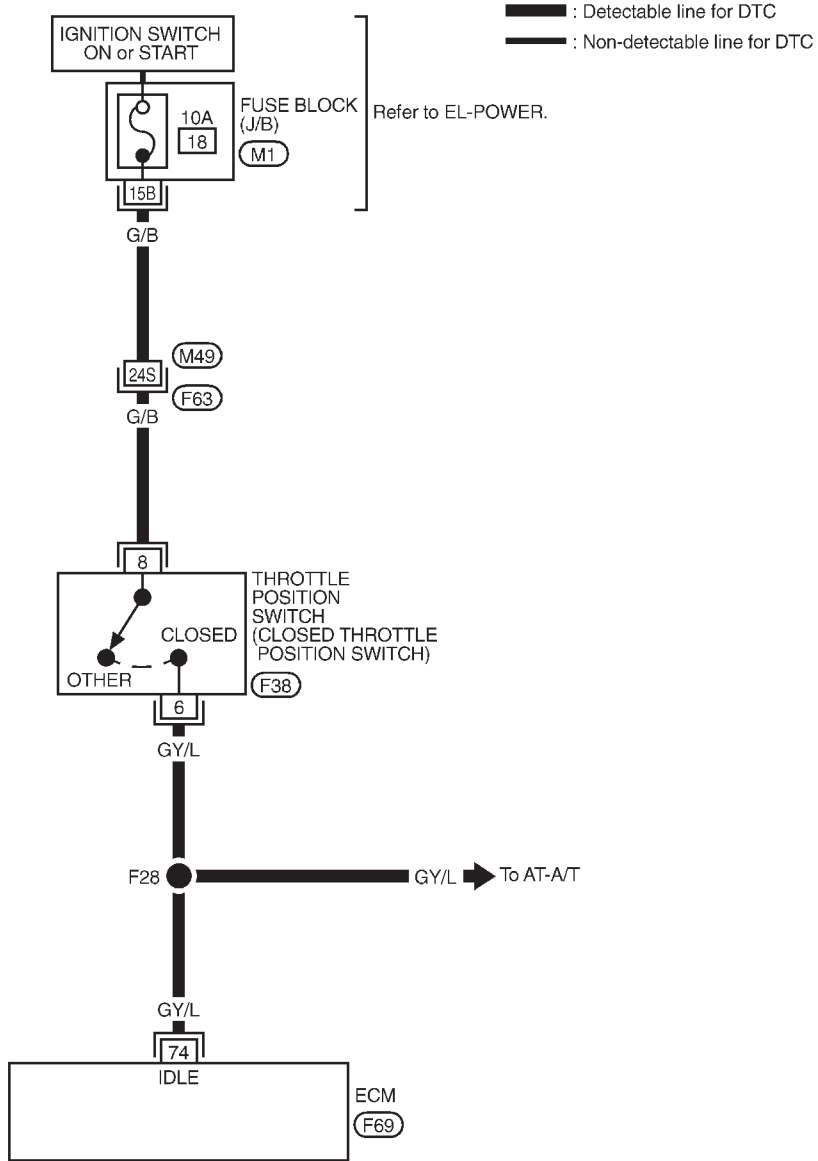
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TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd)

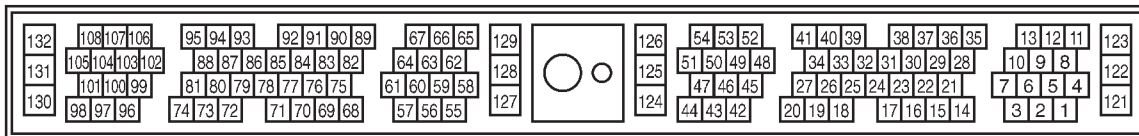
EC-TP/SW-01



Refer to last page (Foldout page).

(M49), (F63)

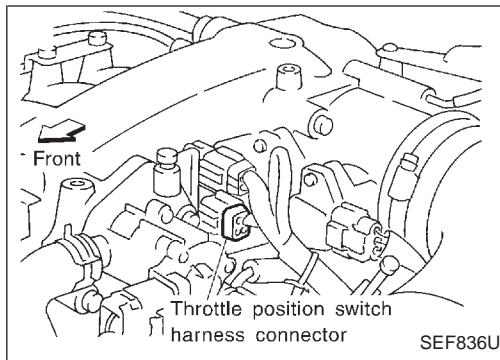
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TROUBLE DIAGNOSIS FOR DTC P0510

Closed Throttle Position Switch (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ⑧ and engine ground with CONSULT-II or tester.

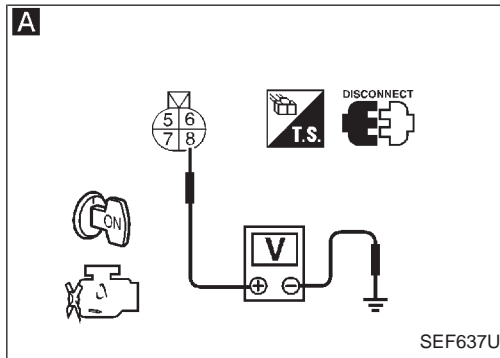
Voltage: Battery voltage

NG

Check the following.

- Harness connectors (F63), (M49)
- 10A fuse
- Harness for open or short between throttle position switch and fuse

If NG, repair harness or connectors.



B

CHECK INPUT SIGNAL CIRCUIT.

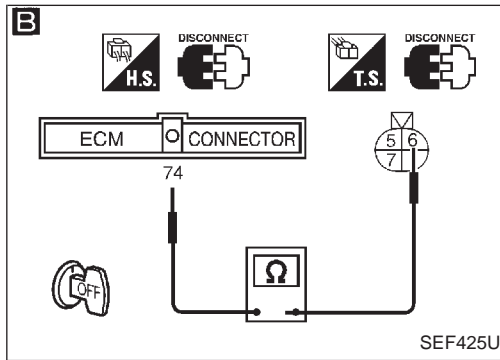
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ⑭ and terminal ⑥.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Repair harness or connectors.



OK

ADJUST THROTTLE POSITION SWITCH.
Perform BASIC INSPECTION, EC-91.

OK

CHECK COMPONENT
(Closed throttle position switch).
Refer to "COMPONENT INSPECTION" on next page.

NG

Replace throttle position switch.

OK

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG

Replace throttle position sensor.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

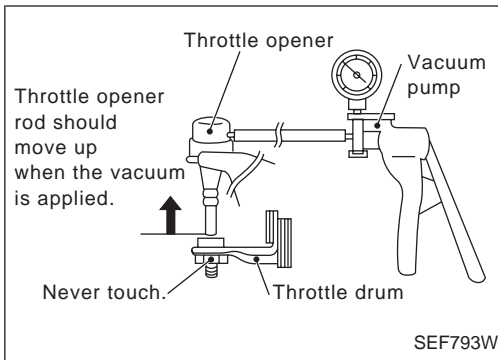
INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0510

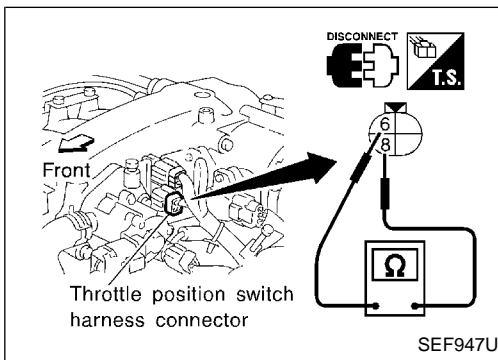
Closed Throttle Position Switch (Cont'd) COMPONENT INSPECTION

Closed throttle position switch (Built in throttle position sensor)



DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V
CLSD THL POS	OFF

SEF745X



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-II.
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-91.

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

OR



6. Disconnect closed throttle position switch harness connector.
7. Check continuity between closed throttle position switch terminals ⑥ and ⑧.

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

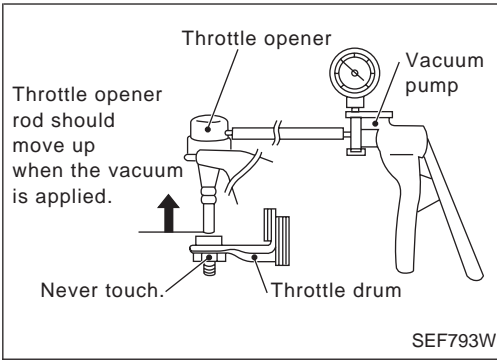
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-91.

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

TROUBLE DIAGNOSIS FOR DTC P0510

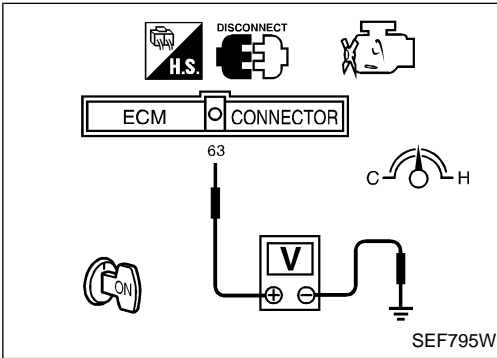
Closed Throttle Position Switch (Cont'd)

Throttle position sensor



DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V
CLSD THL POS	OFF

SEF745X



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-II.
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 - 0.85
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-91.

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

- OR
7. Check voltage between ECM terminal 63 (Throttle position sensor signal) and ground.

Voltage measurement must be made with throttle position sensor installed in vehicle.

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

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-91.

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

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A/T Communication Line (P0600) and A/T Diagnostic Communication Line (P1605)

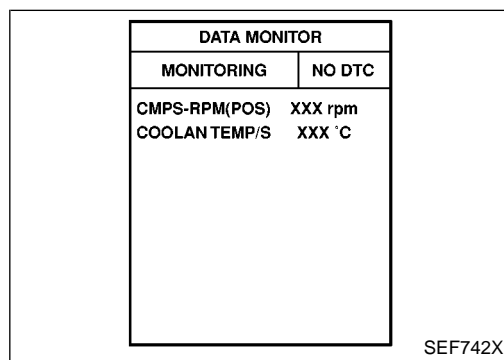
This circuit line (LAN) controls the smooth shifting up and down of A/T during the hard acceleration/deceleration. Pulse signals are exchanged between ECM and TCM (P0600).

This circuit line is also used to communicate malfunction information related to A/T (Automatic Transmission) is transferred through the line (LAN circuit) from TCM to ECM (P1605).

Be sure to erase the malfunction information such as DTC not only in TCM but also ECM after the A/T related repair.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600 0504	<ul style="list-style-type: none"> ECM receives incorrect voltage from TCM continuously. 	<ul style="list-style-type: none"> Harness or connectors (The communication line circuit between ECM and TCM is open or shorted.) TCM Dead (Weak) battery
P1605 0804	<ul style="list-style-type: none"> Signal from TCM is not sent to ECM. 	



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE

If “DIAGNOSTIC TROUBLE CODE 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.

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and let it idle for at least 2 seconds (P0600) and 40 seconds (P1605).
- 4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-352.

OR



Follow the procedure “With CONSULT-II” above.

TROUBLE DIAGNOSIS FOR DTC P0600, P1605

A/T Communication Line (P0600) and A/T Diagnostic Communication Line (P1605) (Cont'd)

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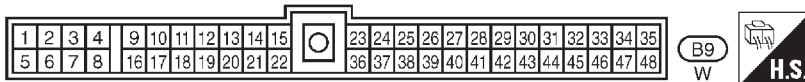
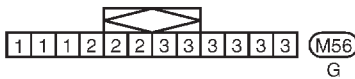
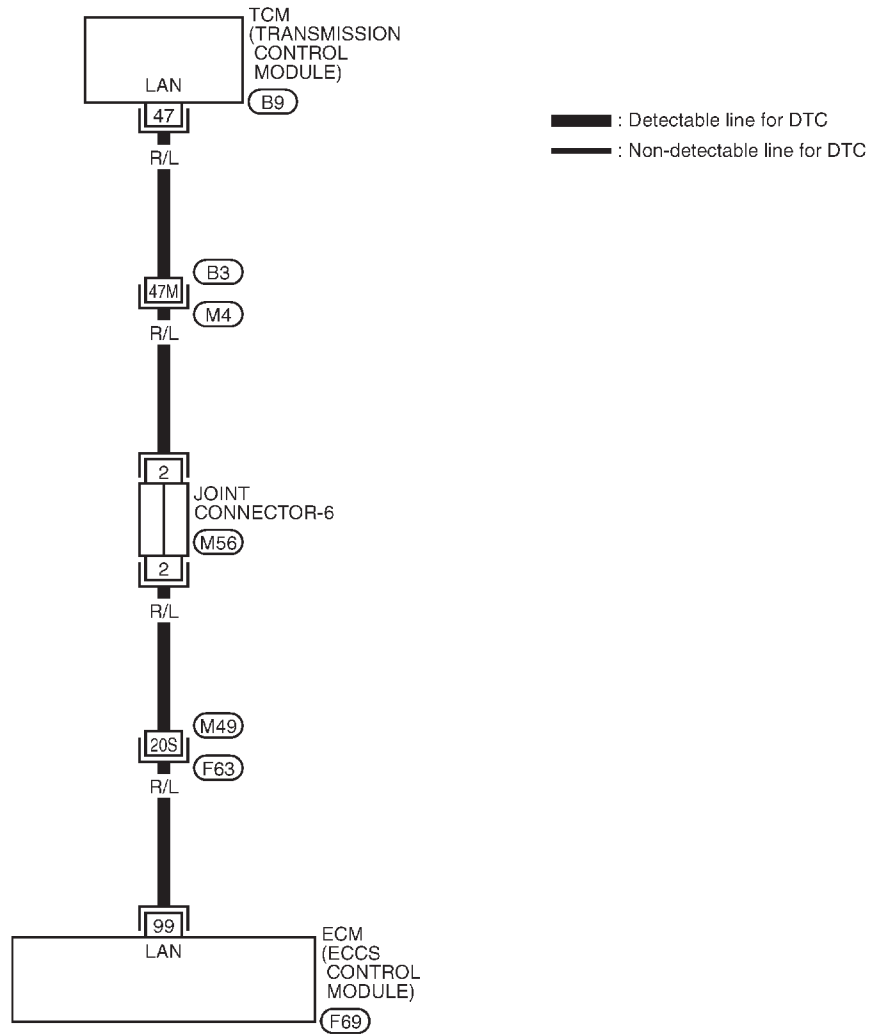
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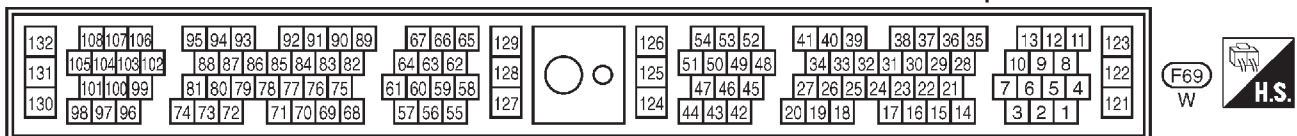
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Refer to last page (Foldout page).

M4, B3

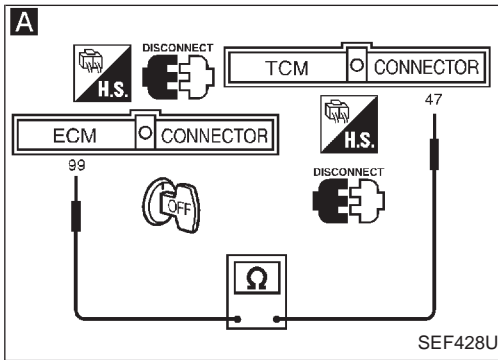
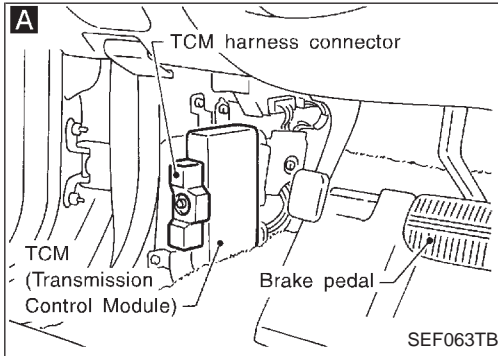
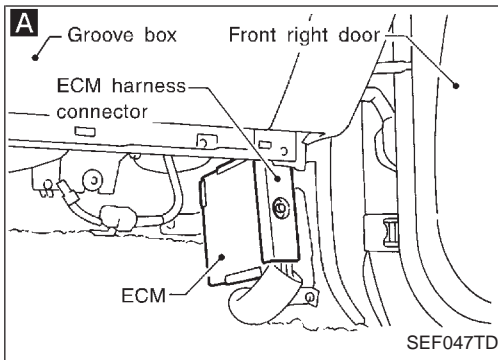
M49, F63



TROUBLE DIAGNOSIS FOR DTC P0600, P1605

A/T Communication Line (P0600) and A/T Diagnostic Communication Line (P1605) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and TCM harness connector.
3. Check harness continuity between ECM terminal 99 and terminal 47.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.

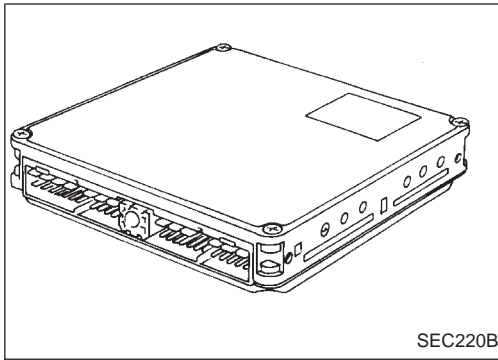
- Harness connectors (M4, B3)
- Harness connectors (F63, M49)
- Joint connector-6
- Check harness for open or short between ECM and TCM.

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK → Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0605



Engine Control Module (ECM)

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

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605 0301	<ul style="list-style-type: none"> ECM calculation function is malfunctioning. 	<ul style="list-style-type: none"> ECM

DTC No.		Detected items	Engine operating condition in fail-safe mode												
CONSULT-II GST	ECM*														
Unable to access ECM	Unable to access Diagnostic Test Mode II	ECM	<p>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 MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver. However, it is not possible to access ECM and DTC cannot be confirmed.</p> <p>Engine control with ECM fail-safe When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.</p> <table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2">ECM fail-safe operation</th> </tr> </thead> <tbody> <tr> <td>Engine speed</td> <td>Engine speed will not rise more than 3,000 rpm.</td> </tr> <tr> <td>Fuel injection</td> <td>Simultaneous multiport fuel injection system</td> </tr> <tr> <td>Ignition timing</td> <td>Ignition timing is fixed at the preset value.</td> </tr> <tr> <td>Fuel pump</td> <td>Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.</td> </tr> <tr> <td>Cooling fans</td> <td>Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.</td> </tr> </tbody> </table> <p>Replace ECM, if ECM fail-safe condition is confirmed.</p>	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 value.	Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.	Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.
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 value.														
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.														
Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.														

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

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DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V

SEF741X

Engine Control Module (ECM) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 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-355.

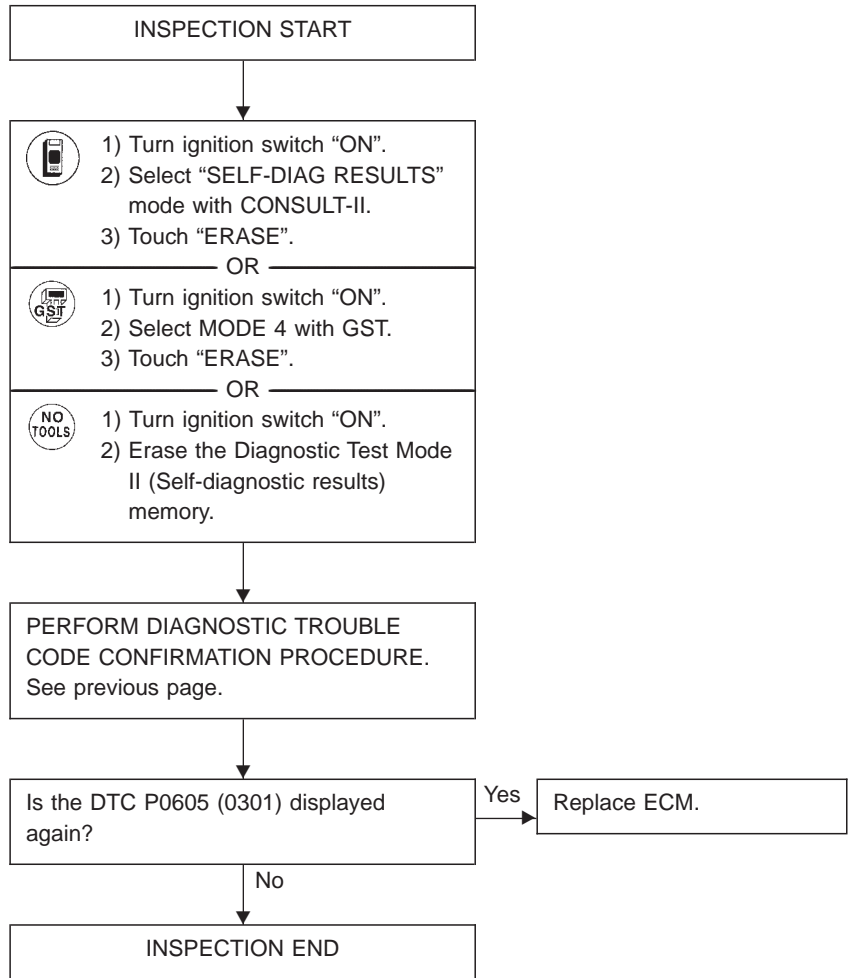
OR



Follow the procedure "With CONSULT-II" above.

TROUBLE DIAGNOSIS FOR DTC P0605

Engine Control Module (ECM) (Cont'd) DIAGNOSTIC PROCEDURE



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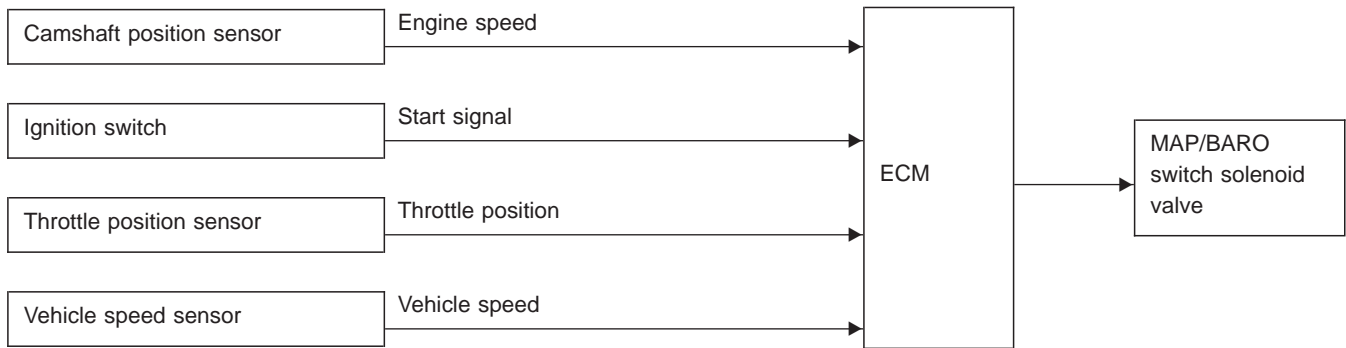
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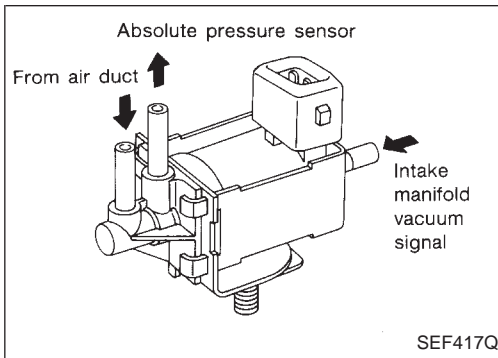
Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve

SYSTEM DESCRIPTION



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	<ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch "ON" <li style="text-align: center;">OR ● For 5 seconds after starting engine <li style="text-align: center;">OR ● More than 5 minutes after the solenoid valve shuts OFF. <li style="text-align: center;">and ● Throttle valve is shut or almost fully shut for more than 5 seconds <li style="text-align: center;">and ● Vehicle speed is less than 100 km/h (62 MPH).



COMPONENT DESCRIPTION

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-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAP/BARO SW/V	<ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch "ON" ● For 5 seconds after starting engine 	BARO
	<ul style="list-style-type: none"> ● More than 5 seconds after starting engine 	MAP

TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	W	MAP/BARO switch solenoid valve	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running └ For 5 seconds after starting engine.	Approximately 0V
			Ignition switch "ON" └ More than 5 seconds after turning ignition switch "ON" Engine is running └ More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) • Hoses (Hoses are clogged, bent, kinked, disconnected, not connected properly.) • Absolute pressure sensor • MAP/BARO switch solenoid valve

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If the 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

Procedure for malfunction A

TESTING CONDITION:

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

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and let it idle.
- 3) Wait at least 10 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-362.

OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF750X

Procedure for malfunction B

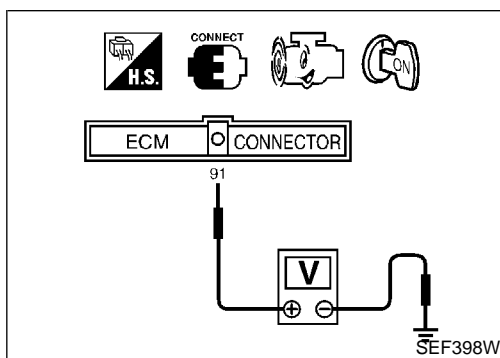
- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
- 4) Make sure that "FUEL/T TEMP SEN" is more than 0°C (32°F).
- 5) Start engine and let it idle for at least 10 seconds.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-303.

OR



- 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 ⑨1 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-303.

OR



- 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 ⑨1 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.

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

8) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-303.

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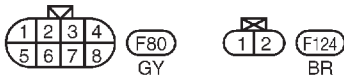
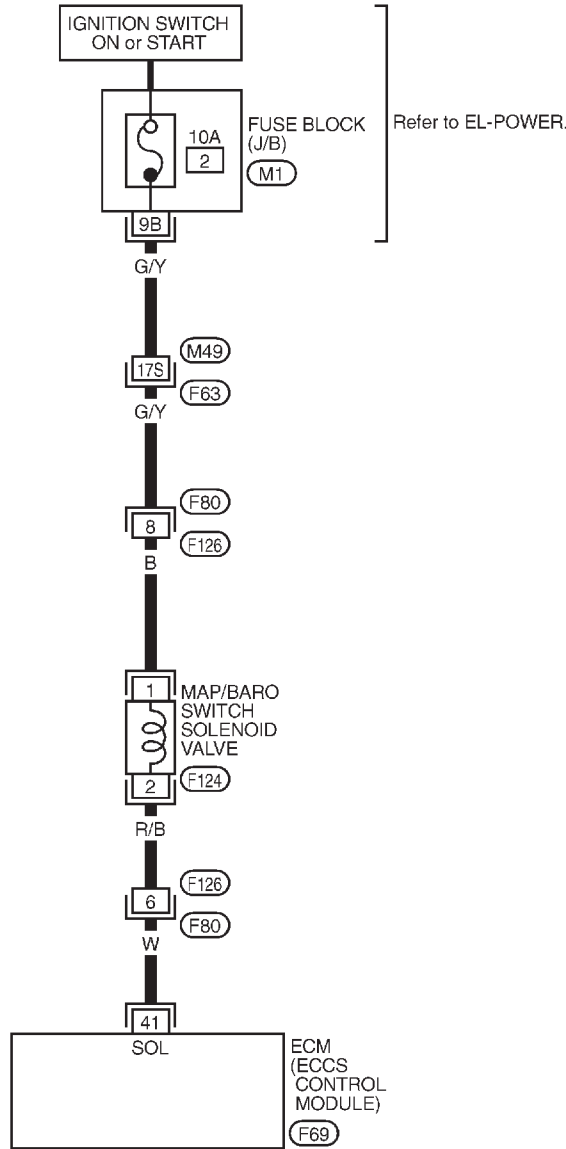
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TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

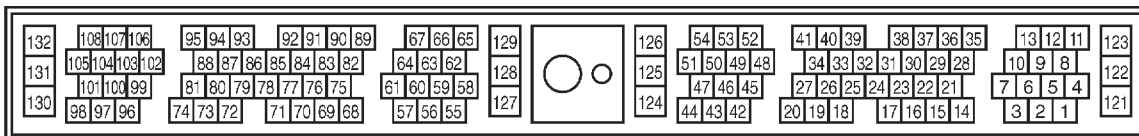
EC-SW/V-01

: Detectable line for DTC
 : Non-detectable line for DTC



Refer to last page (Foldout page).

(M49), (F63)
(M1)



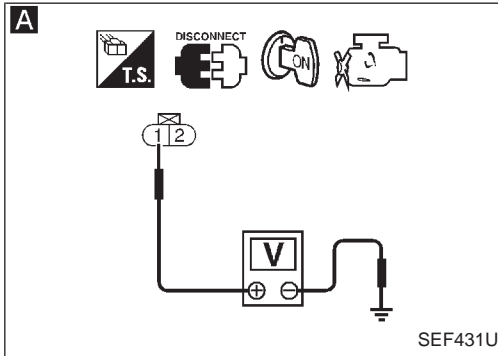
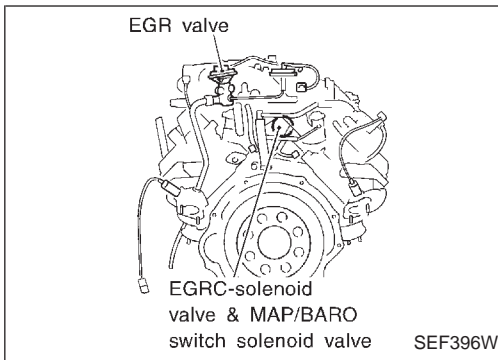
TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE

If the trouble is duplicated after "Procedure for malfunction A", perform "Procedure A" below. If the trouble is detected after "Procedure for malfunction B", perform "Procedure B" on the next page.

Procedure A



INSPECTION START

A

CHECK POWER SUPPLY.

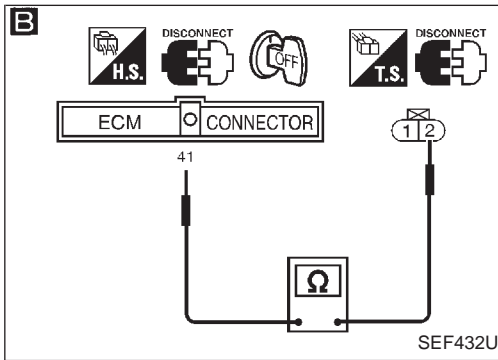
1. Turn ignition switch "OFF".
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ① and engine ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F121, F21, F63, M49)
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

If NG, repair harness or connectors.



B

CHECK OUTPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ④ and terminal ② with CONSULT-II or tester.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F121, F21)
- Harness for open or short between MAP/BARO switch solenoid valve and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

CHECK COMPONENT (MAP/BARO switch solenoid valve). Refer to "COMPONENT INSPECTION" on next page.

NG → Replace MAP/BARO switch solenoid valve.

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

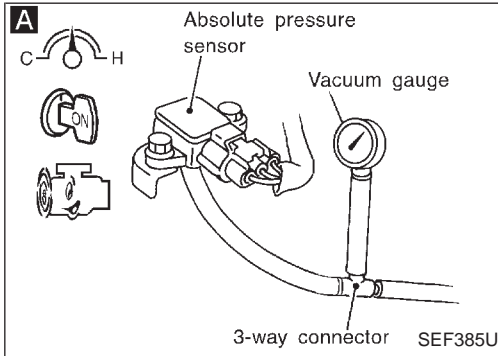
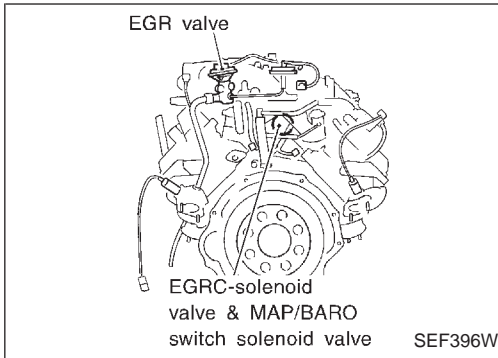
INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

Procedure B



A

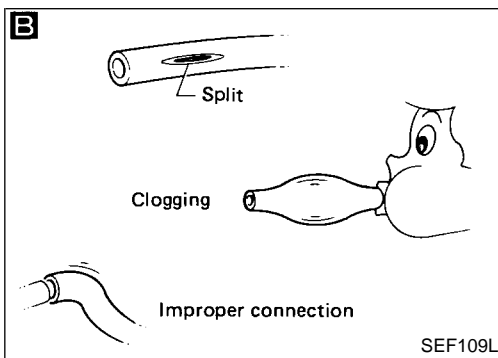
ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

SEF767X

A

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF768X



INSPECTION START

A

CHECK VACUUM SOURCE AND CIRCUIT TO MAP/BARO SWITCH SOLENOID VALVE.

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Connect the MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has a vacuum gauge.
4. Turn ignition switch "ON".
5. Select "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
6. Start engine and let it idle.
7. Touch "MAP" and "BARO" alternately.

MAP/BARO SW/S	Vacuum
BARO	Should not exist.
MAP	Should exist.

OR

4. Turn ignition switch "ON".
5. Check vacuum gauge within 5 seconds after turning ignition switch "ON".

Vacuum should not exist.

6. Start engine and let it idle.
7. Check vacuum gauge.

Vacuum should exist.

OK

CHECK COMPONENT
(Absolute pressure sensor).

1. Check for disconnection of vacuum hose connected to the sensor.
2. Disconnect sensor's connector and check sensor harness connector for water.

Water should not exist. Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P0105", EC-139.

NG

Repair (disconnection) or replace absolute pressure sensor or harness connectors.

Go to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" in EC-117.

B

CHECK HOSE.

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

NG

Clean, repair or reconnect the hose.
If NG, check vacuum port for clogging.

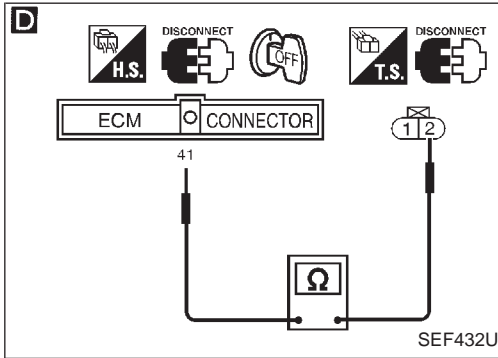
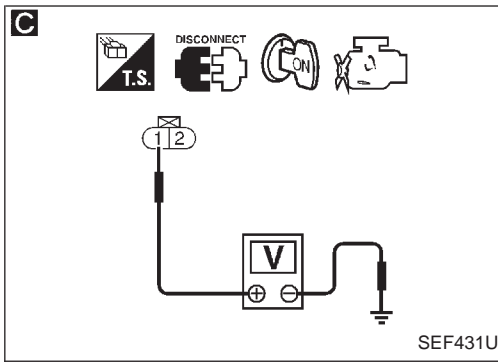
OK

CHECK INTAKE SYSTEM.
Check the intake system for air leaks.

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)



C

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 ① and engine ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F121, F21, F63, M49)
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

If NG, repair harness or connectors.

OK →

D

CHECK OUTPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ④ and terminal ② with CONSULT-II or tester.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F121, F21)
- Harness for open or short between MAP/BARO switch solenoid valve and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK →

CHECK COMPONENT (Absolute pressure sensor).

1. Check for disconnection of vacuum hose connected to the sensor.
2. Disconnect sensor's connector and check sensor harness connectors for water.

Water should not exist.

Refer to "COMPONENT INSPECTION" of "TROUBLE DIAGNOSIS FOR DTC P0105", EC-132.

NG → Repair (disconnection) or replace harness connectors or replace absolute pressure sensor.

OK →

CHECK COMPONENT (MAP/BARO switch solenoid valve).

Refer to "COMPONENT INSPECTION" on next page.

NG → Replace MAP/BARO switch solenoid valve.

OK →

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P1105

Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Switch Solenoid Valve (Cont'd)

COMPONENT INSPECTION

MAP/BARO switch solenoid valve

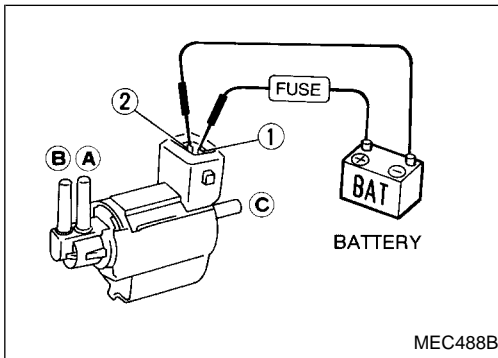
1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
 - Condition: At idle under no-load
 - CONSULT-II display

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

SEF767X

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF768X



MAP/BARO SW/V	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	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

4. If NG, check solenoid valve as shown below.

OR

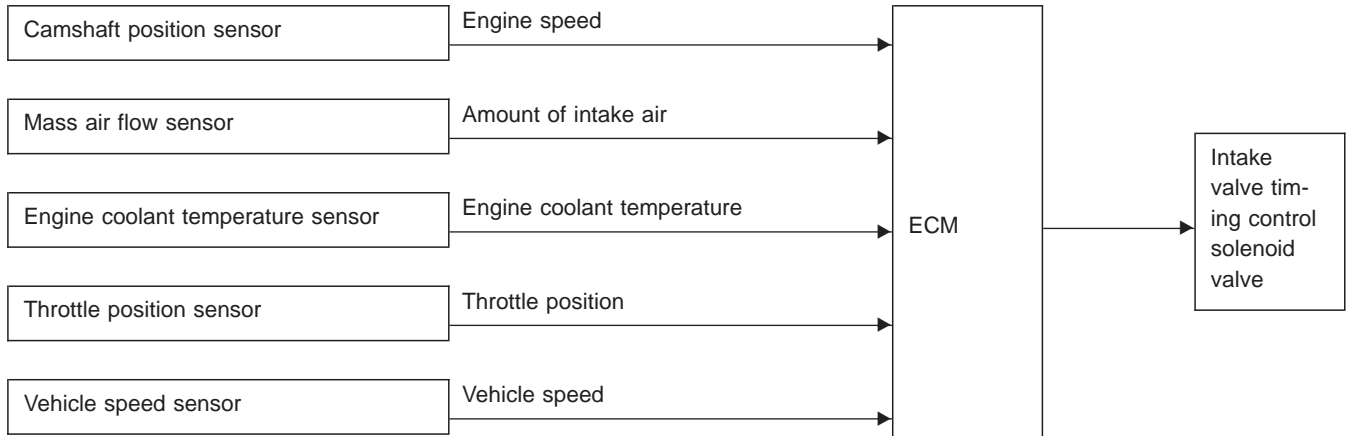
1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

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. Check the time required for the solenoid valve to switch. It should be less than 1 second.
4. If NG, replace solenoid valve.
5. If OK, check "Absolute pressure sensor". Refer to "COMPONENT INSPECTION", EC-139.

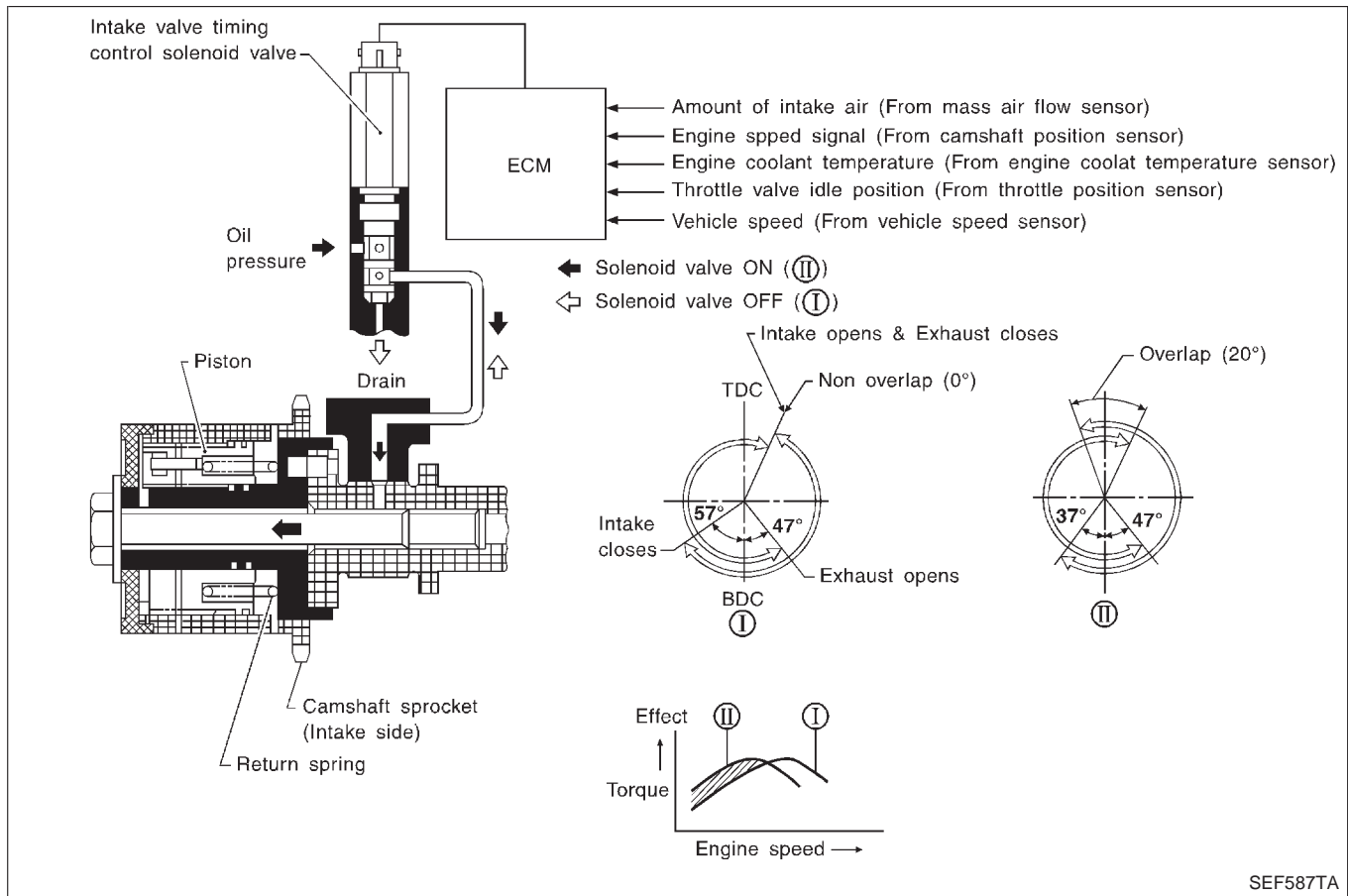
Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank)

SYSTEM DESCRIPTION



The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing. The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control.

When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced.



SEF587TA

TROUBLE DIAGNOSIS FOR DTC P1110 (-B1), P1135 (-B2)

Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank) (Cont'd)

OPERATION

Engine operating condition	Intake valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine valve timing
<ul style="list-style-type: none"> Engine coolant temperature is between 15°C (59°F) to 110°C (230°F) and engine speed is between 1,100 rpm and 4,600 rpm. During high load condition Vehicle speed is more than 4 km/h (2 MPH). 	ON	Advance	Increased	Ⓜ
Those other than above	OFF	Normal	Normal	Ⓛ

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL-B1 INT/V SOL-B2	<ul style="list-style-type: none"> Engine is in warm up condition. Engine speed is more than 2,000 rpm. Quickly depressed accelerator pedal Vehicle speed is more than 4 km/h (2 MPH). 	OFF → ON (Using "INT/V TIM-B1 (-B2)" in "DATA MONITOR", the difference of degree between "OFF" and "ON" is approximately 20 deg.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
24 (RH)	BR/Y	Intake valve timing control solenoid valves	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Intake valve timing control solenoid is operating. 	Approximately 0V
25 (LH)	BR		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Intake valve timing control solenoid is not operating. 	Battery voltage
70 (RH)	R/L	Intake valve timing control position sensors	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Idle speed 	Approximately 0V
71 (LH)	L/W		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Engine speed is 2,000 rpm. 	Approximately 0V

TROUBLE DIAGNOSIS FOR DTC P1110 (-B1), P1135 (-B2)

Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1110 0805 (Left bank)	Comparing the intake valve timing position when the intake valve timing solenoid is ON with that when the solenoid is OFF, the difference does not exceed a certain limit.	<ul style="list-style-type: none"> • Harness or connectors (The left bank intake valve timing control position sensor circuit is open.) • Intake valve timing control position sensor • Accumulation of debris to the signal pick-up portion of the camshaft
P1135 1301 (Right bank)		

GI
MA
EM

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V SOL-B1	OFF
INT/V TIM-B1	XXX deg

SEF821X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive at safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Warm up engine to normal operating temperature [more than 82°C (180°F)].
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 4) Restart engine and wait at least 30 seconds.
- 5) Turn TCS switch "OFF".
- 6) Shift A/T selector lever to "2nd" position.
- 7) Gradually raise engine speed and keep it between 1,100 rpm and 1,500 rpm for at least 20 seconds. (Test is completed when "INT/V SOL - B1" in "DATA MONITOR" with CONSULT-II remains "OFF". If indication is "ON", repeat 7.
- 8) Quickly raise engine speed to more than 2,500 rpm and keep it there for at least 6 seconds. (Test is completed when "INT/V SOL - B1" in "DATA MONITOR" with CONSULT-II remains "ON". If indication is "OFF", repeat 8.
- 9) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-371.

LC
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OR



- 1) Warm up engine to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Restart engine and wait at least 30 second.
- 4) Turn TCS switch "OFF".
- 5) Shift A/T selector lever to "2nd" positions.
- 6) Gradually raise engine speed and keep it between 1,000 rpm and 1,500 rpm for at least 12 seconds.
- 7) Quickly raise engine speed to more than 2,500 rpm and keep it there for at least 6 seconds.
- 8) Select "MODE 7" with GST.
- 9) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-371.

BT

HA

EL

IDX

OR



- 1) Warm up engine to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Restart engine and wait at least 30 seconds.
- 4) Turn TCS switch "OFF".
- 5) Shift A/T selector lever to "D" position.

**Intake Valve Timing Control (P1110: Left bank),
(P1135: Right bank) (Cont'd)**

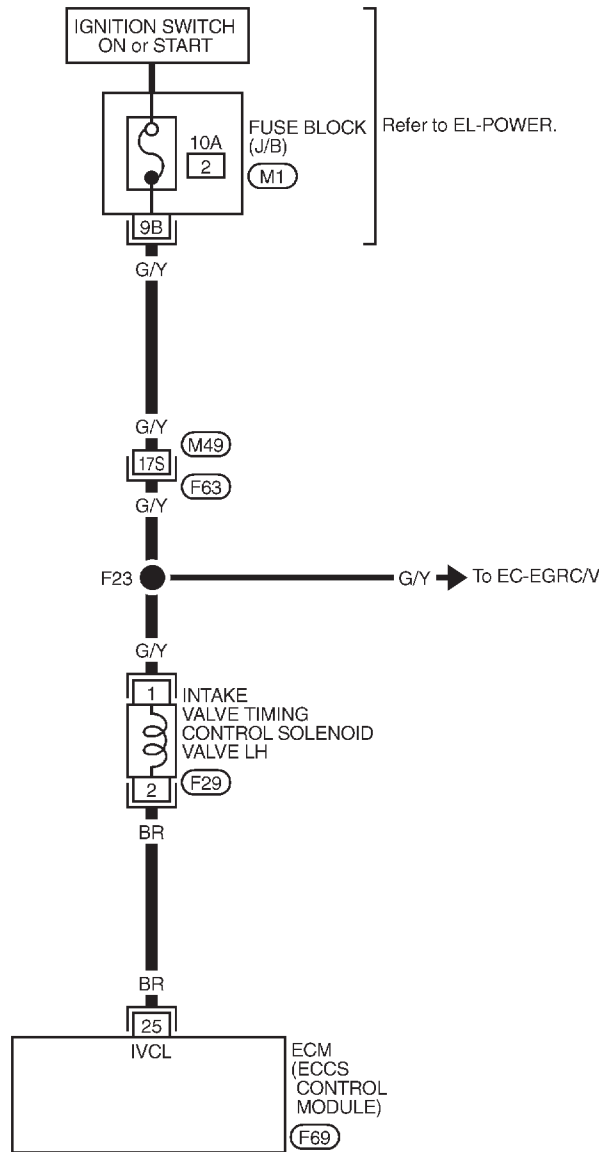
- 6) Gradually raise engine speed and keep it between 1,000 rpm and 1,500 rpm for at least 12 seconds.
- 7) Quickly raise engine speed to more than 2,500 rpm and keep it there for at least 6 seconds.
- 8) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 9) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 10) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-371.

TROUBLE DIAGNOSIS FOR DTC P1110 (-B1), P1135 (-B2)

Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank) (Cont'd)

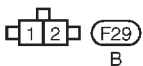
LEFT BANK

EC-IVC-L-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

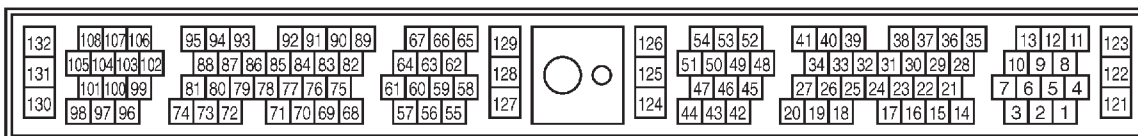
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Refer to last page (Foldout page).

(M49), (F63)

(M1)

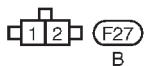
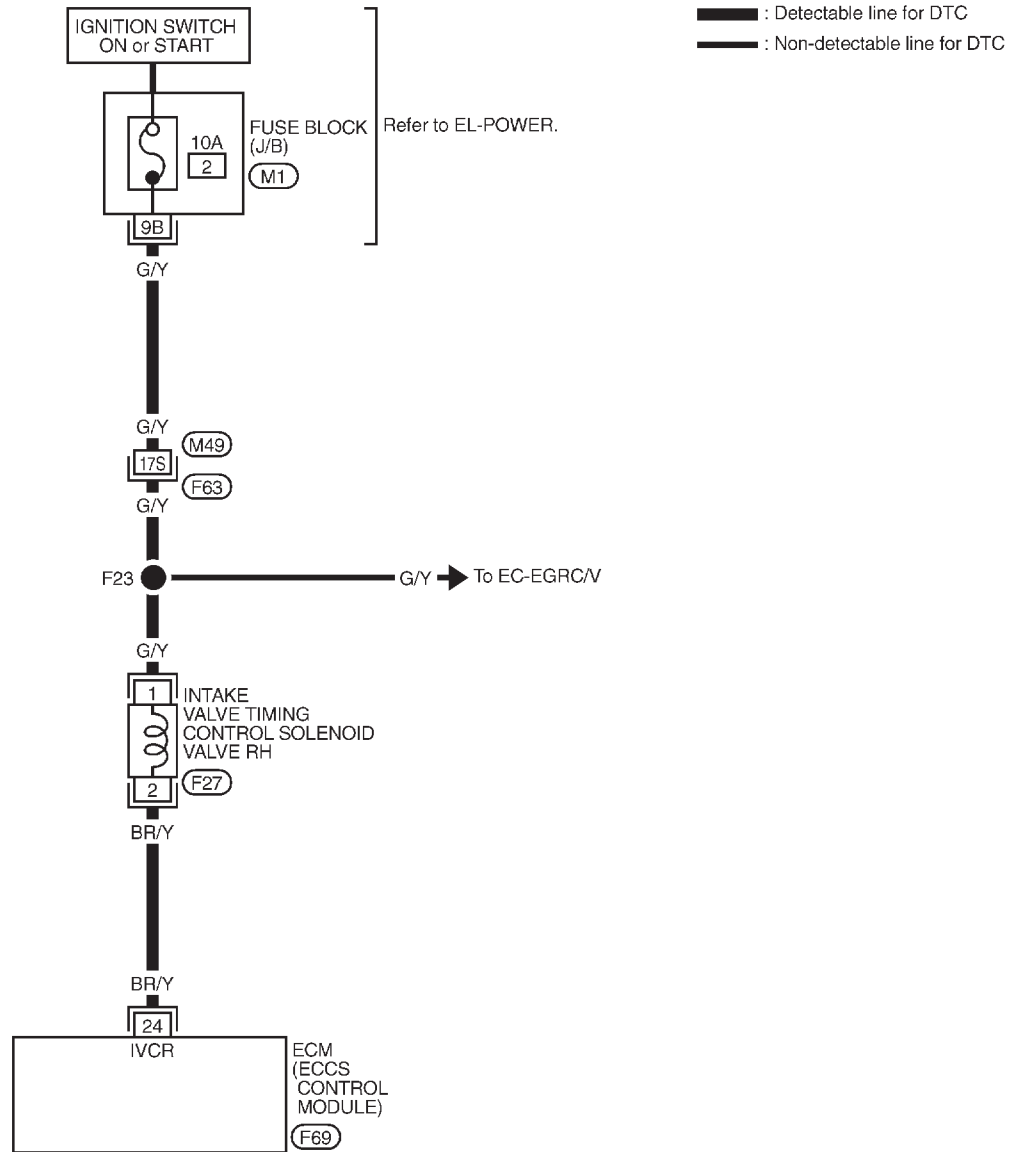


TROUBLE DIAGNOSIS FOR DTC P1110 (-B1), P1135 (-B2)

Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank) (Cont'd)

RIGHT BANK

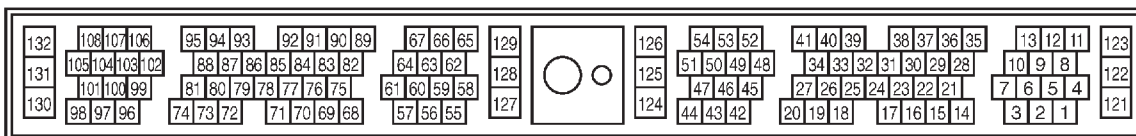
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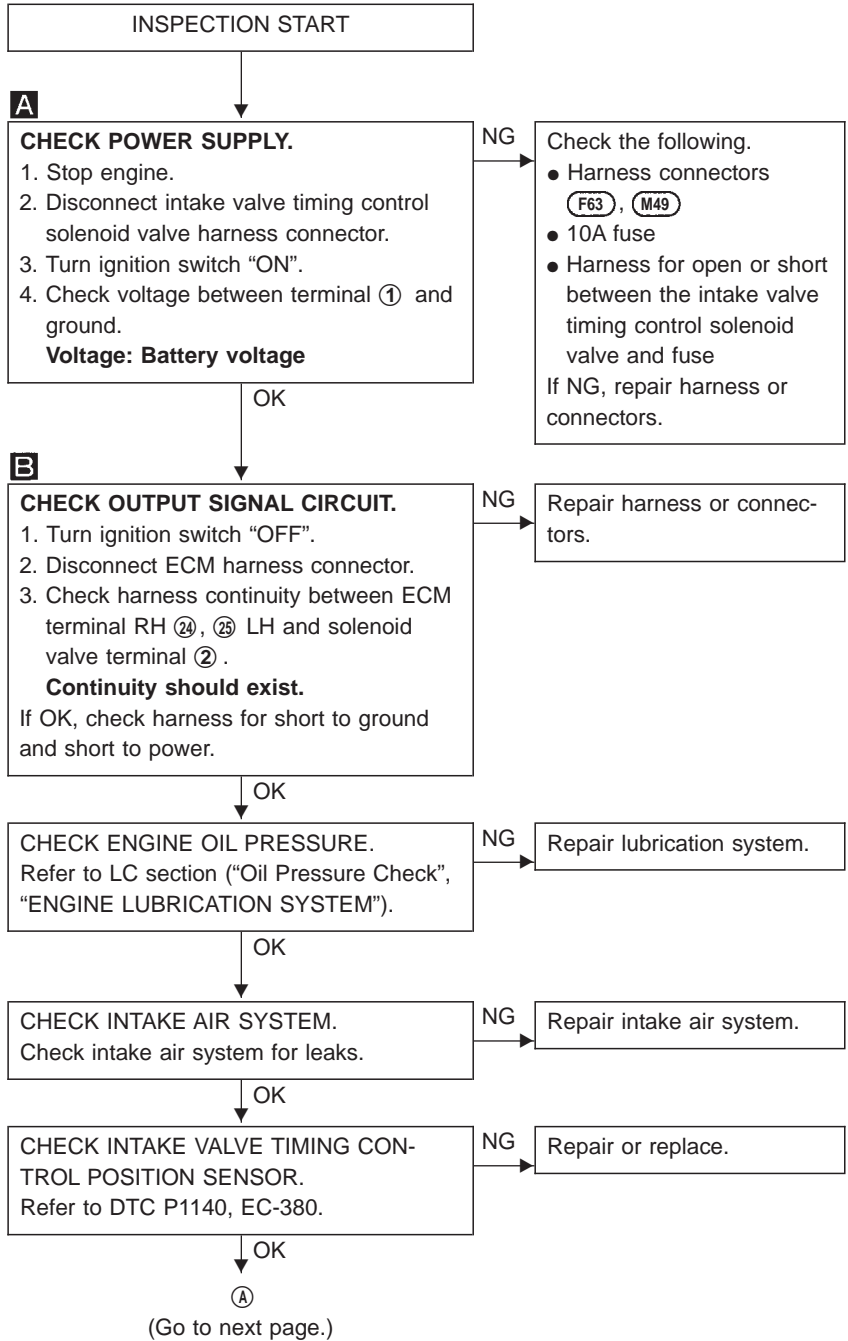
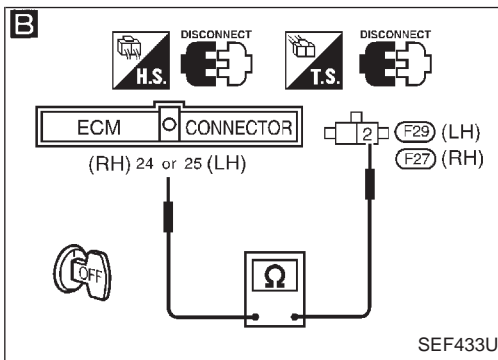
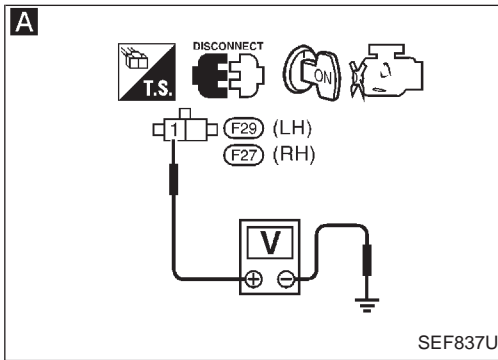
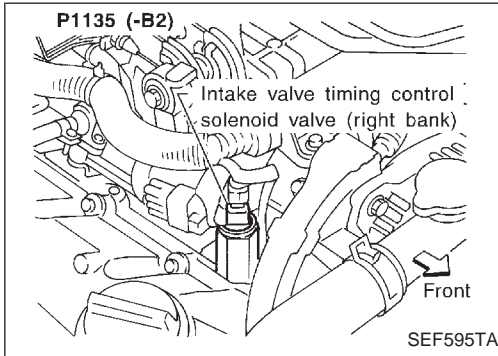
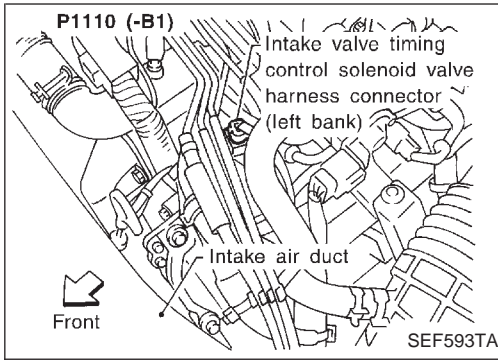
(M1)



TROUBLE DIAGNOSIS FOR DTC P1110 (-B1), P1135 (-B2)

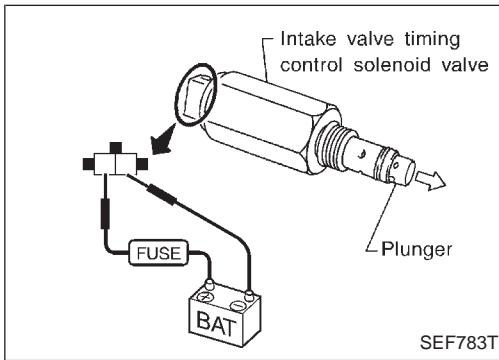
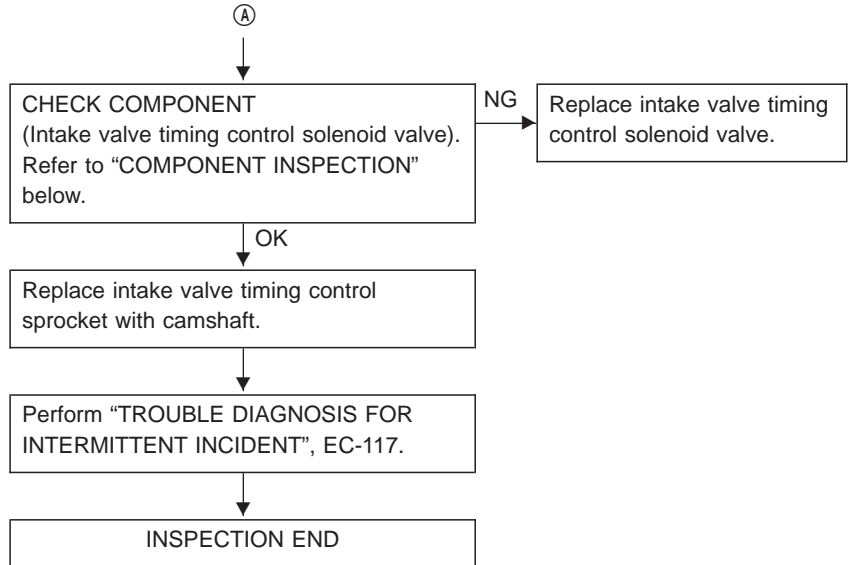
Intake Valve Timing Control (P1110: Left bank), (P1135: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE



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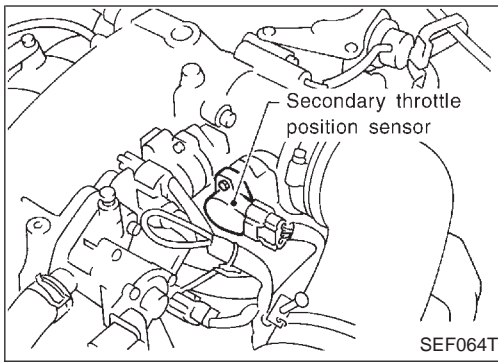
**Intake Valve Timing Control (P1110: Left bank),
(P1135: Right bank) (Cont'd)**



COMPONENT INSPECTION

Intake valve timing control solenoid valve

1. Check oil passage visually for any metal debris.
2. Supply intake valve timing control solenoid valve terminals with battery voltage.
3. Make sure that inside plunger protrudes.
If NG, replace intake valve timing control solenoid valve.

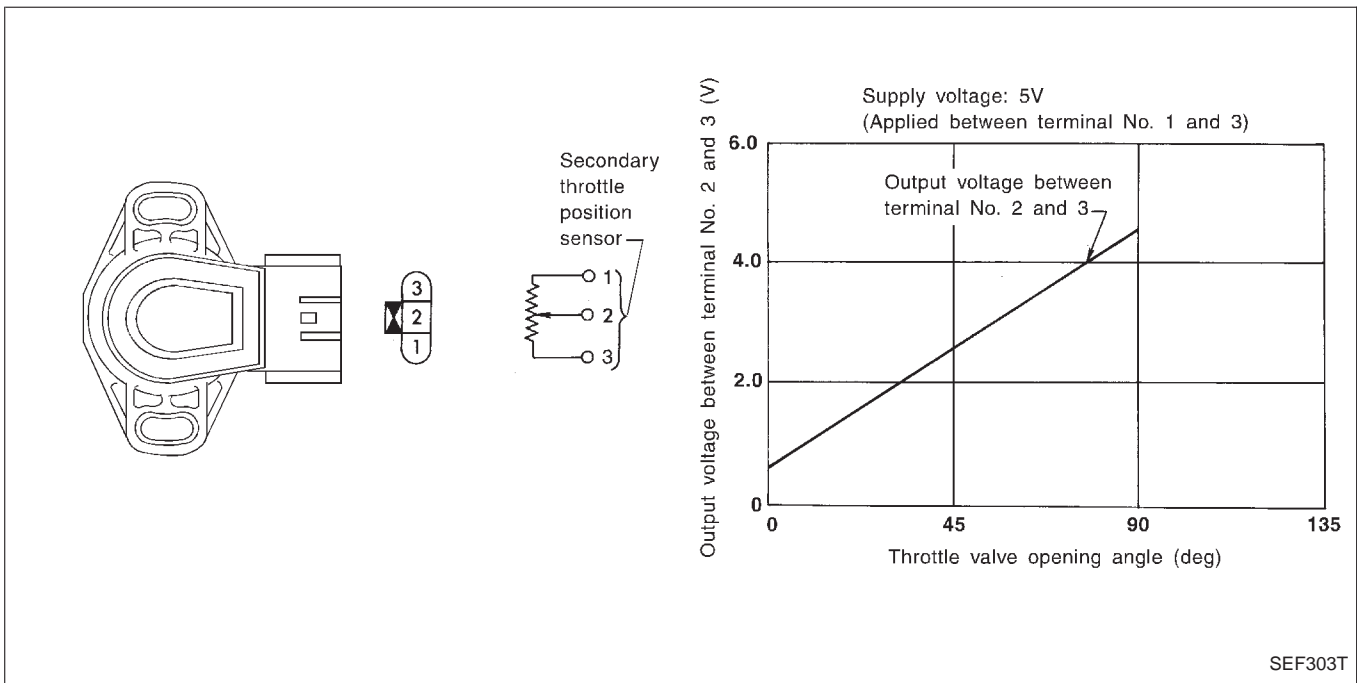


Secondary Throttle Position Sensor (STPS)

COMPONENT DESCRIPTION

The secondary throttle position sensor responds to the movement of the throttle motor which is controlled by the TAC module. This sensor is a kind of potentiometer which transforms the secondary throttle position into output voltage, and emits the voltage signal to the TAC module. In addition, the sensor detects the opening and closing speed and position of the secondary throttle valve and feeds the voltage signal to the TAC module. Another case is when the secondary throttle valve opening becomes smaller than the ordinary throttle valve opening due to TCS operation. In this case, the signal from the secondary throttle valve is used for engine control. This replaces the signal from the ordinary throttle position sensor. The signal of the secondary throttle valve first enters the TAC module, from where it is sent to the ECM.

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CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL/P SEN2	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) 	Throttle valve: fully closed
		Throttle valve: fully open

RS
BT
HA

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
66	L	Secondary throttle position sensor	Ignition switch "ON" └ Approximately 3 seconds after ignition switch "ON" and thereafter	Approximately 3.4V
			Ignition switch "ON" └ Disconnect throttle motor harness connector. └ Fully close secondary throttle valve by hand.	Approximately 0.4V

EL
IDX

TROUBLE DIAGNOSIS FOR DTC P1120

Secondary Throttle Position Sensor (STPS) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1120 0406	A) An excessively low or high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.)
	B) Rationally incorrect voltage is sent to ECM compared with the signals from mass air flow sensor, camshaft position sensor and IACV-AAC valve.	<ul style="list-style-type: none"> ● Harness or connectors ● Secondary throttle position sensor ● TCM

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If the 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C

SEF742X

Procedure for malfunction A

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and wait at least 5 seconds.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-377.

OR



Follow the procedure "With CONSULT-II" above.

TROUBLE DIAGNOSIS FOR DTC P1120

Secondary Throttle Position Sensor (STPS) (Cont'd)

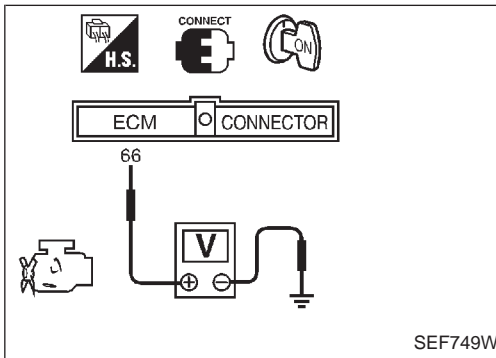
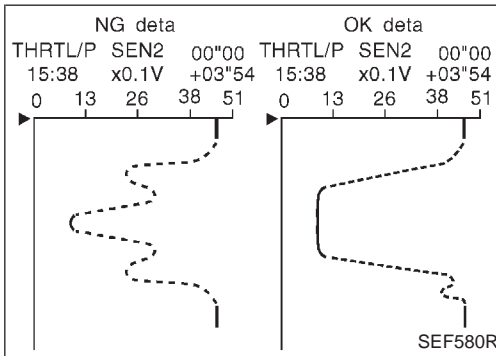
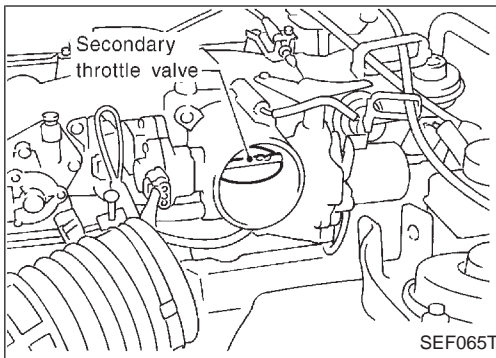
Procedure for malfunction B.

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the secondary throttle position sensor circuit. During this check, a DTC might not be confirmed.

WARNING:

Before touching the secondary throttle valve, be sure to disconnect the throttle motor harness connector. Failure to do so may cause injury due to accidental actuation of the valve.



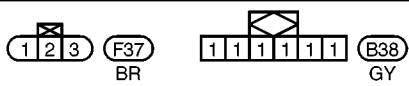
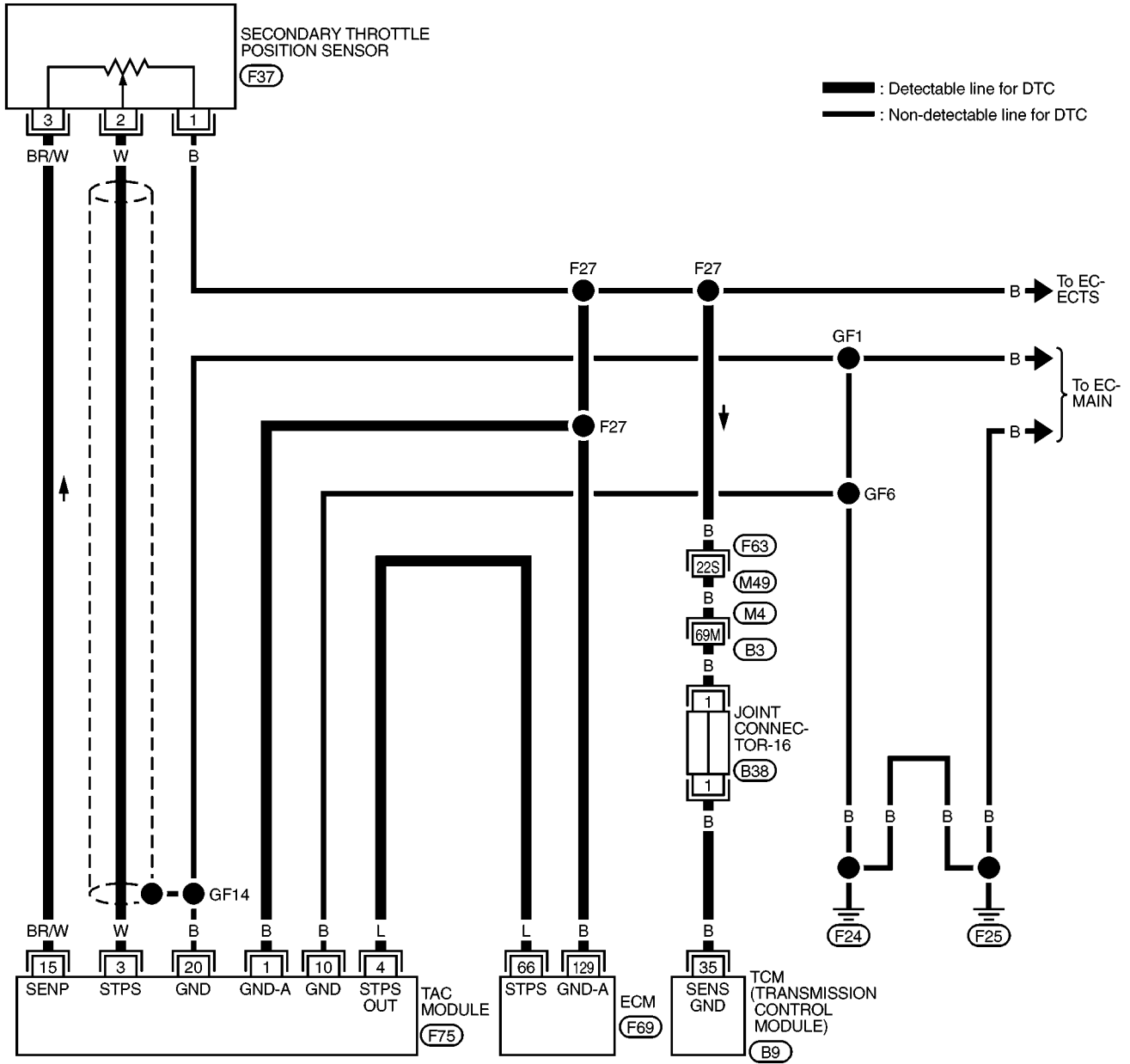
- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch "OFF" and disconnect throttle motor harness connector.
 - 3) Remove intake air duct.
 - 4) Turn ignition switch "ON".
 - 5) Select "MANUAL TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
 - 6) Select "THRTL/P SEN2" in "DATA MONITOR" mode with CONSULT-II.
 - 7) Press RECORD on CONSULT-II SCREEN at the same time close the secondary throttle valve by hand.
 - 8) Print out the recorded data and check the following:
 - The voltage when secondary throttle valve is closed by hand is approximately 0.60 - 1.15V.
 - The voltage decrease is linear in response to secondary throttle valve closing.
 - The voltage when secondary throttle valve is fully opened is approximately 4.3 - 4.7V.
 - 9) If NG, go to "DIAGNOSTIC PROCEDURE", EC-377.
- OR
- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch "OFF" and disconnect throttle motor harness connector.
 - 3) Remove intake air duct.
 - 4) Turn ignition switch "ON".
 - 5) Check the voltage between ECM terminal 66 and ground, then check the following:
 - The voltage when secondary throttle valve is closed by hand is approximately 0.4 - 0.86V.
 - The voltage decrease is linear in response to secondary throttle valve closing.
 - The voltage when secondary throttle valve is fully opened is approximately 3.3 - 3.5V.
 - 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-377.

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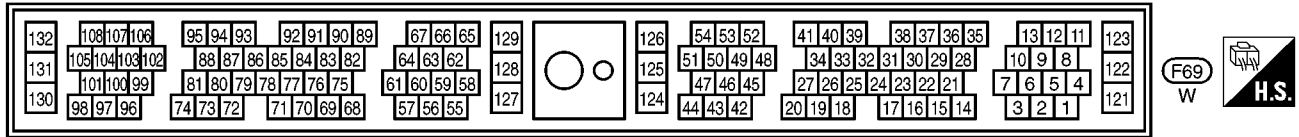
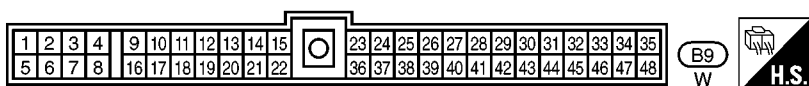
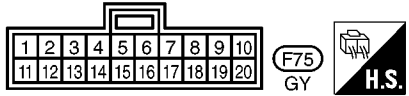
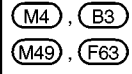
TROUBLE DIAGNOSIS FOR DTC P1120

Secondary Throttle Position Sensor (STPS) (Cont'd)

EC-STPS-01



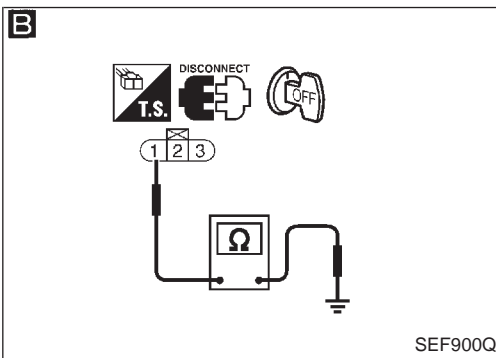
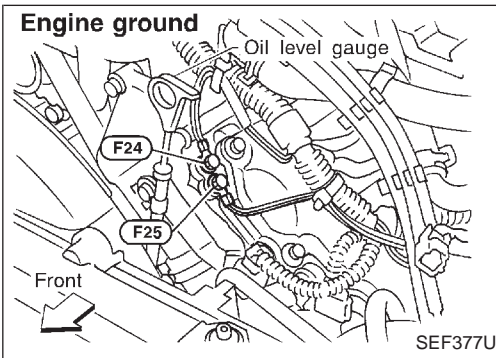
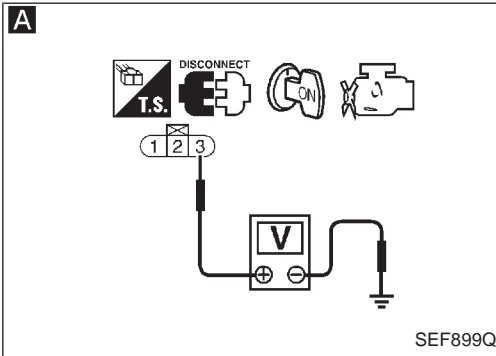
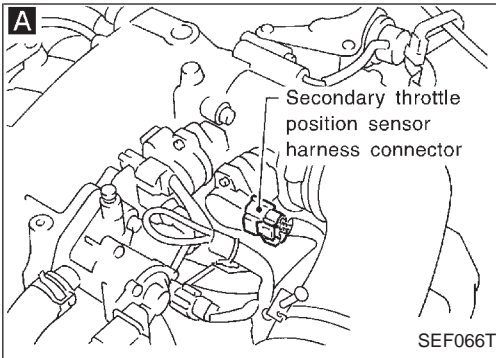
Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P1120

Secondary Throttle Position Sensor (STPS) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect secondary throttle position sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground with CONSULT-II or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

B
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten ground screw.
3. Check harness continuity between terminal ① and engine ground.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F63, M49)
- Harness connectors (M4, B3)
- Harness connectors (F62, F61)
- Joint connector-16
- Harness for open or short between sensor and throttle actuator control (TAC) module
- Harness for open or short between secondary throttle position sensor and ECM
- Harness for open or short between secondary throttle position sensor and TCM (Transmission Control Module)

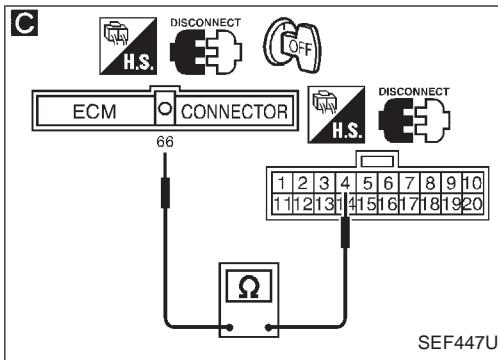
If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK → (Go to next page.)

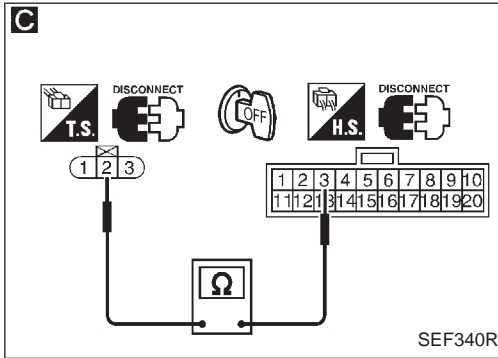
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TROUBLE DIAGNOSIS FOR DTC P1120

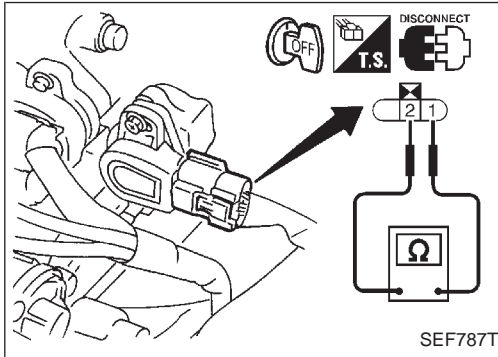
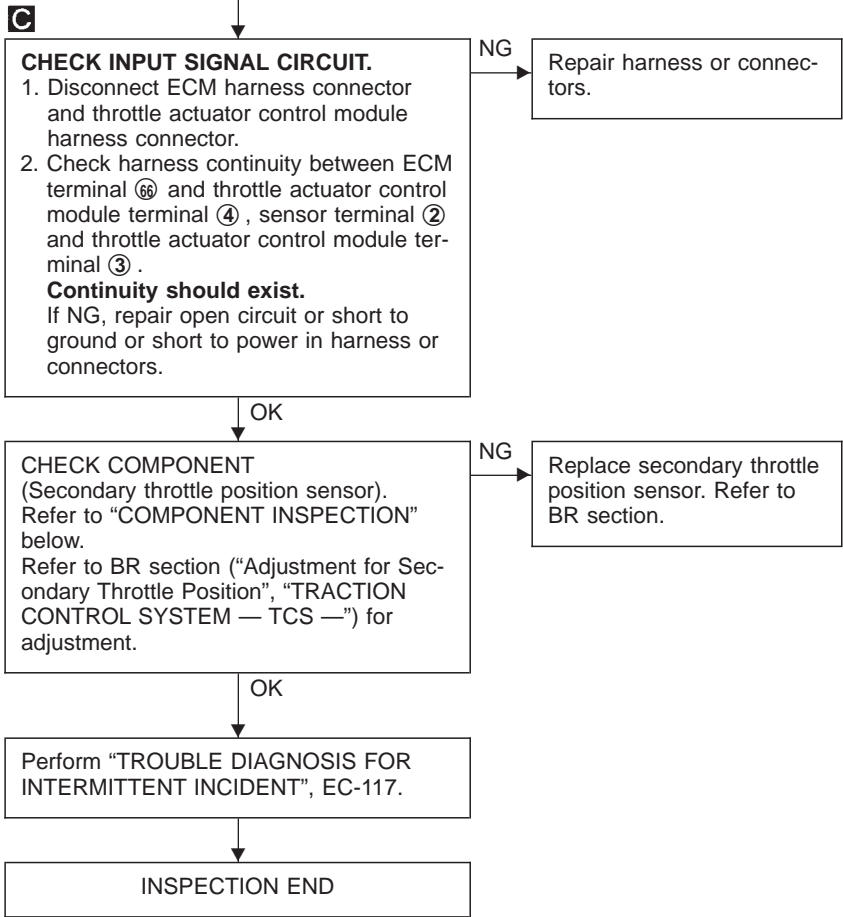
Secondary Throttle Position Sensor (STPS) (Cont'd)



SEF447U



SEF340R



SEF787T

COMPONENT INSPECTION

Secondary throttle position sensor

WARNING:

Before touching the secondary throttle valve, be sure to disconnect the throttle motor harness connector. Failure to do so may cause injury due to accidental actuation of the valve.

1. Turn ignition switch "OFF".
2. Disconnect secondary throttle position sensor harness connector.
3. Disconnect throttle motor harness connector.
4. Remove intake air duct.
5. Make sure that resistance between terminals 2 and 1 changes when opening secondary throttle valve manually.

Throttle valve conditions	Resistance at 25°C (77°F)
Completely closed	Approximately 0.6 kΩ
Partially open	0.6 - 4.0 kΩ
Completely open	Approximately 5 kΩ

Tandem Throttle Position Sensor

This diagnosis is for tandem throttles (main throttle and secondary throttle). The quantity of intake air is determined by these two throttle valves. A rationality check is then carried out by ECM after monitoring the signals of these two throttle position sensors.

GI

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1125 1502	<ul style="list-style-type: none"> Rationally incorrect voltage is entered to ECM compared with the signals from mass air flow sensor, camshaft position sensor and IACV-AAC valve. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuits are open or shorted.) Throttle position sensor or secondary throttle position sensor Throttle actuator control (TAC) module

MA

EM

LC

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

EC

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

FE

AT



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch “ON”.
- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine and run it for 15 seconds.

PD

FA

OR



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Start engine and run it for 15 seconds.
- Select “MODE 7” with GST.

RA

BR

OR



- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Start engine and run it for 15 seconds.
- Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
- Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.

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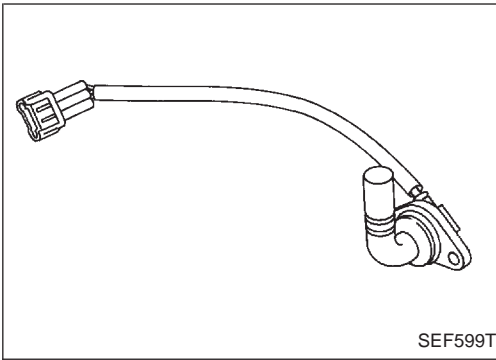
DIAGNOSTIC PROCEDURE

HA

Refer to TROUBLE DIAGNOSIS FOR DTC P0120, EC-150 OR Refer to TROUBLE DIAGNOSIS FOR DTC P1120, EC-373.

EL

IDX



Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank)

COMPONENT DESCRIPTION

The intake valve timing control position sensor is located rearmost of the left-bank cylinder head. This sensor detects a signal (intake valve position) generated by the cutout portion of camshaft and sends it to the ECM. This sensor is not used to control the engine system. It is used only for the on board diagnosis of intake valve timing control.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM-B1 INT/V TIM-B2	<ul style="list-style-type: none"> Engine is running. 	Advanced angle (degree) of the intake camshaft should be displayed.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
70 (RH)	R/L	Intake valve timing control position sensors	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Idle speed 	Approximately 0V <p style="text-align: right;">SEF551T</p>
71 (LH)	L/W		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Engine speed is 2,000 rpm. 	Approximately 0V <p style="text-align: right;">SEF552T</p>

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1140 1303 (Left bank)	The proper pulse signal from the intake valve timing control position sensors is not sent to ECM while the engine is running at the specified engine speed.	<ul style="list-style-type: none"> Harness or connectors (The left bank intake valve timing control position sensor circuit is open.) Intake valve timing control position sensor Accumulation of debris to the signal pick-up portion of the camshaft
P1145 1304 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
B/FUEL SCHDL	XXX msec
INT/V SOL-B1	OFF
INT/V TIM-B1	XXX deg

SEF752X

Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and keep the engine speed at 2,000 rpm and wait at least 15 seconds.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-384.

OR



- 1) Start engine and keep the engine speed at 2,000 rpm and wait at least 15 seconds.
- 2) Select "MODE 7" with GST.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-384.

OR



- 1) Start engine and keep the engine speed at 2,000 rpm and wait at least 15 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-384.

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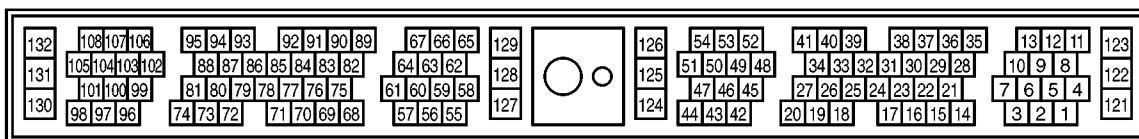
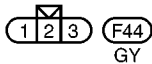
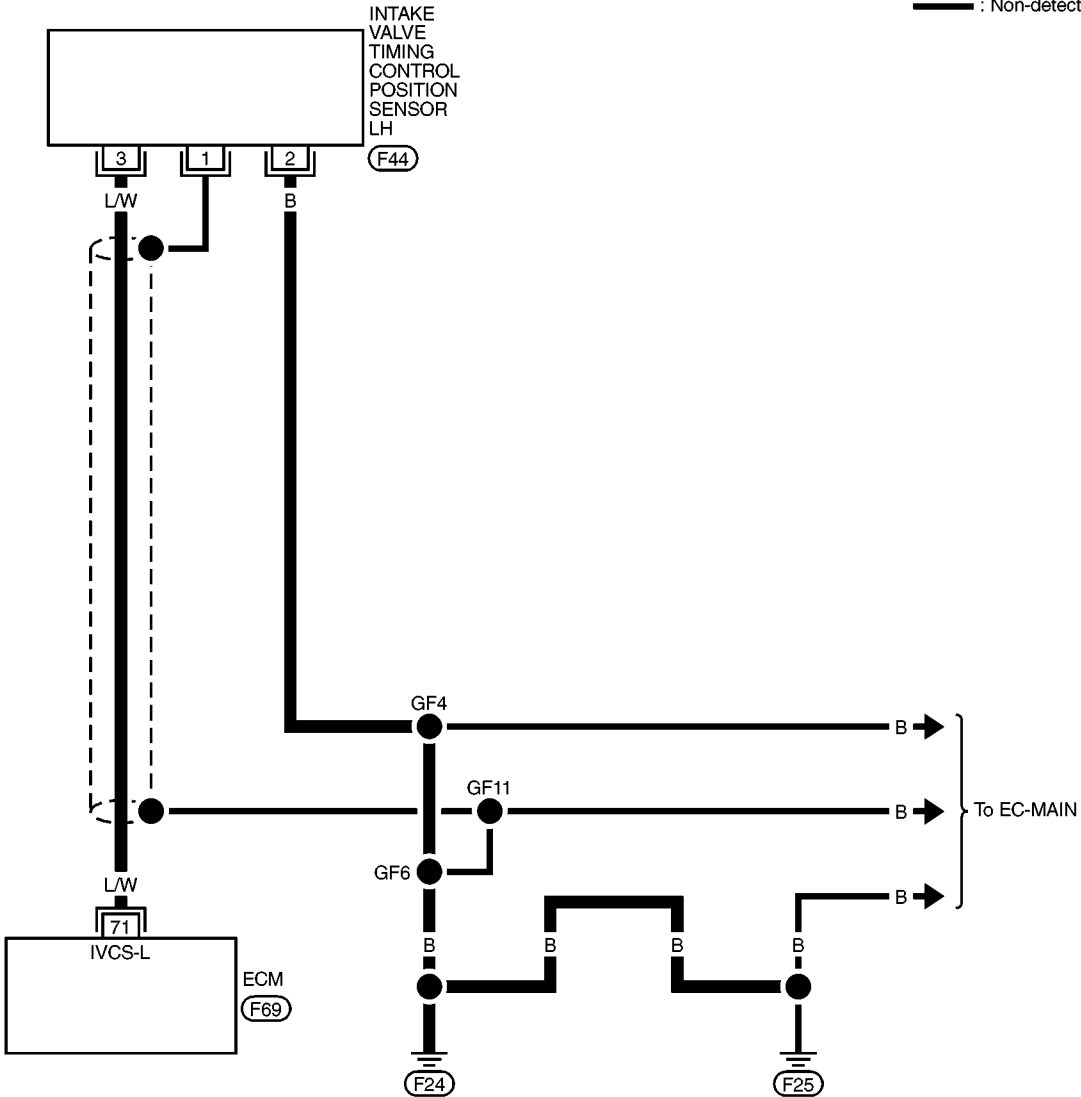
TROUBLE DIAGNOSIS FOR DTC P1140 (-B1), P1145 (-B2)

Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank) (Cont'd)

LEFT BANK

EC-IVCS-L-01

— : Detectable line for DTC
 - - - : Non-detectable line for DTC

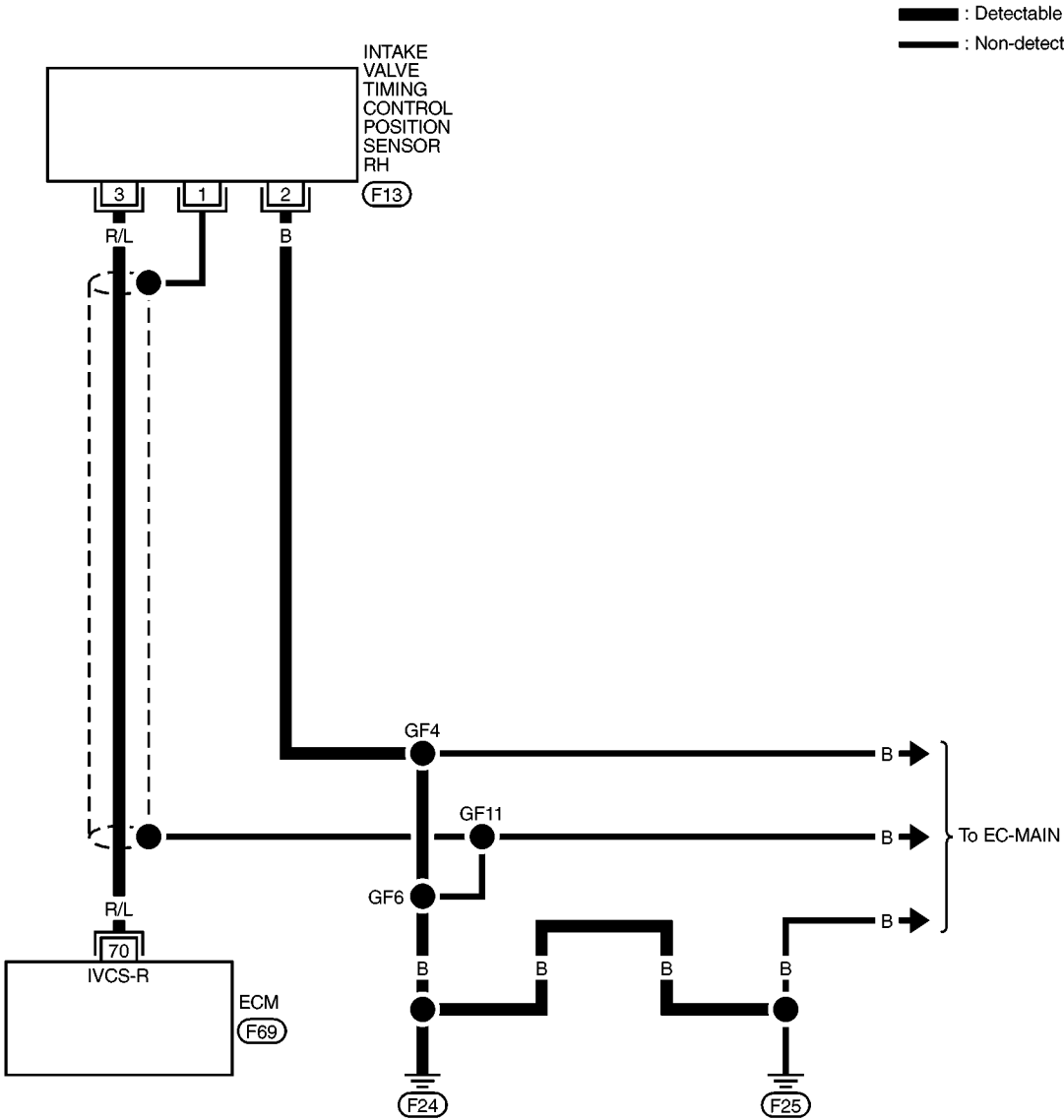


TROUBLE DIAGNOSIS FOR DTC P1140 (-B1), P1145 (-B2)

Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank) (Cont'd)

RIGHT BANK

EC-IVCS-R-01



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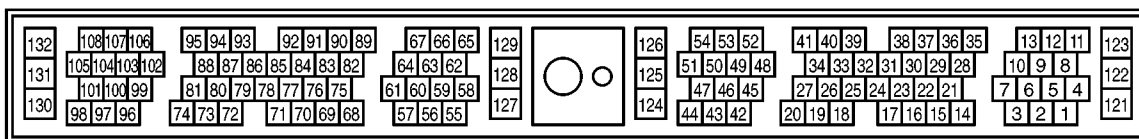
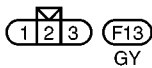
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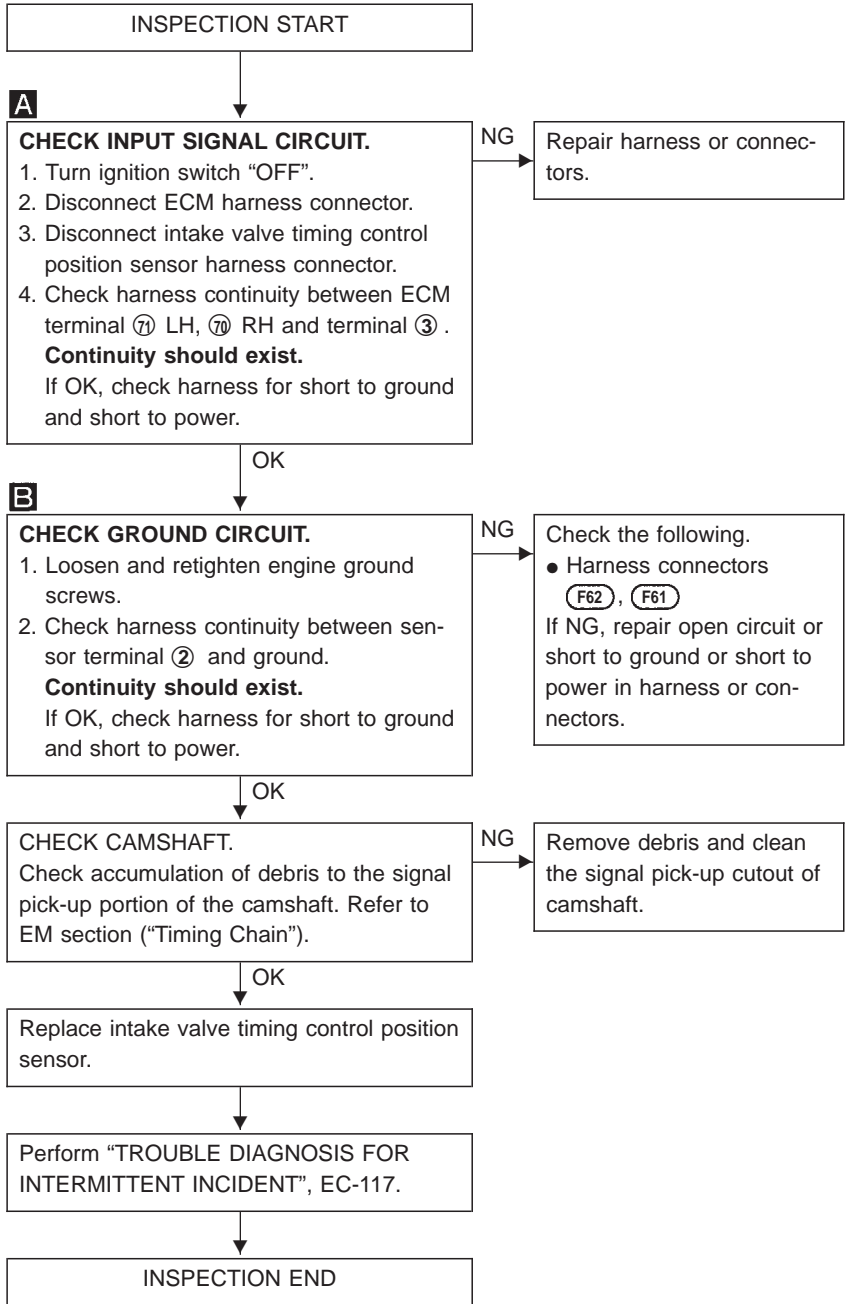
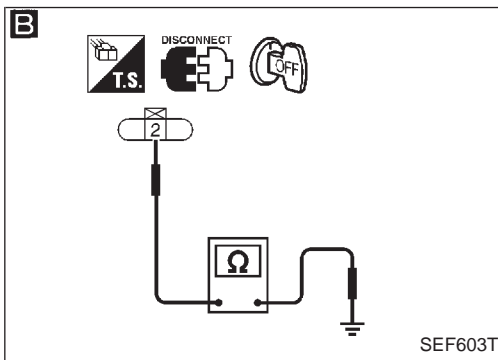
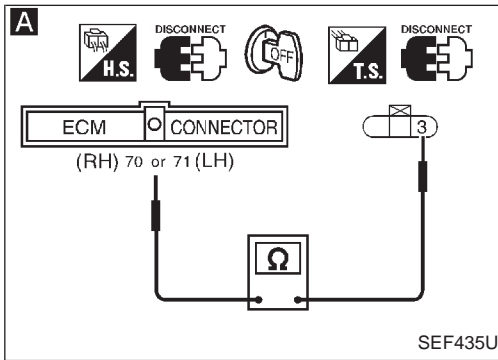
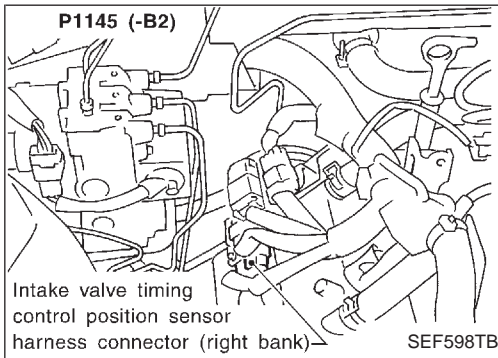
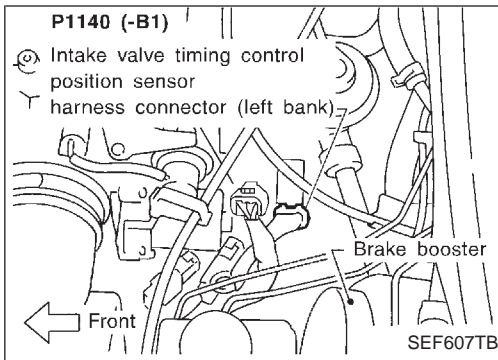
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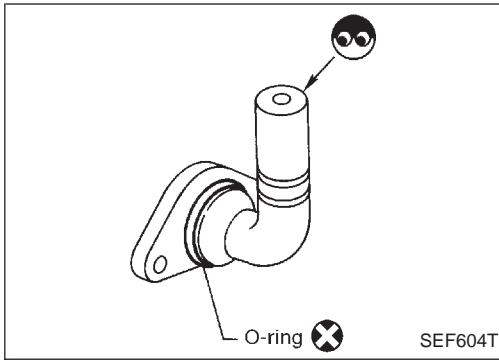


TROUBLE DIAGNOSIS FOR DTC P1140 (-B1), P1145 (-B2)

Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank) (Cont'd)

DIAGNOSTIC PROCEDURE





Intake Valve Timing Control Position Sensor (P1140: Left bank), (P1145: Right bank) (Cont'd)
COMPONENT INSPECTION

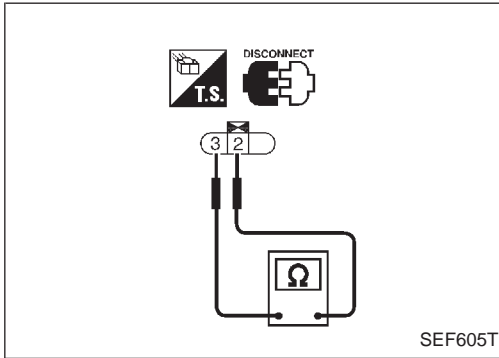
Intake valve timing control position sensor

1. Disconnect intake valve timing control position sensor harness connector.
2. Loosen fixing bolt of the sensor.
3. Visually check the sensor for chipping.
4. Check resistance between terminals ② and ③.

Resistance:

600 - 740Ω [at 20°C (68°F)]

If NG, replace intake valve timing control position sensor.



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**Closed Loop Control (P1148: Left bank),
(P1168: Right bank)**

★ The closed loop control has the one trip detection logic.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148 0307 (Left bank)	<ul style="list-style-type: none"> The closed loop control function for left bank does not operate even when vehicle is driving in the specified condition. 	<ul style="list-style-type: none"> The front heated oxygen sensor circuit is open or shorted. Front heated oxygen sensor Front heated oxygen sensor heater
P1168 0308 (Right bank)		

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH

SEF759X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE 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 “DIAGNOSTIC TROUBLE CODE 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.



- Start engine and warm it up to normal operating temperature.
- Select “DATA MONITOR” mode with CONSULT-II.
- Hold engine speed at 2,000 rpm and check the following.
 - “FR O2 SENSOR” voltage should go above 0.70V at least once.

_____ OR _____

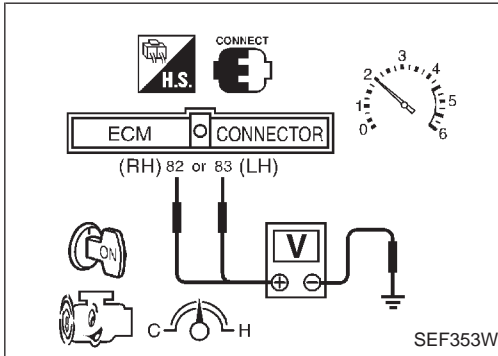
 - “FR O2 SENSOR” voltage should go below 0.21V at least once.

If the check result is NG, perform “DIAGNOSIS PROCEDURE”, EC-191.
If the check result is OK, perform the following step.
- Let engine idle at least 3 minutes.

**Closed Loop Control (P1148: Left bank),
(P1168: Right bank) (Cont'd)**

- 5) Maintain the following condition at least 50 consecutive seconds.
B/FUEL SCHDL: 2.5 ms or more
CMPS-RPM (POS): 2,000 - 3,000 rpm
Selector lever: Suitable position
VHCL SPEED SE: More than 70 km/h (43 MPH)
During this test P0130 may be displayed on the CONSULT-II screen.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-186.

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OR
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed loop control. During this check, a 1st trip DTC might not be confirmed.

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminals 82 RH, 83 LH (sensor) and 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.
 - OR
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-186.

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DIAGNOSTIC PROCEDURE

Refer to TROUBLE DIAGNOSIS FOR DTC P0133 (-B1), P0153 (-B2), EC-186.

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Traction Control System (TCS) Signal Circuit

The ECM uses this circuit line for checking the TCS operation. Voltage signals are sent and received between the ECM and the throttle actuator control module.

- ★ Freeze frame data is not stored in the ECM for the TCS signal circuit.
The MIL will not light for TCS signal circuit malfunction.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1210 0106	<ul style="list-style-type: none"> An excessively low or high voltage from the throttle actuator control (TAC) module is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The circuit is open or shorted.) Throttle actuator control (TAC) module

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch “ON” and TCS switch “ON”, then start engine.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Run engine for at least 3 seconds.
- 4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-390.

OR



- 1) Turn ignition switch “ON” and TCS switch “ON”, then start engine.
- 2) Run engine for at least 3 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-390.

TROUBLE DIAGNOSIS FOR DTC P1210

Traction Control System (TCS) Signal Circuit (Cont'd)

EC-TCS/SW-01

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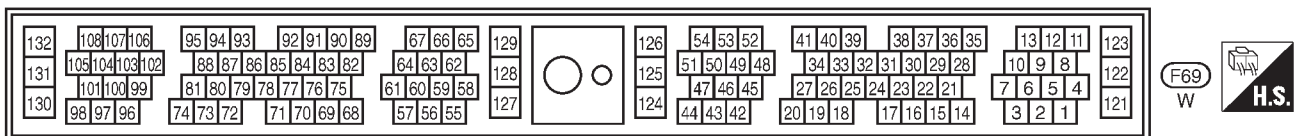
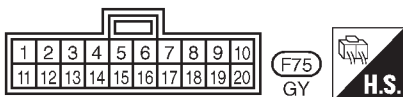
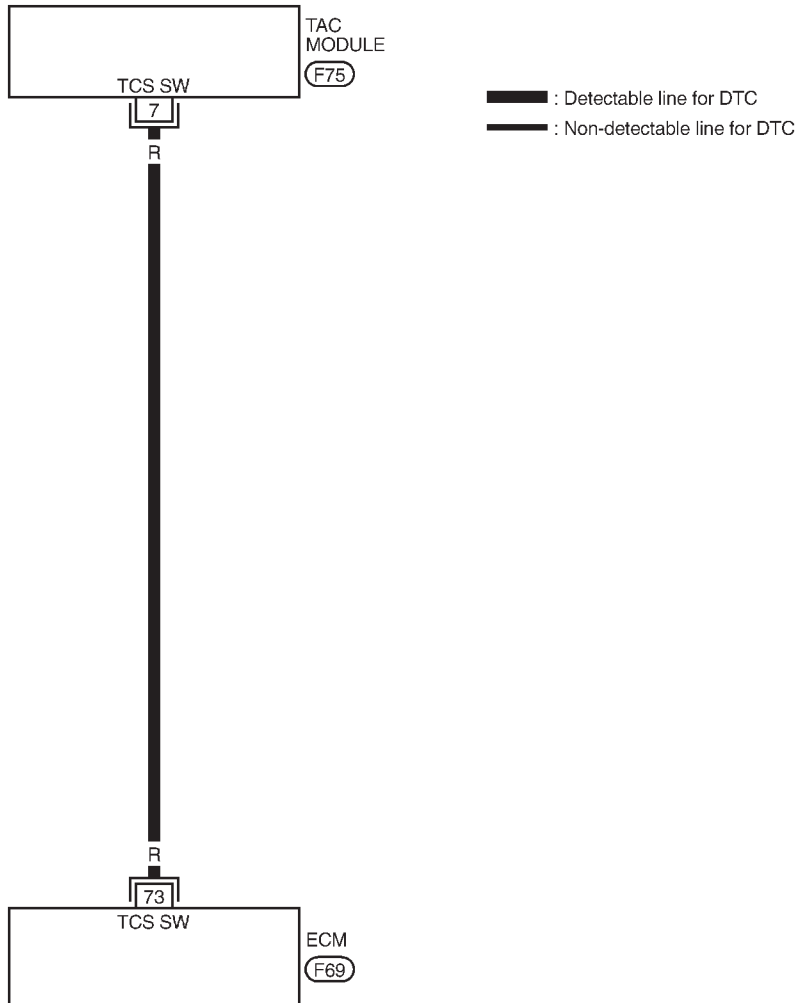
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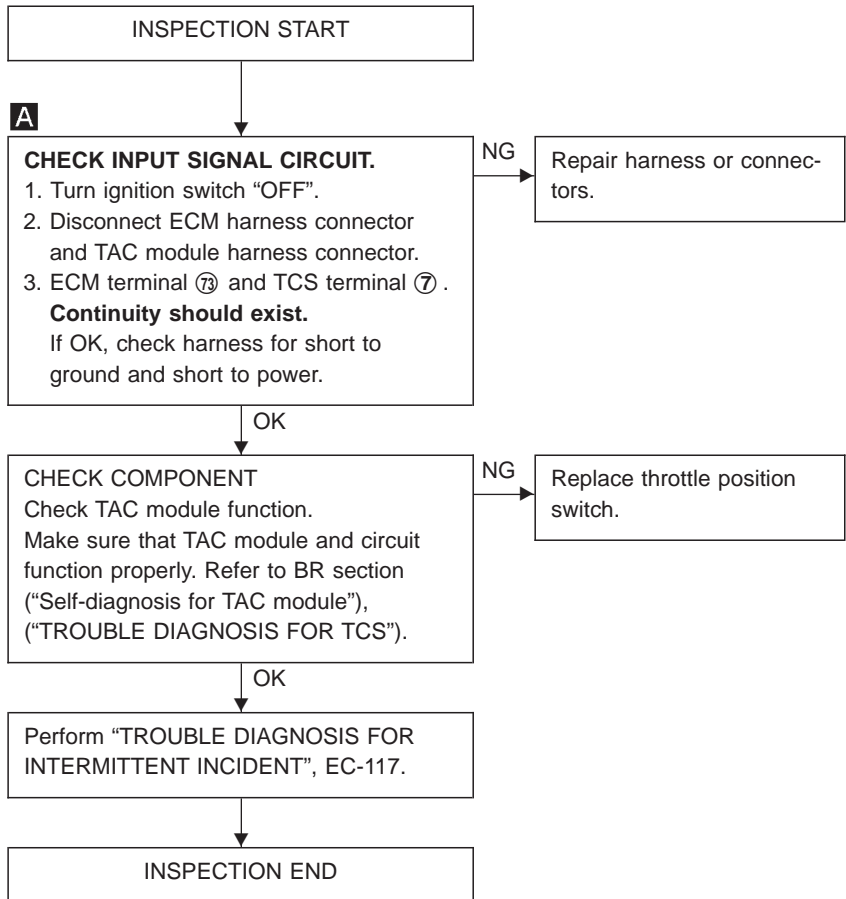
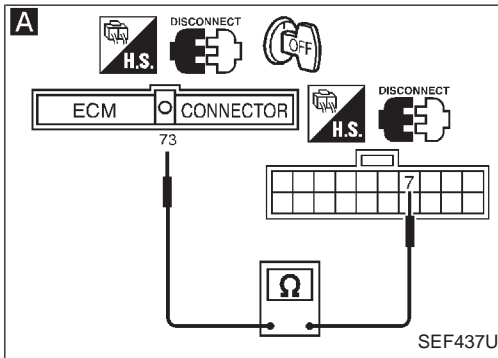
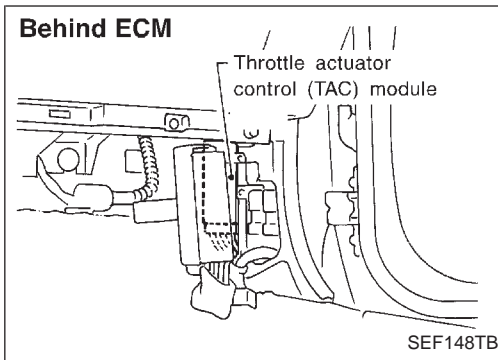
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TROUBLE DIAGNOSIS FOR DTC P1210

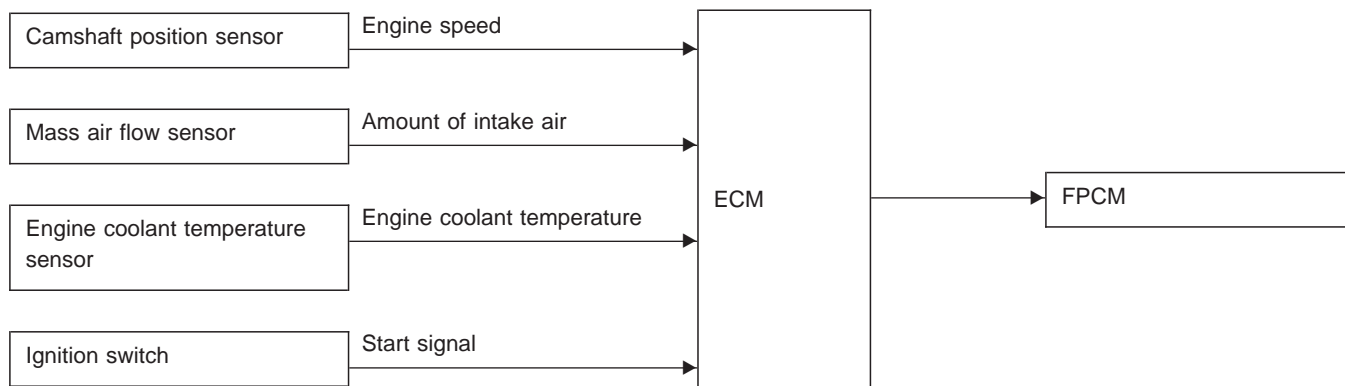
Traction Control System (TCS) Signal Circuit (Cont'd)

DIAGNOSTIC PROCEDURE



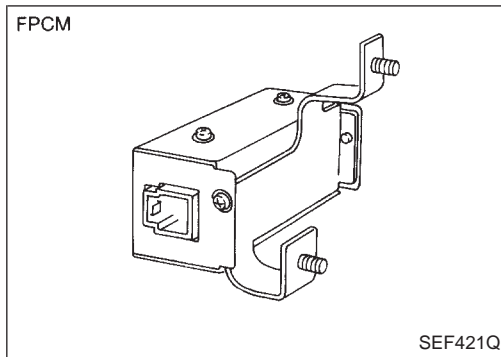
Fuel Pump Control Module (FPCM)

SYSTEM DESCRIPTION



This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage supplied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
<ul style="list-style-type: none"> Engine cranking Within 16 seconds after starting engine [above 100°C (212°F)] Engine is running under heavy load and high speed conditions 	high	Battery voltage (11 - 14V)
Except the above	low	Approximately 7V



COMPONENT DESCRIPTION

The FPCM adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is increased. When the FPCM decreases the voltage, the fuel flow is decreased.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FPCM	<ul style="list-style-type: none"> Within 16 seconds after starting the engine, when engine coolant temperature is more than 100°C (212°F) 	HIGH → LOW
FPCM D/R VOLT	<ul style="list-style-type: none"> Within 16 seconds after starting the engine, when engine coolant temperature is more than 100°C (212°F) 	Approx. 5.0V → Approx. 0.4V

TROUBLE DIAGNOSIS FOR DTC P1220

Fuel Pump Control Module (FPCM) (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
15	R/L	Fuel pump control module	Engine is cranking.	Approximately 0.4V
			Engine is running. └ Idle speed	Approximately 10V
93	G/R	Fuel pump control module (FPCM) check	When cranking the engine	Approximately 0V
			After starting the engine	Approximately 5V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1220 1305	<ul style="list-style-type: none"> An improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM. 	<ul style="list-style-type: none"> Harness or connectors (FPCM circuit is open or shorted.) Dropping resistor FPCM

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
FPCM DR VOLT	XXX V
FPCM	LOW

SEF822X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Lift up vehicle.
- 2) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine (TCS switch "OFF").
- 4) Shift A/T selector lever to "D" position.
- 5) Hold vehicle speed at 70 to 100 km/h (43 to 62 MPH) for 12 seconds.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-394.

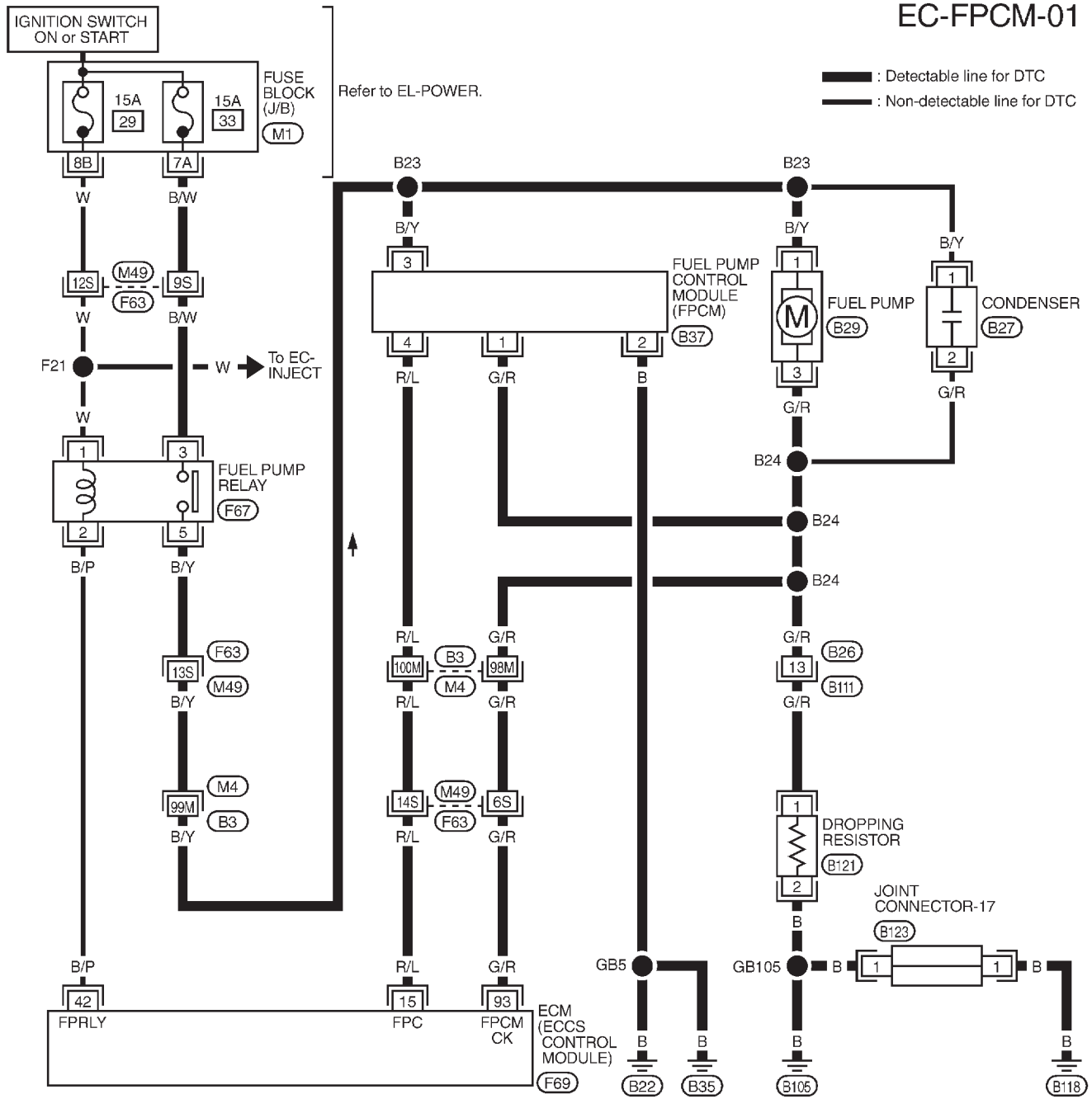


OR _____
Follow the procedure "With CONSULT-II" above.

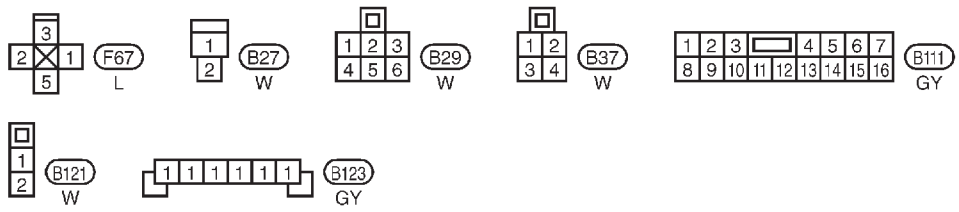
TROUBLE DIAGNOSIS FOR DTC P1220

Fuel Pump Control Module (FPCM) (Cont'd)

EC-FPCM-01

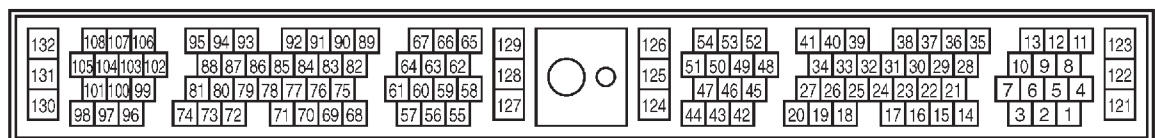


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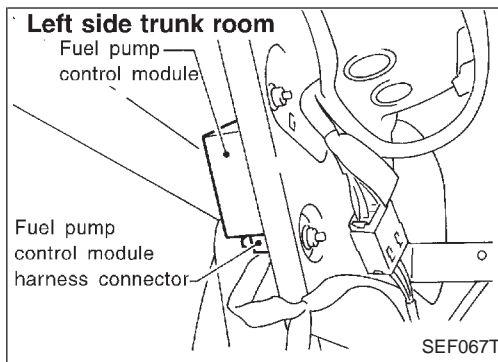
- M4, B3
- M49, F63
- M1



TROUBLE DIAGNOSIS FOR DTC P1220

Fuel Pump Control Module (FPCM) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect FPCM harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground with CONSULT-II or tester.

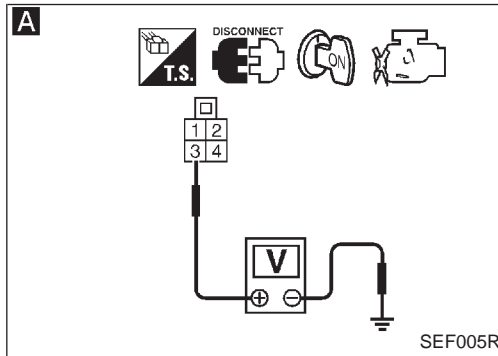
Voltage: Battery voltage

NG

Check the following.

- Harness connectors (F63), (M49)
- Harness for open or short between FPCM and fuel pump relay

If NG, repair harness or connectors.



B

CHECK GROUND CIRCUIT-I.

1. Turn ignition switch "OFF".
2. Disconnect dropping resistor harness connector.
3. Check harness continuity between FPCM and dropping resistor terminal ② and engine ground.

Continuity should exist.

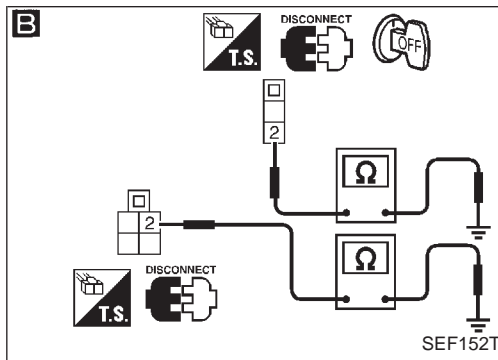
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connector (B123)

If NG, repair open circuit or short to ground or short to power in harness or connectors.



C

CHECK GROUND CIRCUIT-II.

1. Disconnect fuel pump harness connector.
2. Check harness continuity between fuel pump terminal ③ and dropping resistor terminal ①, resistor terminal ① and FPCM terminal ①.
3. Check harness continuity between FPCM terminal ① and engine ground, terminal ③ and engine ground.

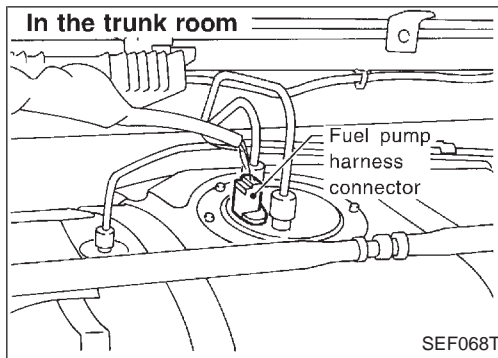
Continuity should exist.

Continuity should not exist.

If OK, check harness for short to ground and short to power.

NG

Repair harness or connectors.



D

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑮ and terminal ④.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F63), (M49)
- Harness connectors (M4), (B3)
- Harness for open or short between ECM and FPCM

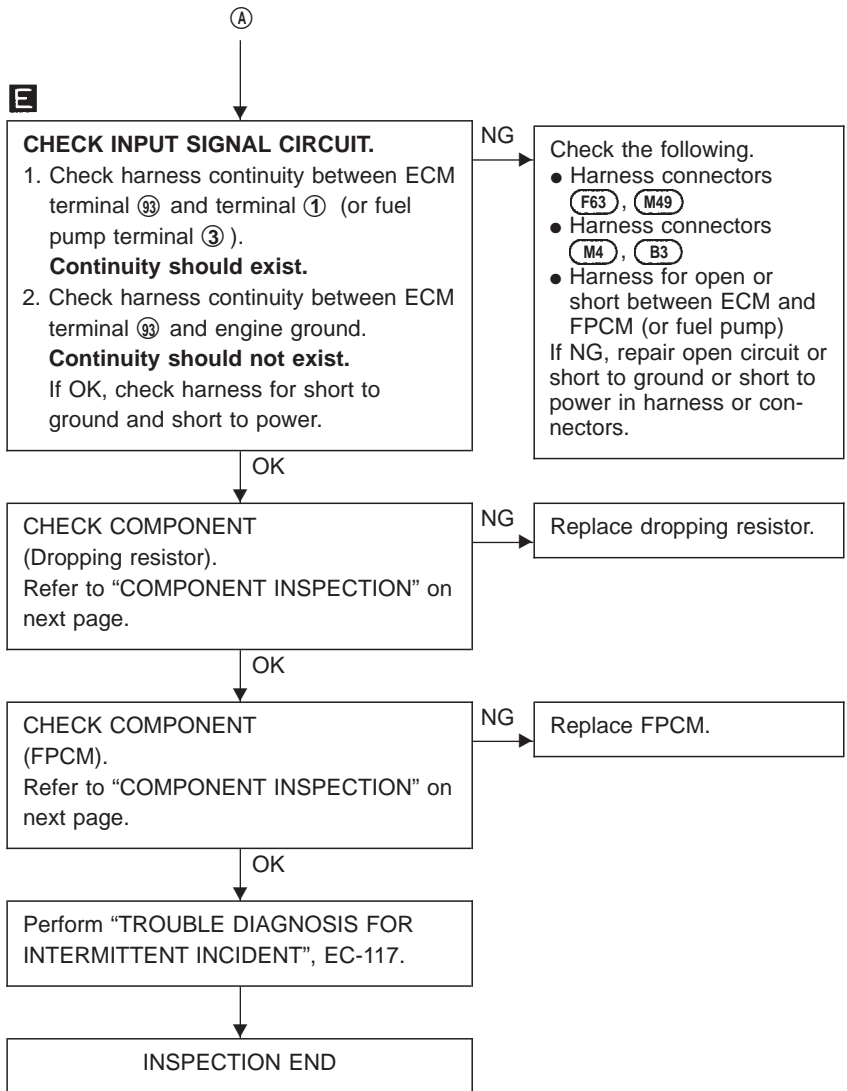
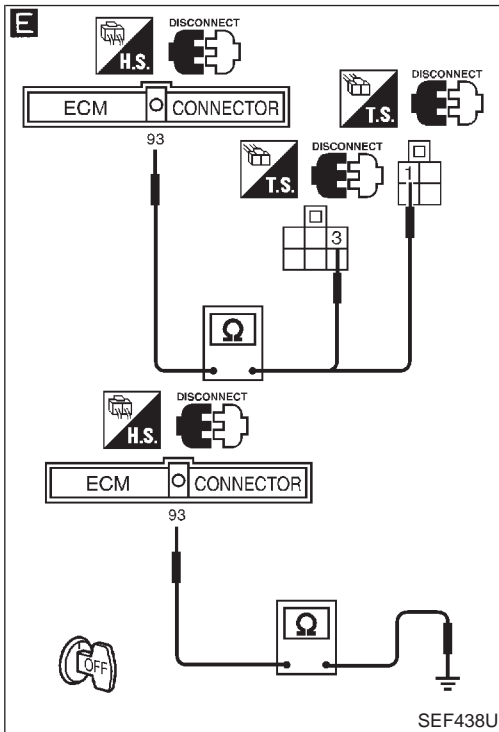
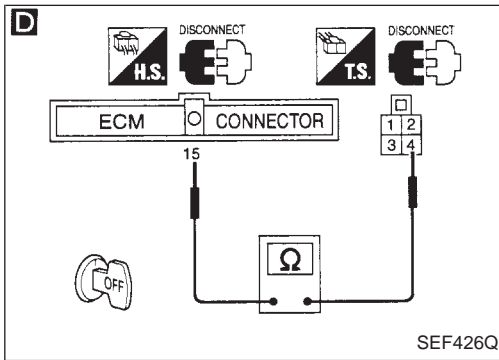
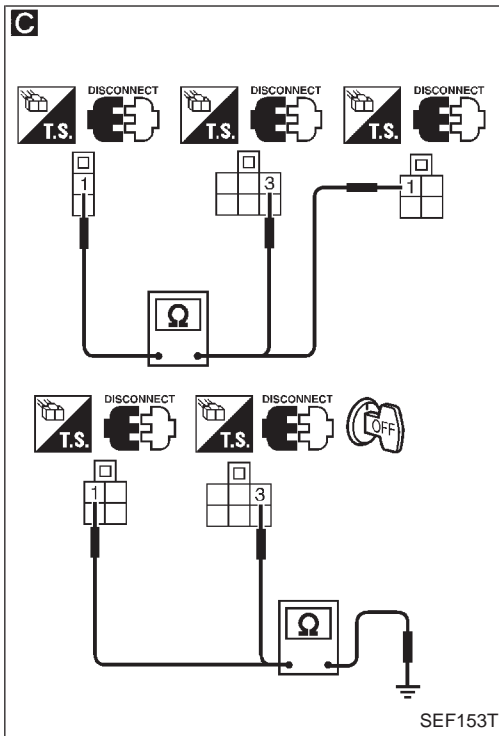
If NG, repair open circuit or short to ground or short to power in harness or connectors.

Ⓐ

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P1220

Fuel Pump Control Module (FPCM) (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P1220

Fuel Pump Control Module (FPCM) (Cont'd) COMPONENT INSPECTION

ACTIVE TEST	
FPCM	HI
MONITOR	
CMPS-RPM(POS)	XXX rpm
FPCM DR VOLT	XXX V
FPCM	LOW

SEF770X

ACTIVE TEST	
FPCM	LOW
MONITOR	
CMPS-RPM(POS)	XXX rpm
FPCM DR VOLT	XXX V
FPCM	LOW

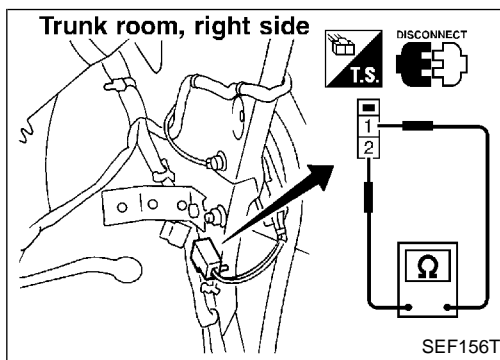
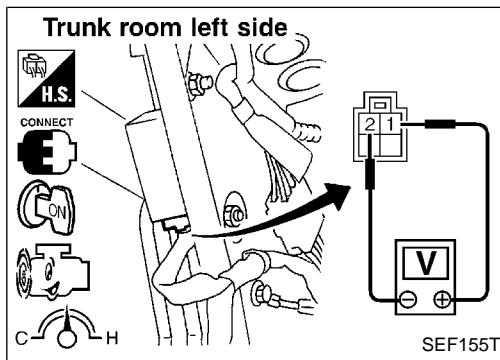
SEF771X

FPCM

- Start engine and let it idle.
- Perform "FPCM" in "ACTIVE TEST" mode with CONSULT-II.
- Check the following.
 - When selecting "HI", "FPCM DR VOLT" indicates approximately 0V.
 - When selecting "LOW", "FPCM DR VOLT" indicates approximately 4.4V.
- If NG, replace FPCM.

OR

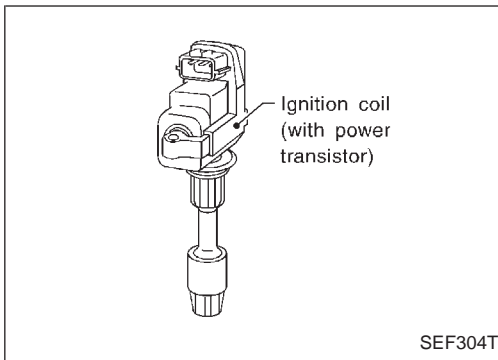
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Start engine and let it idle.
- Check voltage between terminals ① and ②.
 - Within 30 seconds of starting engine:**
Approximately 0V
 - More than 30 seconds after starting engine:**
Approximately 4.4V
- If NG, replace FPCM.



Dropping resistor

Check resistance between terminals ① and ②.
Resistance: Approximately 0.8Ω at 25°C (77°F)

TROUBLE DIAGNOSIS FOR DTC P1320



Ignition Signal

COMPONENT DESCRIPTION

Ignition coil & power transistor

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

GI
MA
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CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	15° BTDC
		2,000 rpm	More than 25° BTDC

EC
FE

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
43	Y/R	Ignition signal (No. 1)	Engine is running. (Warm-up condition) Idle speed	Approximately 0.38V
44	G/R	Ignition signal (No. 8)		
46	L/R	Ignition signal (No. 7)	Engine is running. (Warm-up condition) Engine speed is 2,000 rpm.	Approximately 0.55V
47	GY	Ignition signal (No. 3)		
50	PU/W	Ignition signal (No. 6)		
51	GY/R	Ignition signal (No. 5)		
53	W/R	Ignition signal (No. 4)		
54	R/L	Ignition signal (No. 2)		

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ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not sent during engine cranking or running. 	<ul style="list-style-type: none"> ● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit built into ignition coil ● Camshaft position sensor ● Camshaft position sensor circuit

IDX

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V

SEF741X

Ignition Signal (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- If both DTC P1320 (0201) and DTC P0340 (0101), P0335 (0802) or P1336 (0905) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340, P0335 or P1336 first. (See EC-268, 273 or 405.)



- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and wait at least 4 seconds. (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-402.

OR

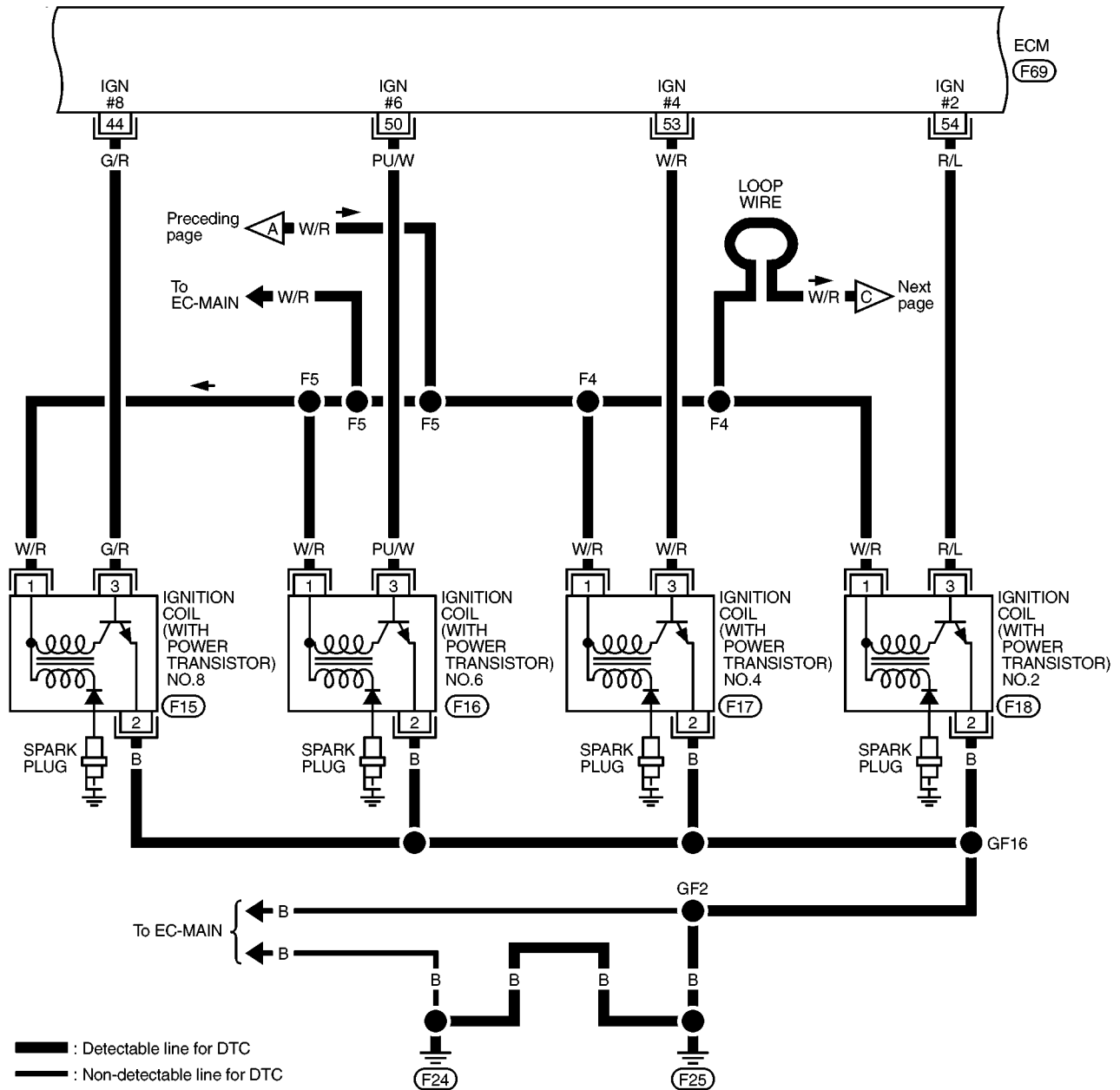


Follow the procedure “With CONSULT-II” above.

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)

EC-IGN/SG-02



1 2 3 (F15), (F16), (F17), (F18)
GY GY GY GY

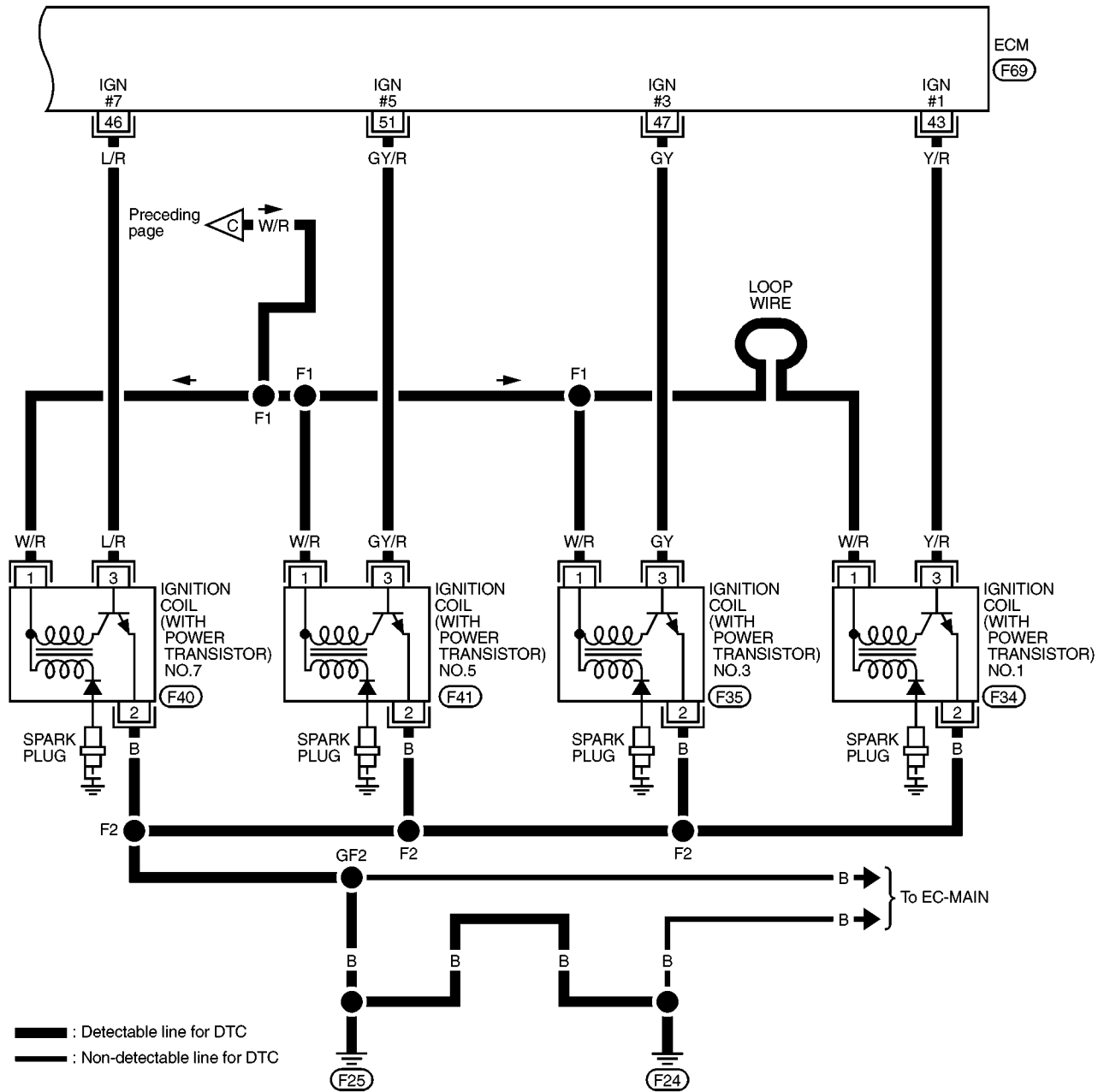
132	108	107	106	95	94	93	92	91	90	89	67	66	65	129	126	54	53	52	41	40	39	38	37	36	35	13	12	11	123		
131	105	104	103	102	88	87	86	85	84	83	82	64	63	62	128	125	51	50	49	48	34	33	32	31	30	29	28	10	9	8	122
130	101	100	99	81	80	79	78	77	76	75	61	60	59	58	127	124	47	46	45	27	26	25	24	23	22	21	7	6	5	4	121
	98	97	96	74	73	72	71	70	69	68	57	56	55			44	43	42	20	19	18	17	16	15	14	3	2	1			



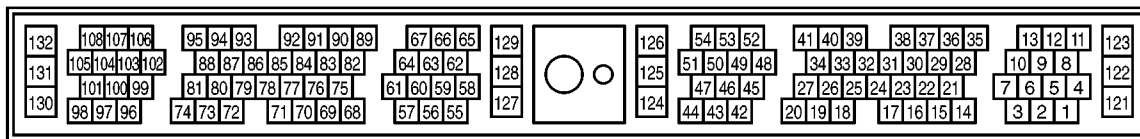
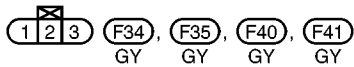
TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)

EC-IGN/SG-03

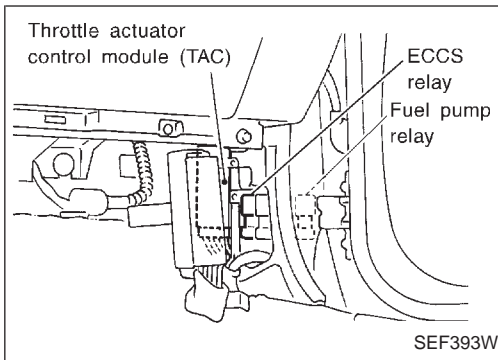


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TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd) DIAGNOSTIC PROCEDURE

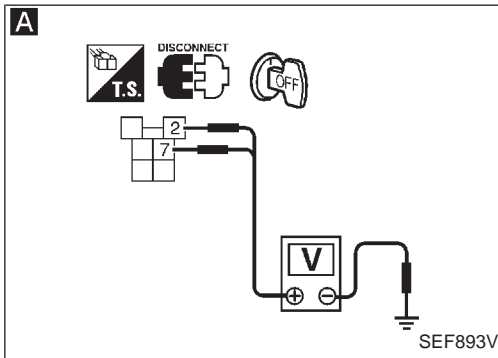


INSPECTION START

Start engine.
Is engine running?

Yes → Go to **D** "SEARCH FOR MALFUNCTIONING CIRCUIT" on next page.

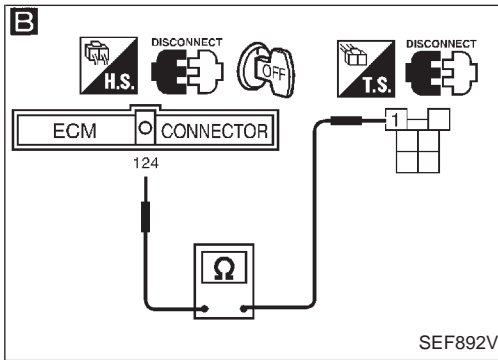
No → **A**



CHECK POWER SUPPLY-1.
1. Turn ignition switch "OFF".
2. Disconnect ECCS relay.
3. Check voltage between terminals ②, ⑦ and ground with CONSULT-II or tester.
Voltage: Battery voltage

NG → Check the following.
● Harness connectors (F1), (E14)
● Harness connectors (F2), (E13)
● 10A fuse
● 7.5A fuse
● Harness for open or short between battery and ECCS relay
If NG, repair harness or connectors.

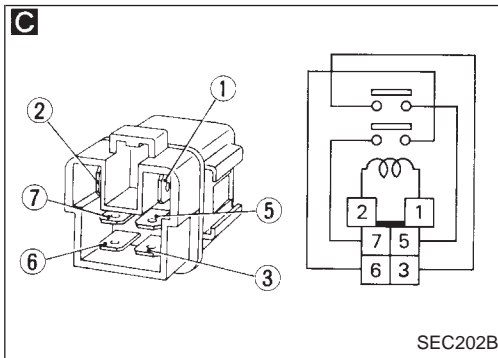
OK → **B**



CHECK OUTPUT SIGNAL CIRCUIT-1.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (124) and terminal ①.
Continuity should exist.
If OK, check harness for short to ground and short to power.

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

OK → **C**



CHECK ECCS RELAY.
1. Apply 12V direct current between relay terminals ① and ②.
2. Check continuity between relay terminals ③ and ⑤, ⑦ and ⑥.
12V (① - ②) applied:
Continuity exists.
No voltage applied:
No continuity

NG → Replace ECCS relay.

OK →
1. Reconnect ECCS relay and ECM harness connector.
2. Go to **E** "CHECK POWER SUPPLY-2" on next page.

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)

D

ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX step

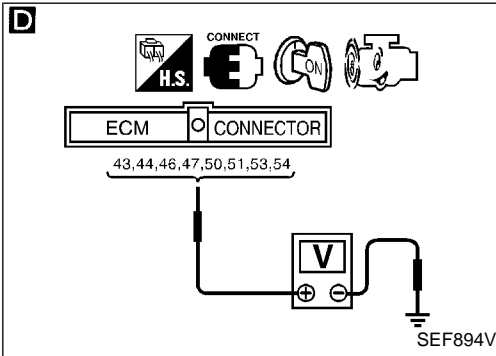
SEF793X

D

SEARCH FOR MALFUNCTIONING CIRCUIT.

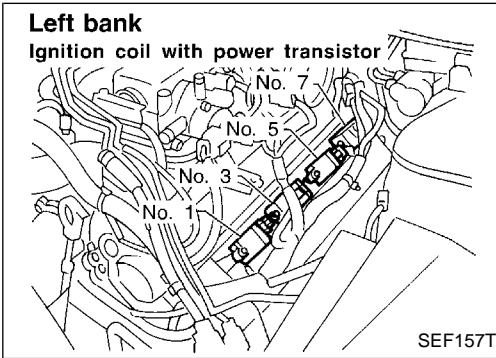
1. Start engine and let it idle.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Search for circuit which does not produce a momentary engine speed drop.

OR



2. Check output signal voltage between ECM terminals ④③, ④④, ④⑥, ④⑦, ⑤⑩, ⑤①, ⑤③, ⑤④ and ground with oscilloscope.

3. Search for circuit that signal voltage does not match to "DATA" in "ECM INSPECTION TABLE".



E

CHECK POWER SUPPLY-2.

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector(s).
3. Turn ignition switch "ON".
4. Check voltage between each ignition coil harness connector terminal ① and ground with CONSULT-II or tester.

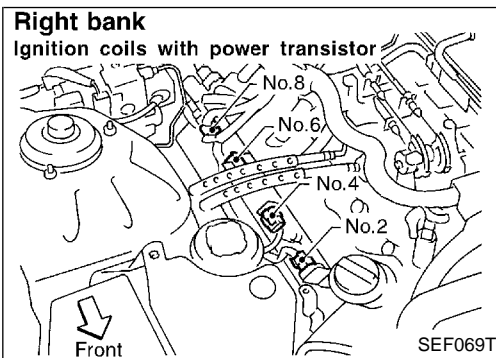
Voltage: Battery voltage

NG

Check the following.

- Harness for open or short between ignition coil and ECCS relay

If NG, repair harness or connectors.



OK

F

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Check harness continuity between ignition coil harness connector terminal ② and engine ground.

Continuity should exist.

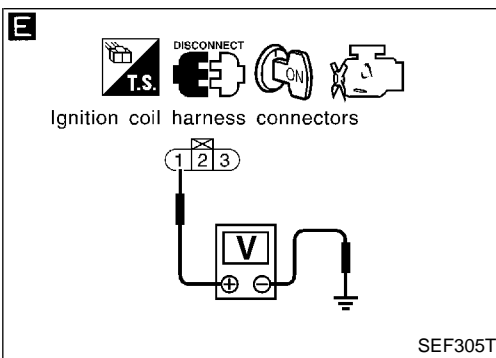
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F61), (F62)
- Check for open or short between ignition coil and engine ground

If NG, repair open circuit or short to ground or short to power in harness or connectors.



OK

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(Go to next page.)

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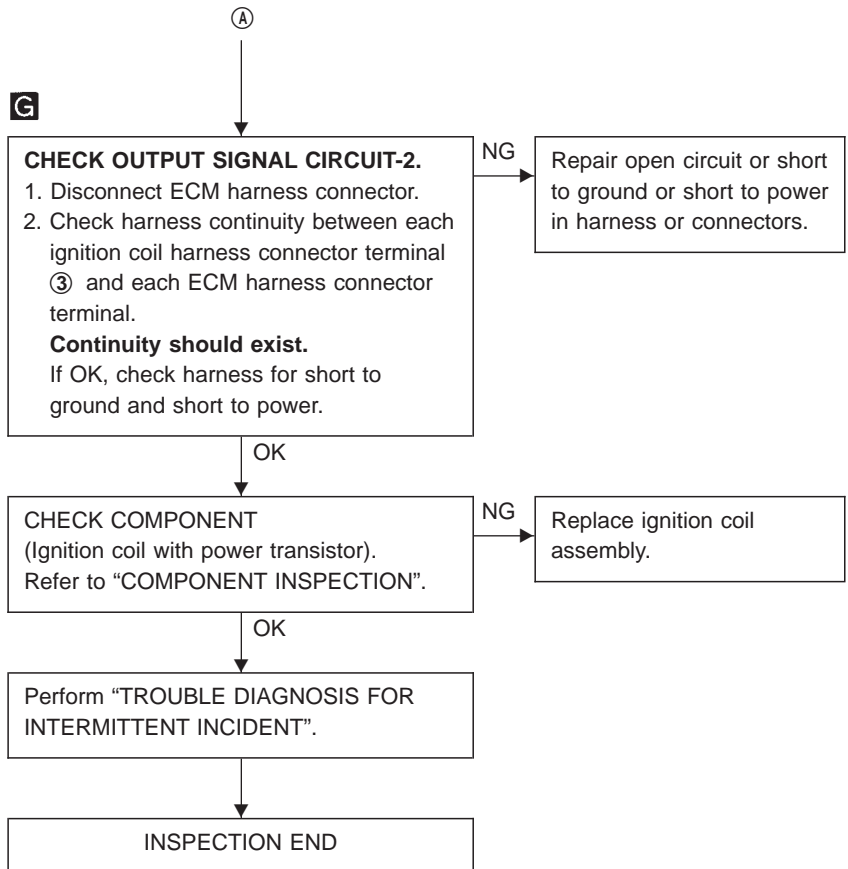
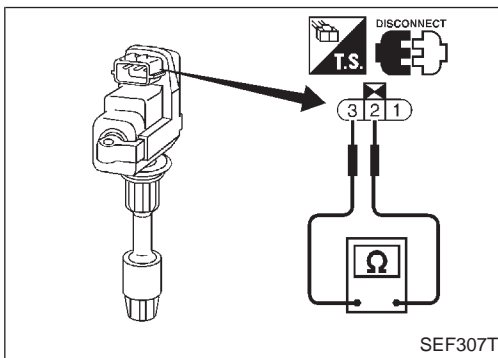
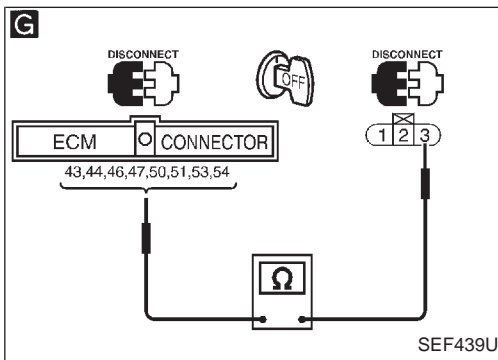
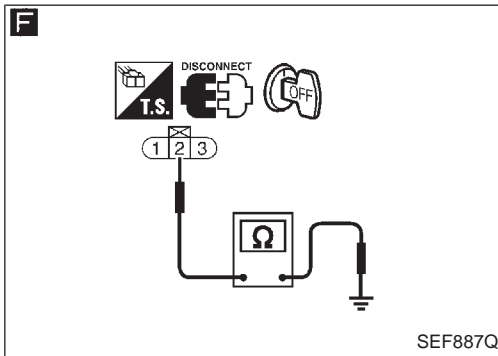
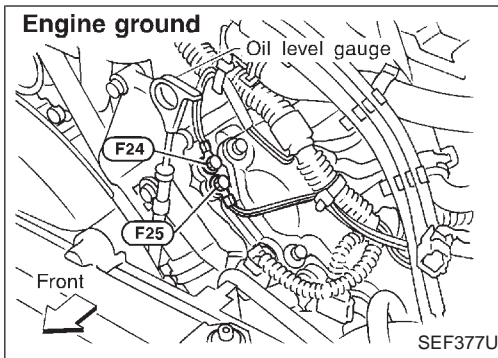
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TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (Cont'd)



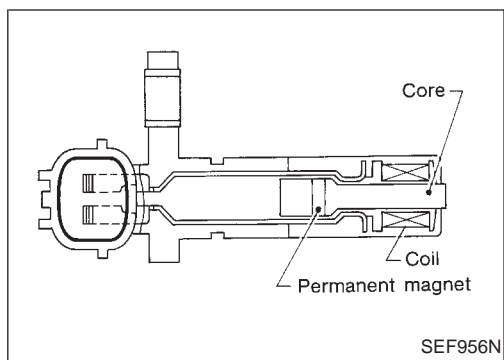
COMPONENT INSPECTION

Ignition coil with power transistor

1. Disconnect ignition coil with power transistor harness connector.
2. Check ignition coil with power transistor for resistance between terminals ③ and ② .

Terminals	Resistance	Result
③ and ②	Not 0Ω	OK
	0Ω	NG

If NG, replace ignition coil with power transistor assembly.



Crankshaft Position Sensor (CKPS) (OBD) (COG)

COMPONENT DESCRIPTION

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the 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 directly used to control the engine system. It is used only for the on board diagnosis of misfire.

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ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC voltage)
57	B/R	Crankshaft position sensor (OBD)	<p>Engine is running. (Warm-up condition)</p> <p>└ Idle speed</p>	<p>Approximately 1.7V</p> <p>SEF545T</p>
			<p>Engine is running. (Warm-up condition)</p> <p>└ Engine speed is 2,000 rpm.</p>	<p>Approximately 0V</p> <p>SEF546T</p>

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ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	<ul style="list-style-type: none"> Chipping of the signal plate (on drive plate) gear teeth (cogs) is detected by the ECM. 	<ul style="list-style-type: none"> Harness or connectors Crankshaft position sensor (POS) Signal plate (drive plate) Dead (Weak) battery

EL
IDX

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

SEF736X

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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.



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 3 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-408.

OR



Follow the procedure "With CONSULT-II" above.

TROUBLE DIAGNOSIS FOR DTC P1336

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

EC-CKPS-01

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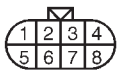
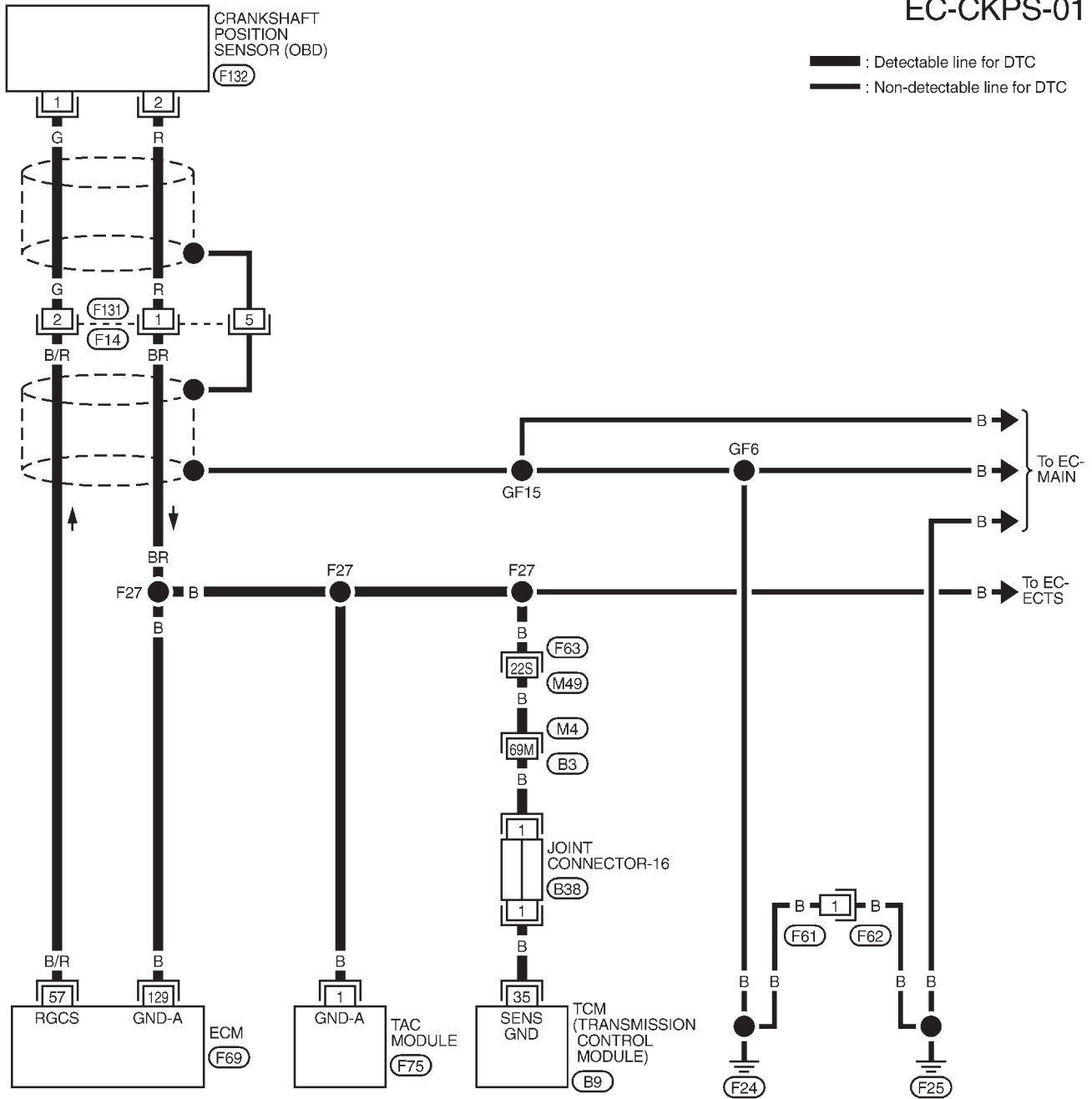
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F14
GY



F62
W



F132
GY

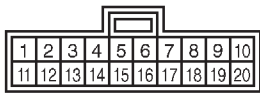


B38
GY

Refer to last page (Foldout page).

M4, B3

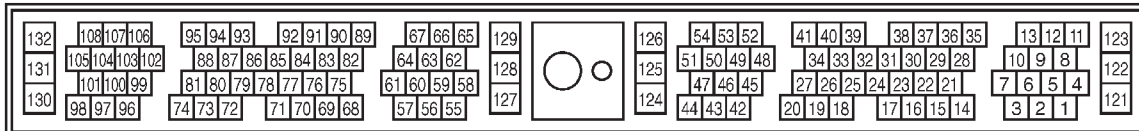
M49, F63



F75
GY



B9
W



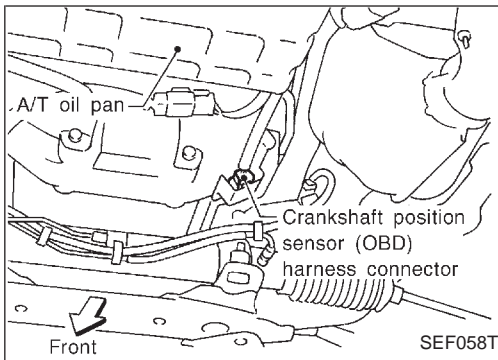
F69
W



TROUBLE DIAGNOSIS FOR DTC P1336

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)

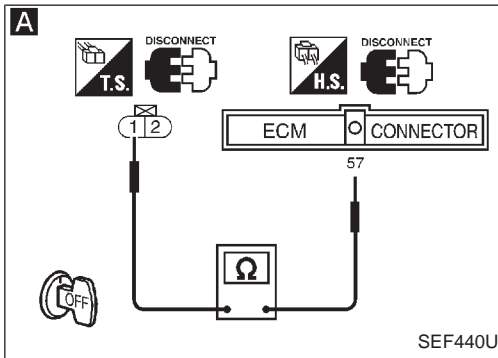
DIAGNOSTIC PROCEDURE



INSPECTION START

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

A



CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) harness connector and ECM harness connector.
3. Check continuity between sensor terminal ① and ECM terminal ⑤ with CONSULT-II or tester.

Continuity should exist.
If OK, check harness for short to ground and short to power.

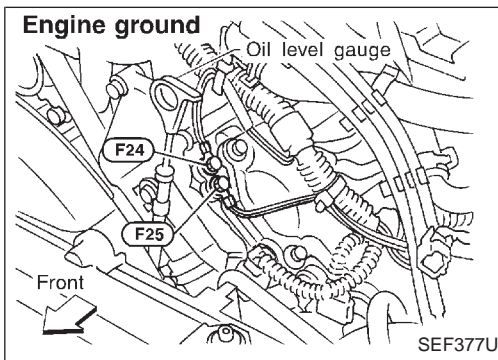
NG

Check the following.

- Harness connectors (F14), (F131)
- Harness for open or short between crankshaft position sensor (OBD) and ECM

If NG, repair open circuit or short to ground or short to power in harness or connectors.

B



CHECK GROUND CIRCUIT.

1. Reconnect ECM harness connector.
2. Check harness continuity between terminal ② and engine ground.

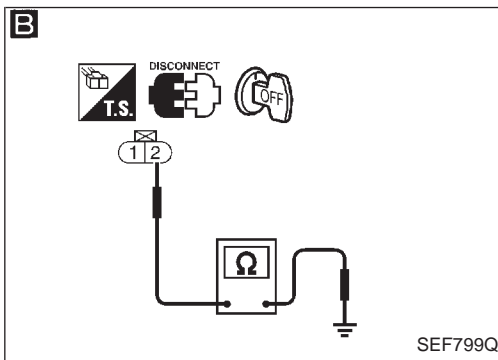
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (F14), (F131)
- Harness connectors (F63), (M69)
- Harness connectors (M4), (B3)
- Joint connector-16
- Harness for open or short between crankshaft position sensor (OBD) harness connector and ECM
- Harness for open or short between crankshaft position sensor (OBD) and throttle actuator control (TAC) module
- Harness for open or short between crankshaft position sensor and TCM

If NG, repair open circuit or short to ground or short to power in harness or connectors.



CHECK COMPONENT [Crankshaft position sensor (OBD)]. Refer to "COMPONENT INSPECTION" on next page.

NG

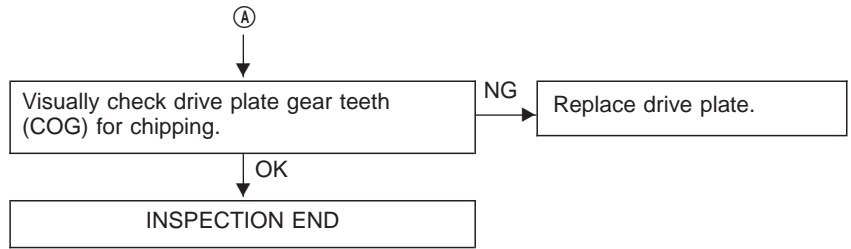
Replace crankshaft position sensor (OBD).

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P1336

Crankshaft Position Sensor (CKPS) (OBD) (COG) (Cont'd)



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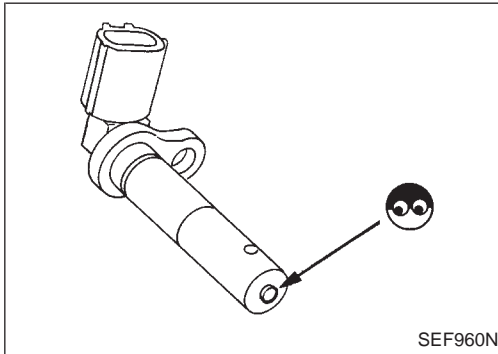
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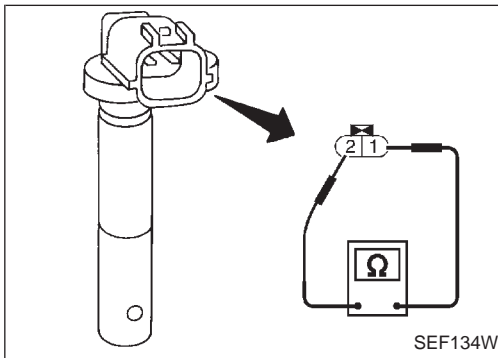
IDX



COMPONENT INSPECTION

Crankshaft position sensor (OBD)

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.

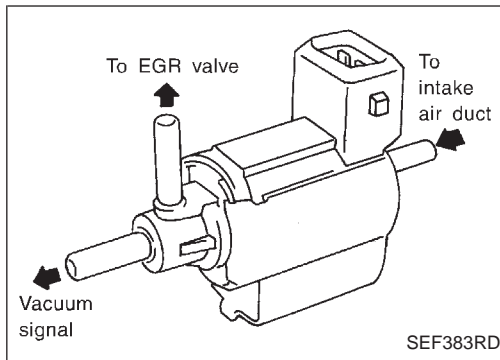


5. Check resistance as shown in the figure.

Resistance:

Approximately 166.5 - 203.5Ω [at 20°C (68°F)]

TROUBLE DIAGNOSIS FOR DTC P1400



EGRC-solenoid Valve

COMPONENT DESCRIPTION

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. A plunger will then move to flow the vacuum signal (from the intake manifold collector to the EGR valve.)

The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an OFF signal, the plunger is returned by the spring and cut the vacuum signal.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "D" No-load 	Idle	OFF
		Reving engine up from idle to 3,000 rpm	ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
10	L/Y	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Lift up drive wheels and rev engine up from idle to 3,000 rpm in "1st" position.	0 - 0.7V
			Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	<ul style="list-style-type: none"> The improper voltage signal is sent to ECM through EGRC-solenoid valve. 	<ul style="list-style-type: none"> Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) EGRC-solenoid valve

TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

TESTING CONDITION:

- If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II and wait at least 5 seconds.
- 3) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-413.

OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO FAIL
COOLAN TEMP/S	XXX °C

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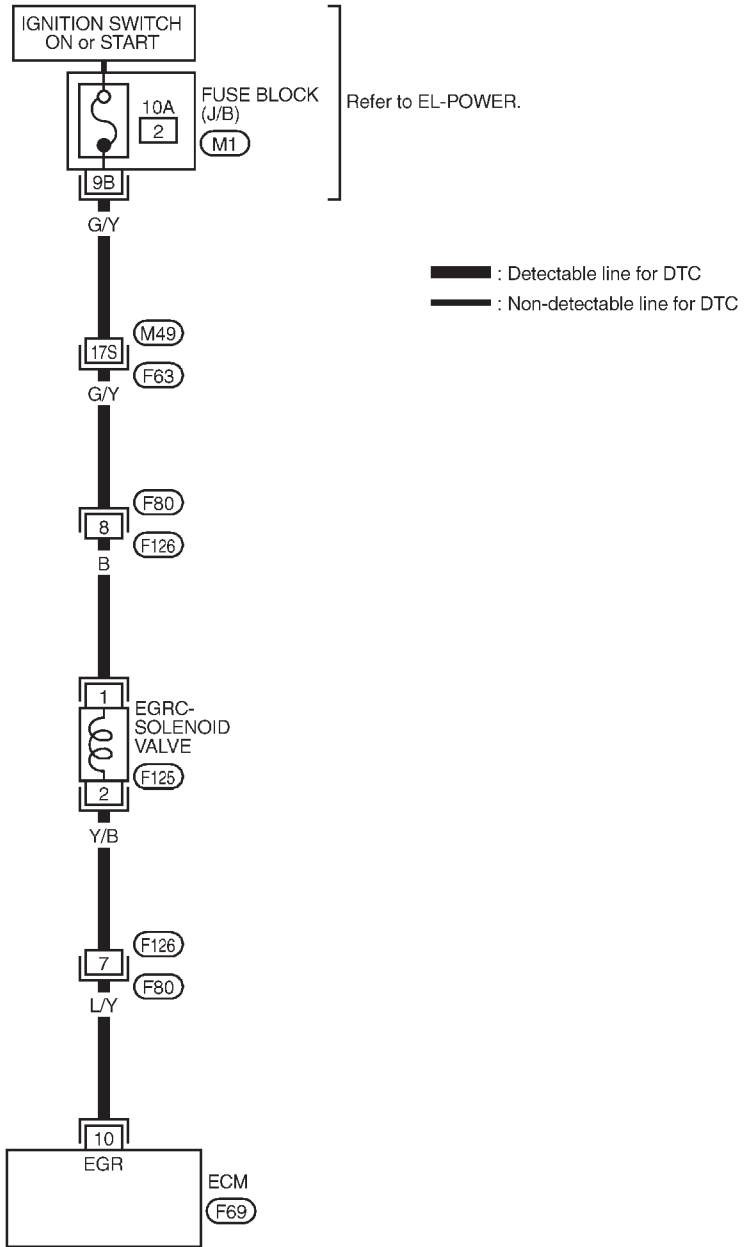
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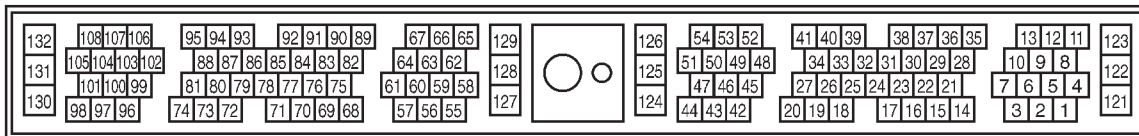
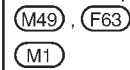
TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-solenoid Valve (Cont'd)

EC-EGRC/V-01

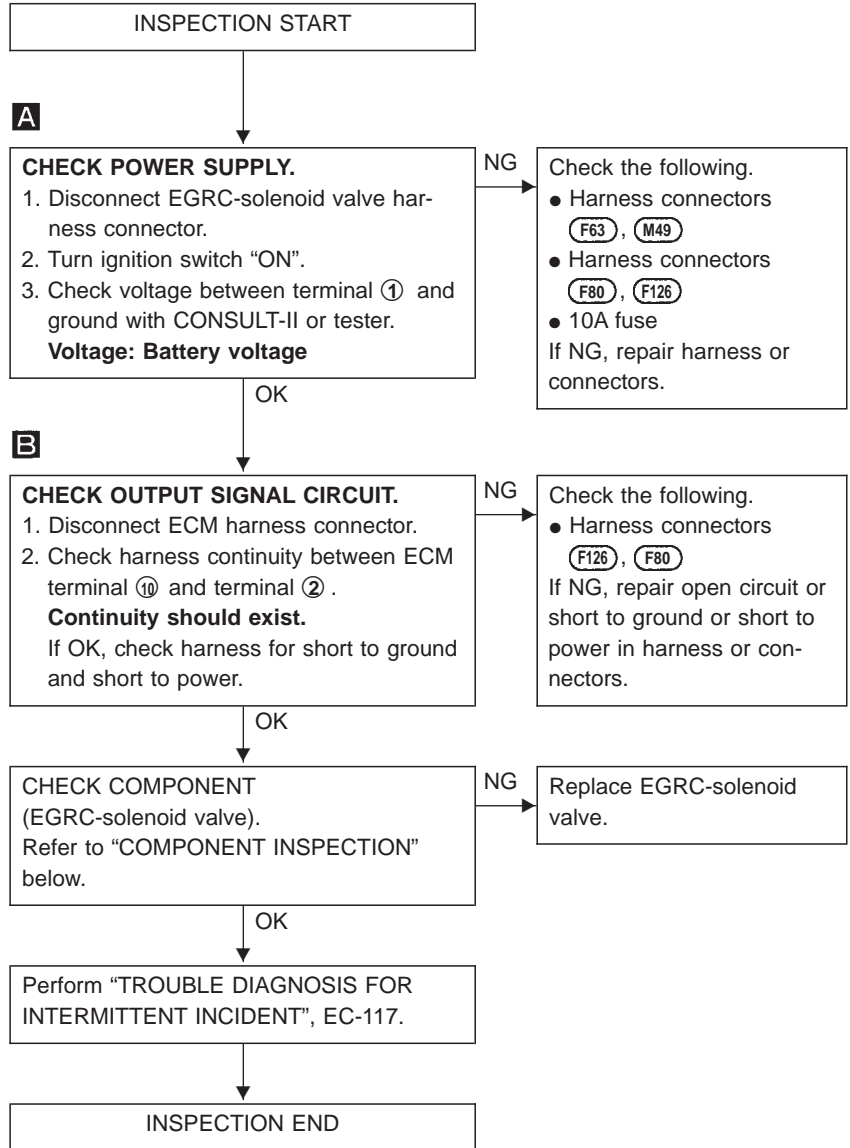
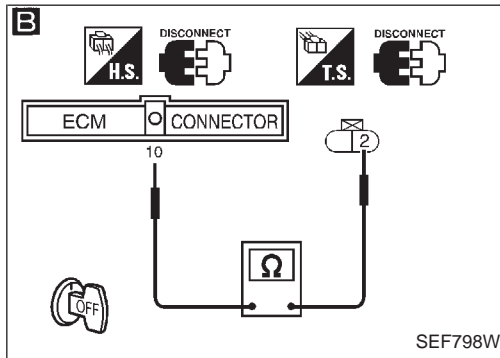
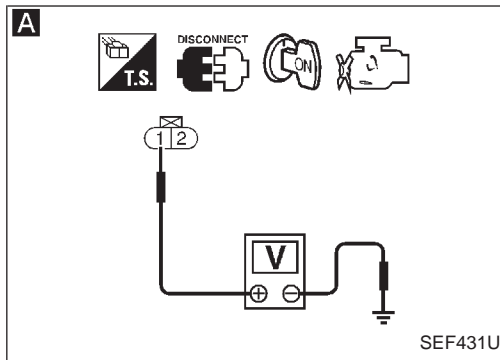


Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-solenoid Valve (Cont'd) DIAGNOSTIC PROCEDURE



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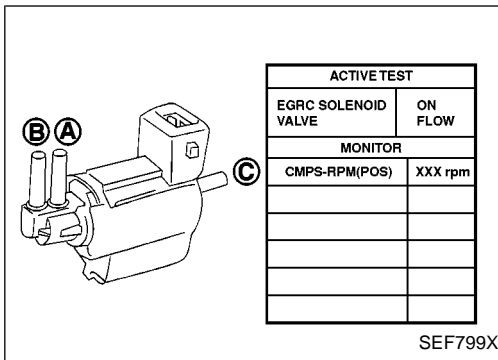
TROUBLE DIAGNOSIS FOR DTC P1400

EGRC-solenoid Valve (Cont'd)

EGRC-solenoid valve

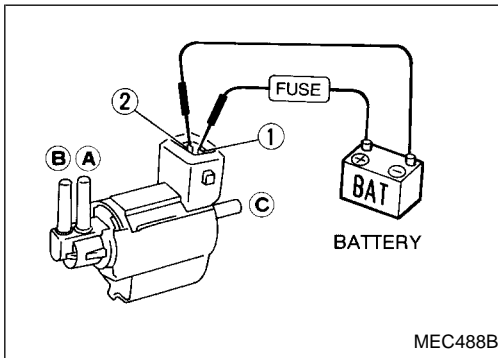
Check air passage continuity.

- Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
EGRC SOLENOID VALVE		
ON	Yes	No
OFF	No	Yes

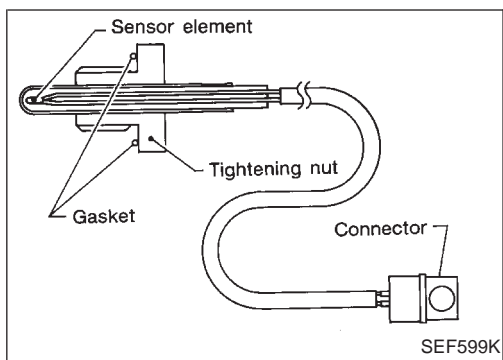
OR



Check solenoid valve, following the table as shown below:

Conditions	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace the solenoid valve.

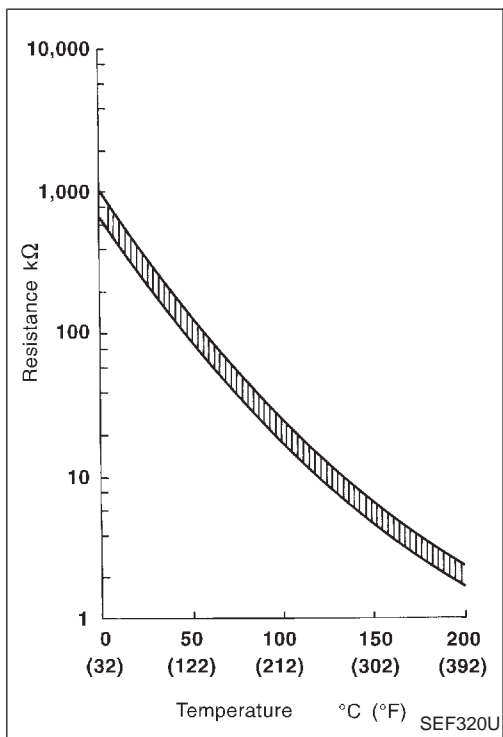


EGR Temperature Sensor

COMPONENT DESCRIPTION

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 directly used to control the engine system. It is used only for the on board diagnosis.



EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.092 - 0.12
100 (212)	0.87	0.017 - 0.024

*: These data are reference values and measured between ECM terminal 63 (EGR temperature sensor) and ECM terminal 128 (ECM ground).

When EGR system is operating:
Voltage: 0 - 1.5V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

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TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 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) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-419.

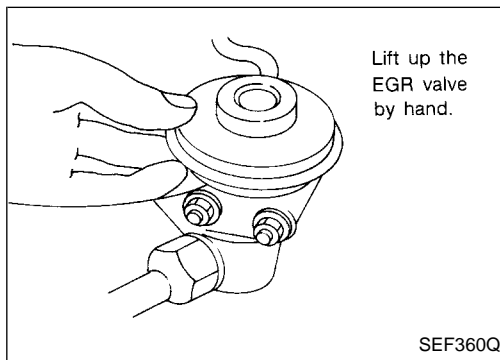
OR



Follow the procedure "With CONSULT-II" above.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
EGR TEMP SEN	XXX V
INT/A TEMP SE	XXX °C

SEF753X



Procedure for malfunction B

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at temperature above -10°C (14°F).



- 1) Start engine and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting.
If the check result is NG, go to "TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1402". (See pages EC-279, 288 and 421.)
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) 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 1.0V.

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", EC-419.

If the check result is OK, go to following step.

- 6) Turn ignition switch "OFF" and wait at least 5 seconds.
- 7) Turn ignition switch "ON".
- 8) Check the output voltage of "THRTL POS SEN" at closed throttle position and note it.
- 9) Start engine (TCS switch "OFF").
- 10) Maintain the following conditions for at least 5 consecutive seconds.

CMPS-RPM (POS): 1,200 - 2,200 rpm

VHCL SPEED SE: 10 km/h (6 MPH) or more

B/FUEL SCHDL: 2.3 - 4.5 msec

THRTL POS SEN: X - (X + 0.52) V

X = Voltage value measured at step 7)

Selector lever: Suitable position

- 11) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-419.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

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TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

OR

OVERALL FUNCTION CHECK

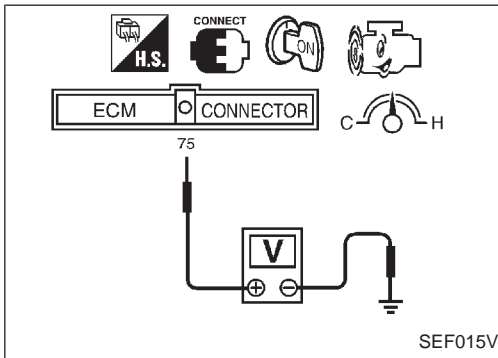
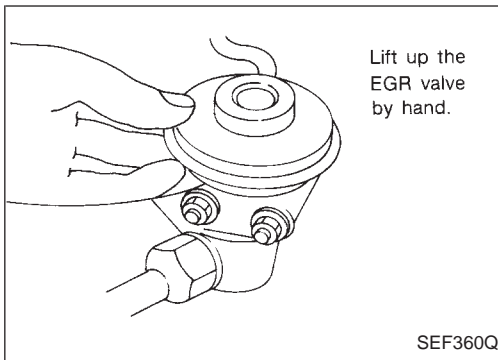
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.



- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P1402, EC-421.
- 4) Check voltage between ECM terminal 75 and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.

Voltage should decrease to less than 1.0V.

- 5) If step 4 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400 and P1400, EC-284, 413.
- 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-419.



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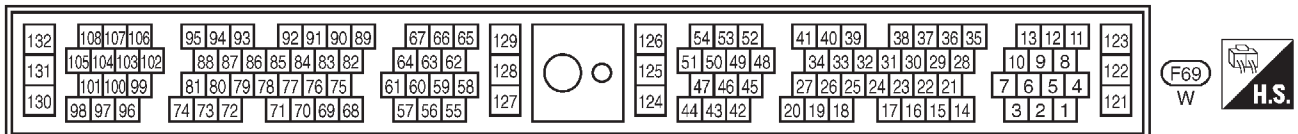
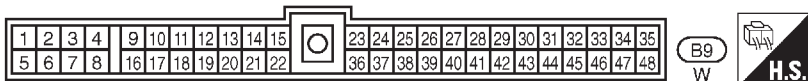
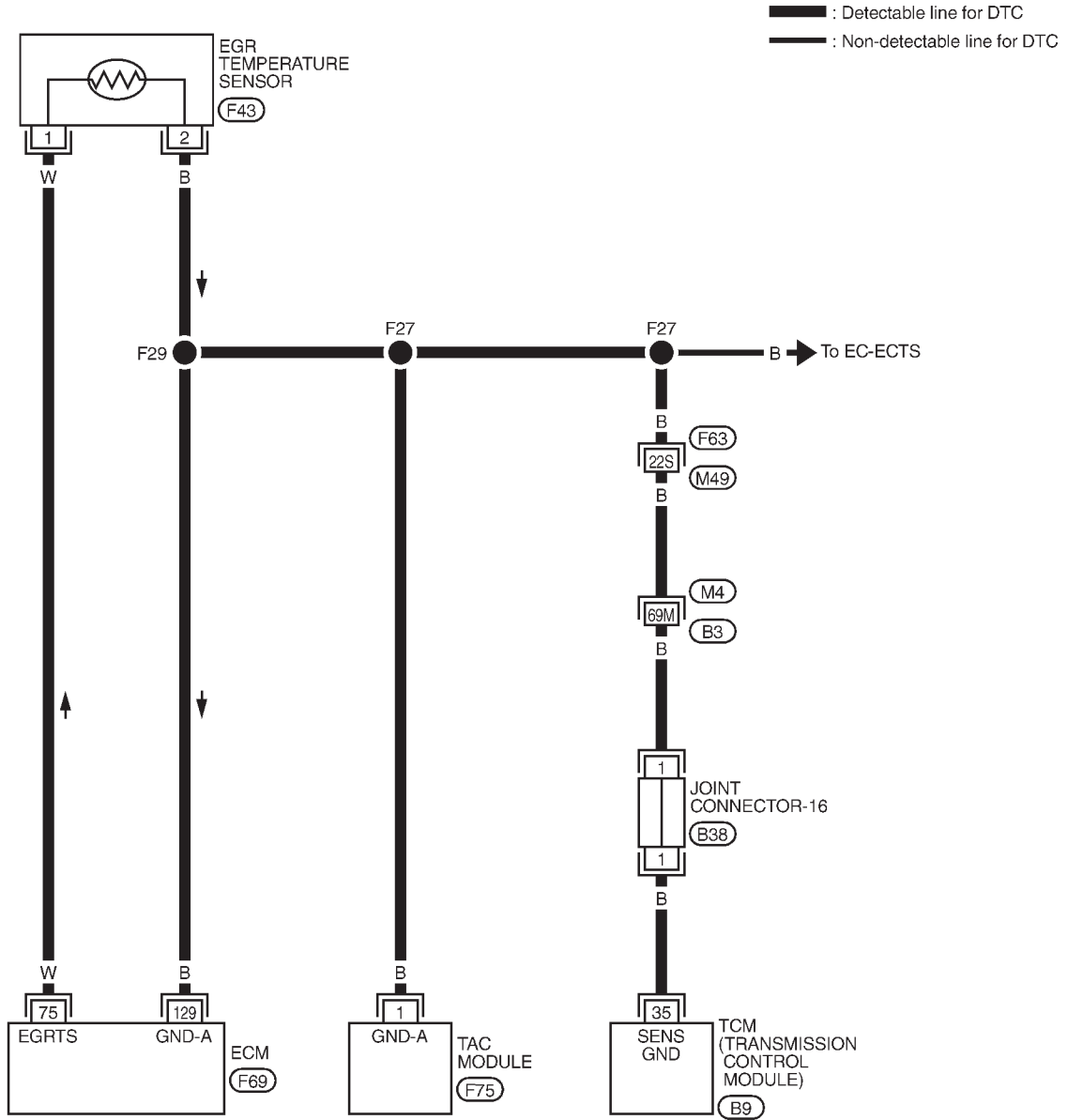
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TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

EC-EGR/TS-01



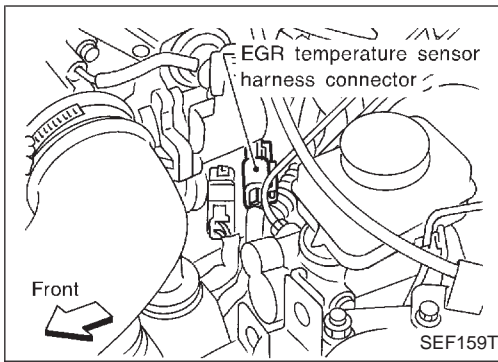
Refer to last page (Foldout page).

M4, B3
M49, F63

TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

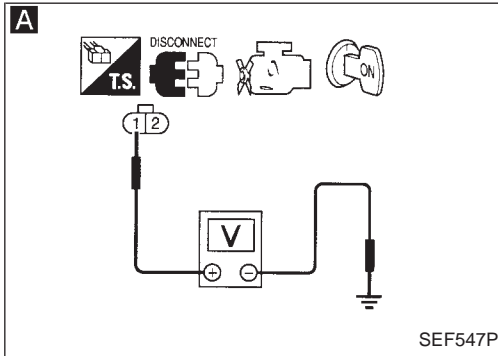
DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
 1. Disconnect EGR temperature sensor harness connector.
 2. Turn ignition switch "ON".
 3. Check voltage between terminal ① and ground with CONSULT-II or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

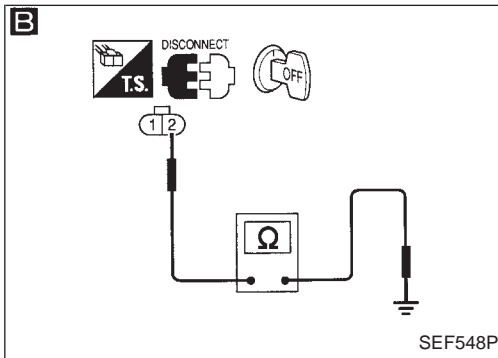


B
CHECK GROUND CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Check harness continuity between terminal ② and engine ground.
Continuity should exist.
 If OK, check harness for short to ground and short to power.

NG → Check the following.

- Harness connectors (F63), (M49)
- Harness connectors (M4), (B3)
- Joint connector-16
- Harness for open or short between ECM and EGR temperature sensor
- Harness for open or short between EGR temperature sensor and throttle actuator control (TAC) module
- Harness for open or short between TCM and EGR temperature sensor

If NG, repair open circuit or short to ground or short to power in harness or connectors.



OK →

CHECK COMPONENT
 (EGR temperature sensor).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGR temperature sensor.

OK → Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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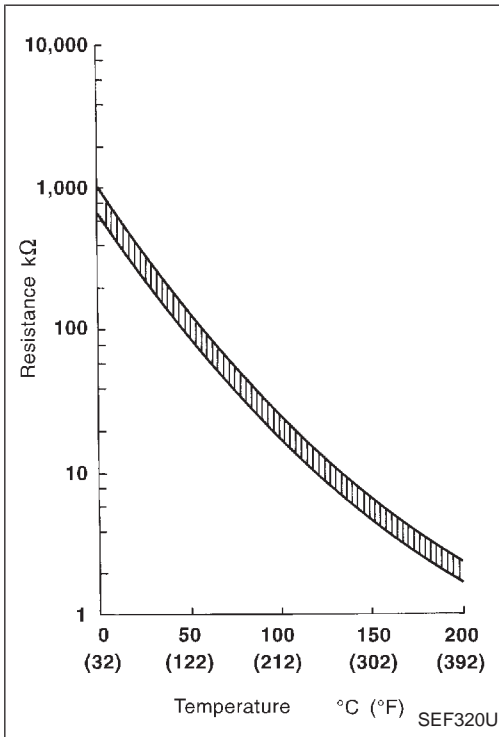
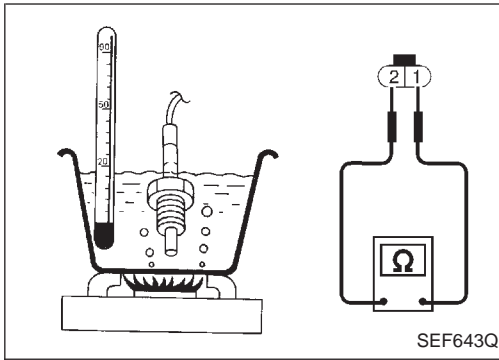
TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (Cont'd)

COMPONENT INSPECTION

EGR temperature sensor

Check resistance change and resistance value.

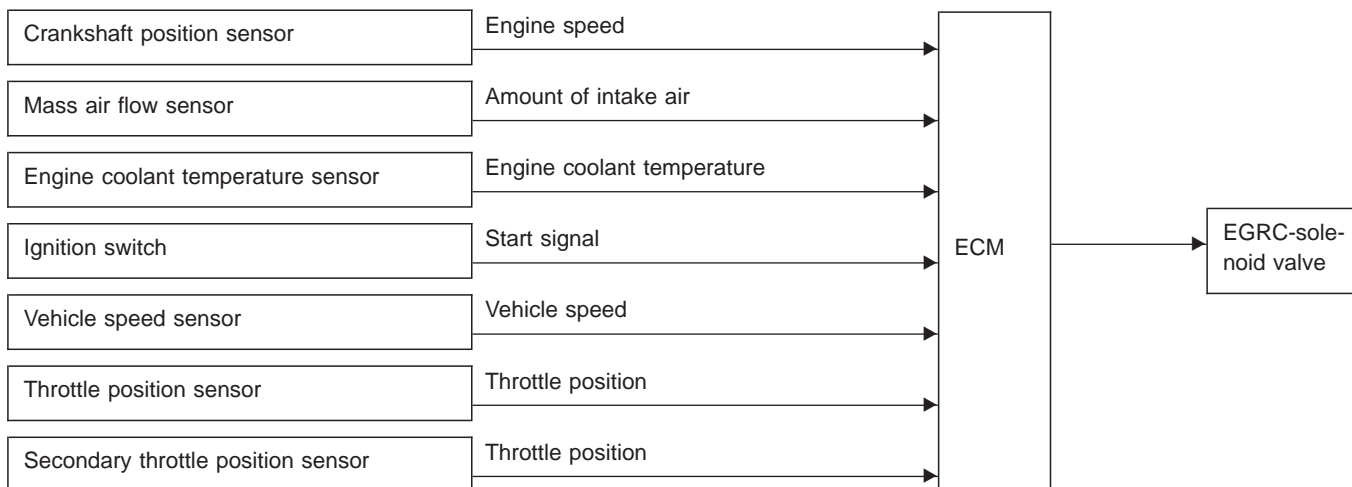


EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.092 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.

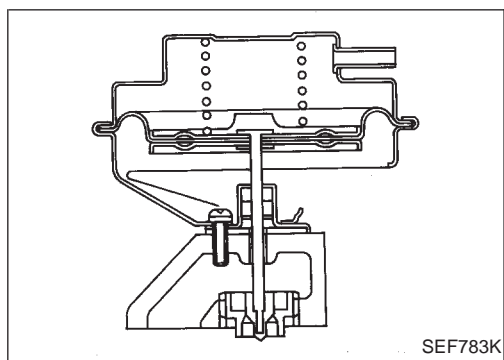
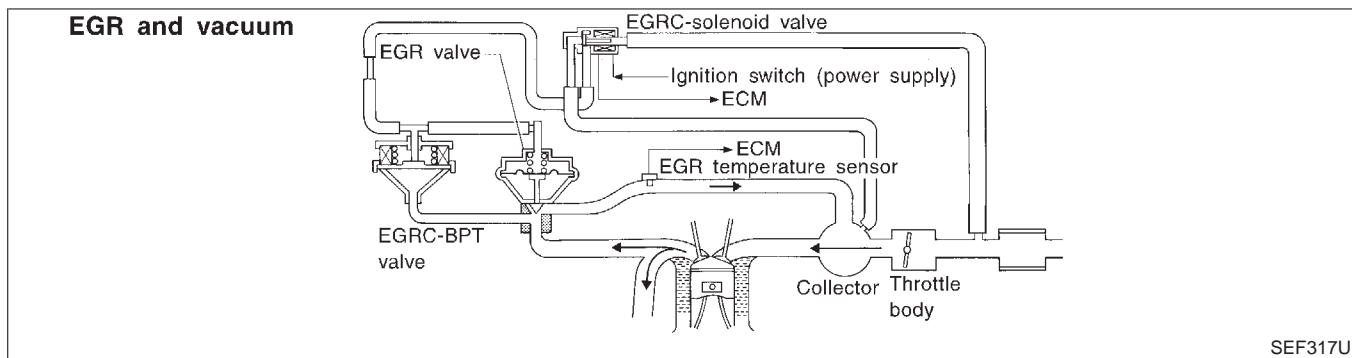
EGR Function (Open)

SYSTEM DESCRIPTION



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 flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve remain closed.

- Low engine coolant temperature
- Engine starting
- Engine stopped
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low vehicle speed
- TCS is operating



COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

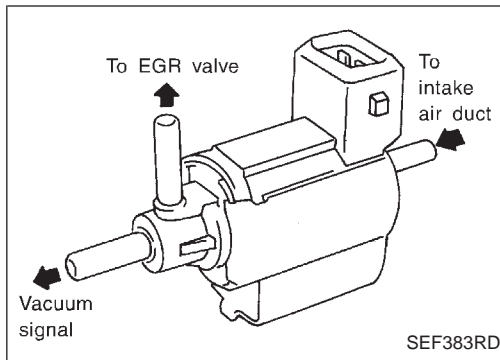
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

EGRC-solenoid valve

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 signal reaches to the EGR valve. When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

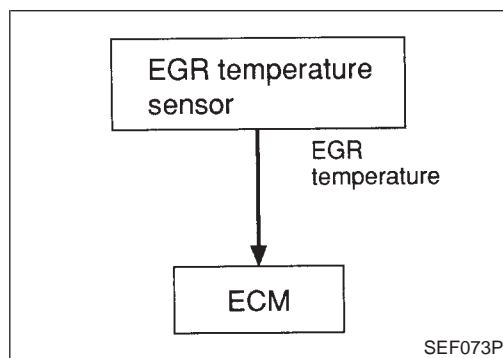
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	OFF
		Reving engine up from idle to 3,000 rpm	ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
75	W	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
			Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
10	L/Y	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Lift up drive wheels and rev engine up from idle to 3,000 rpm in "D" position.	0 - 0.7V
			Engine is running. (Warm-up condition) └ Idle speed	BATTERY VOLTAGE (11 - 14V)



ON BOARD DIAGNOSIS LOGIC

If 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.

TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402 0514	<ul style="list-style-type: none"> EGR flow is detected under conditions that do not call for EGR. 	<ul style="list-style-type: none"> EGRC-solenoid valve EGR valve leaking or stuck open EGR temperature sensor EGRC-BPT valve

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EGR SYSTEM P1402	
CHECK ENGINE COOLANT TEMP WITH DATA MONITOR. IS COOLANT TEMP BETWEEN -10 TO 40 °C.(14 TO 104 °F)	
MONITOR	
COOLAN TEMP/S	XXX °C

SEF808X

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

If “DIAGNOSTIC TROUBLE CODE 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 temperature above -10°C (14°F).
- Engine coolant temperature and EGR temperature must be verified in “DATA MONITOR” mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.
COOLAN TEMP/S: -10 to 40°C (14 to 104°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 coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.



- Turn ignition switch “OFF” and wait at least 5 seconds. Then turn ignition switch “ON”.
- Select “EGR SYSTEM P1402” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
- Follow instruction of CONSULT-II.
- Start engine and let it idle until “TESTING” on CONSULT-II screen is turned to “COMPLETED”. (It will take 70 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 40°C (14 to 104°F). Retry from step 1).

- Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”, EC-426.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
EGR TEMP SEN	XXX V
INT/A TEMP SE	XXX °C

SEF753X

EGR SYSTEM P1402	
OUT OF CONDITION	
MONITOR	
CMPS-RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

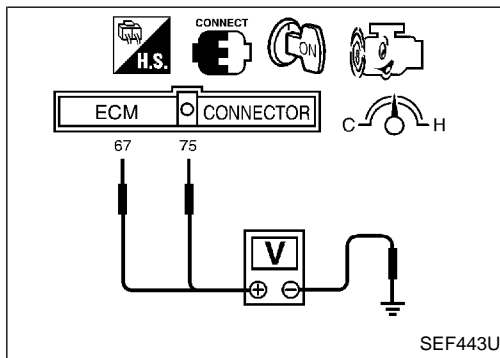
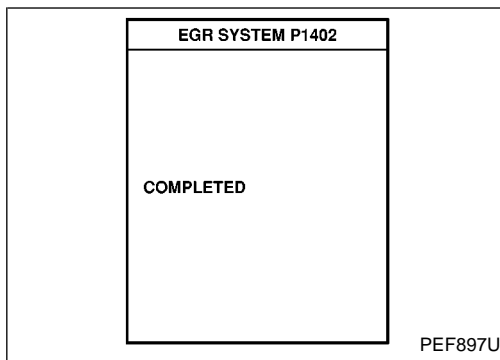
PEF245V

EGR SYSTEM P1402	
TESTING	
MONITOR	
CMPS-RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF246V

TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)



- OR
- 1) Turn ignition switch "ON" and select "MODE 1" with GST.
 - 2) Check that engine coolant temperature is within the range of -10 to 40°C (14 to 104°F).
 - 3) Check that voltage between ECM terminal 75 (EGR temperature) and ground is less than 4.8V.
 - 4) Start engine (TCS switch "OFF") and let it idle for at least 70 seconds.
 - 5) Stop engine.
 - 6) Perform the step 1) to 4) again.
 - 7) Select "MODE 3" with GST.
 - 8) If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-426.

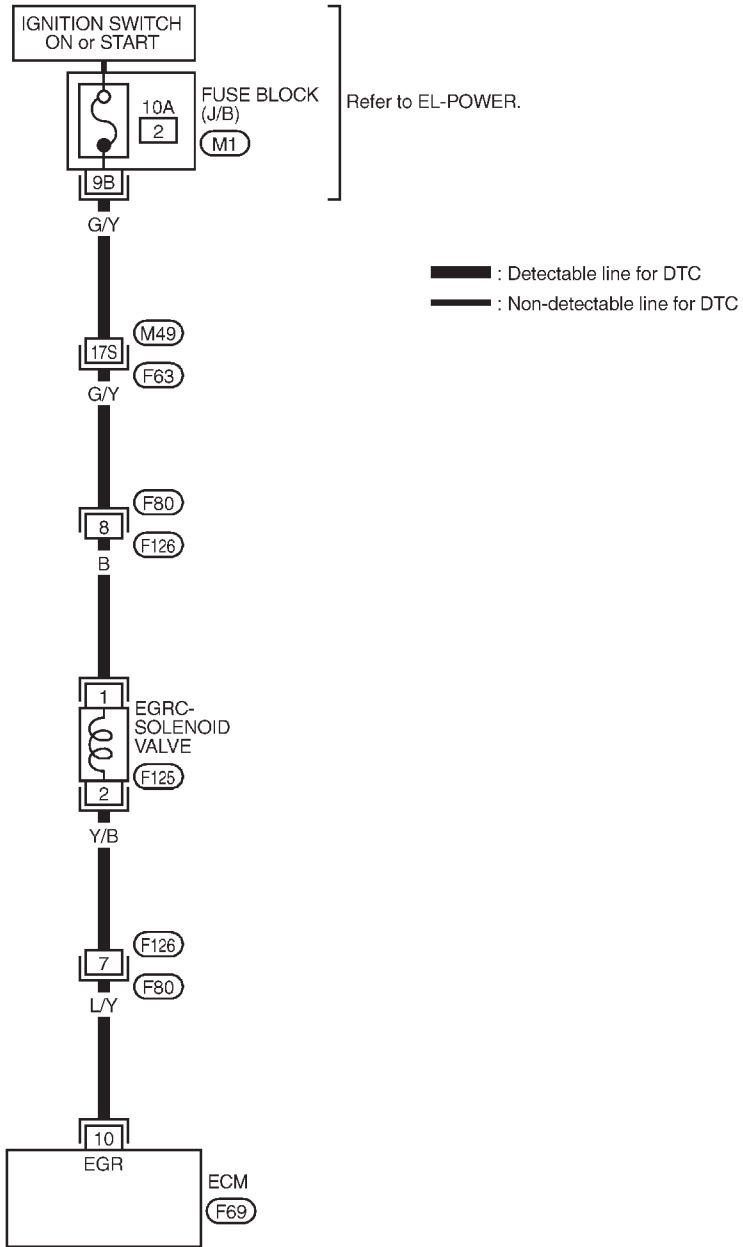
- OR
- 1) Turn ignition switch "ON".
 - 2) Check the following voltages.
ECM terminal 67 (Engine coolant temperature) and ground:
2.7 - 4.4V
ECM terminal 75 (EGR temperature) and ground:
Less than 4.8V
 - 3) Start engine and let it idle for at least 70 seconds.
 - 4) Turn ignition "OFF" and wait at least 5 seconds.
 - 5) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.
 - 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-426.

When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

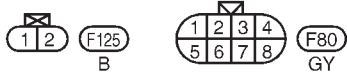
TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

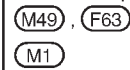
EC-EGRC/V-01



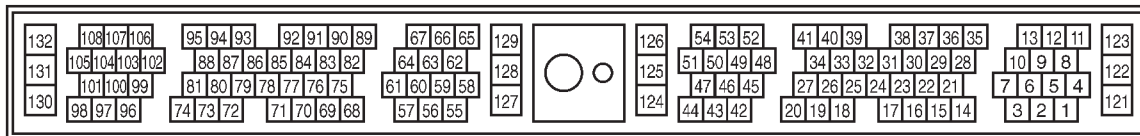
- GI
- MA
- EM
- LC
- EC**
- FE
- AT
- PD
- FA
- RA
- BR
- ST
- RS
- BT



Refer to last page (Foldout page).



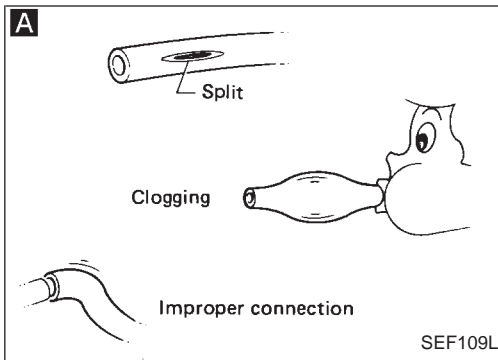
- HA
- EL
- IDX



TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

DIAGNOSTIC PROCEDURE

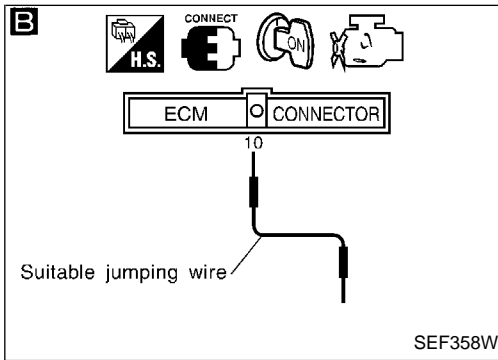


SEF109L

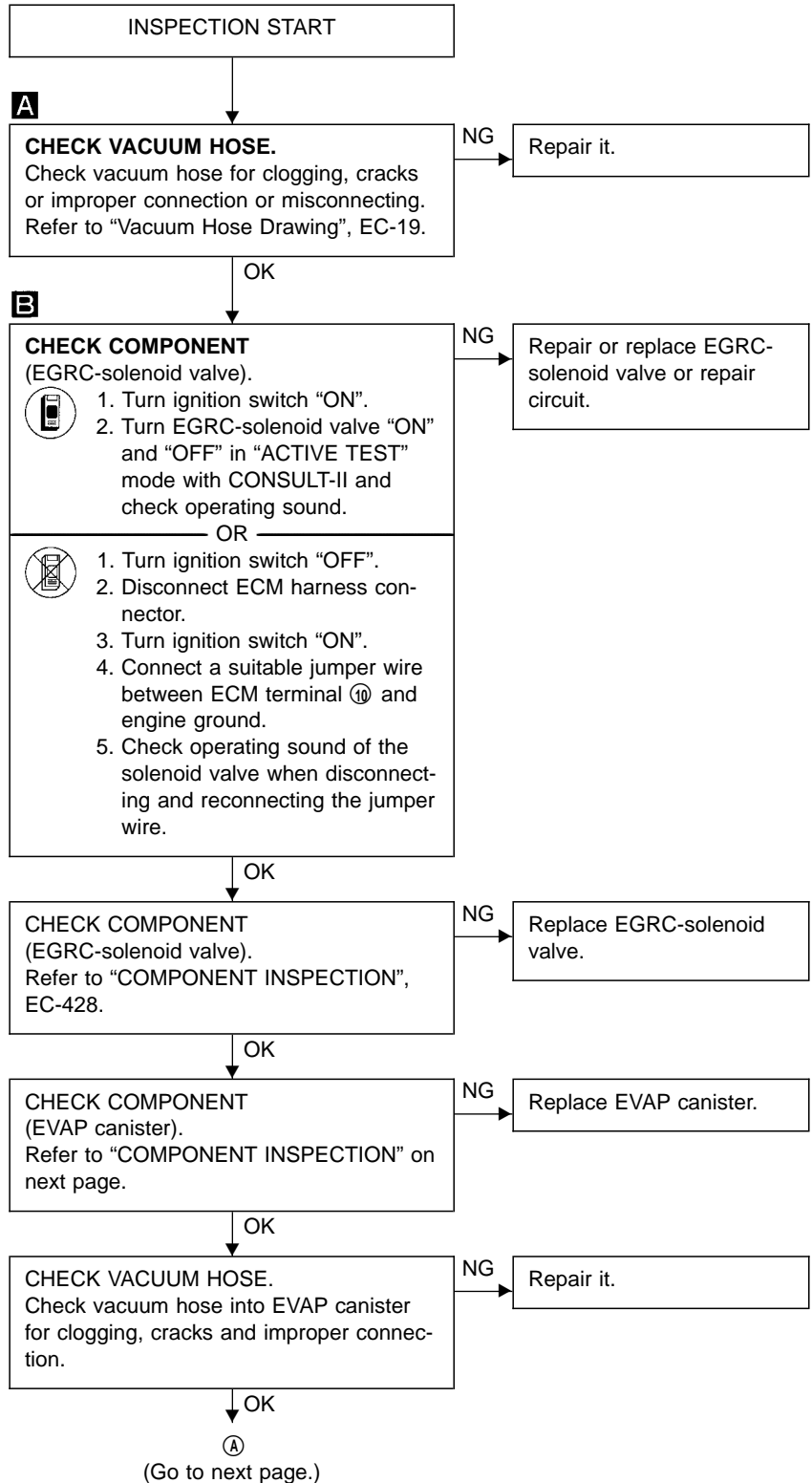
B

ACTIVE TEST	
EGRC SOLENOID VALVE	ON FLOW
MONITOR	
CMPS-RPM(POS)	XXX rpm

SEF764X

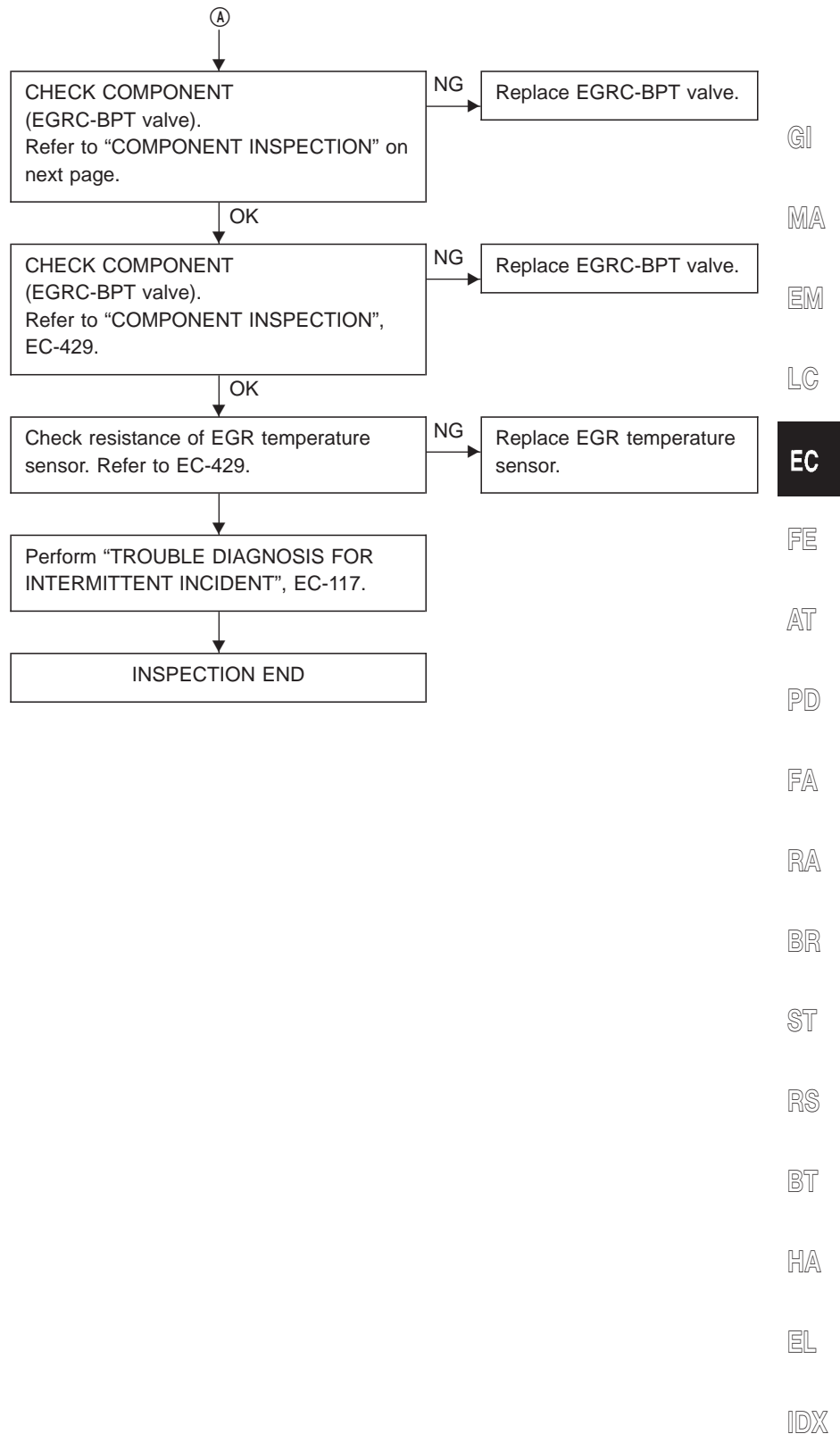


SEF358W



TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

COMPONENT INSPECTION

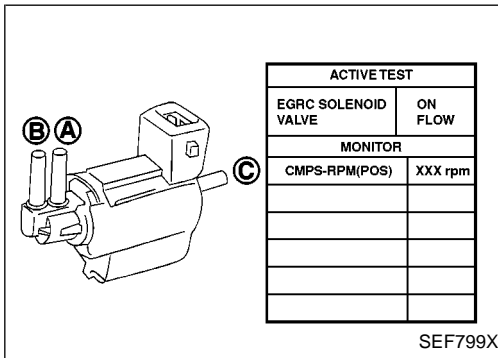
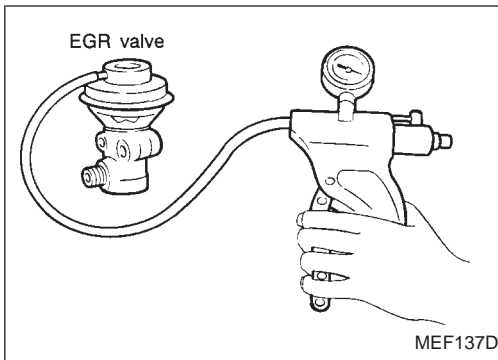
EGR valve

- Apply vacuum to EGR valve vacuum port with a hand vacuum pump.

EGR valve spring should lift.

- Check for sticking.

If NG, repair or replace EGR valve.



EGRC-solenoid valve

Check air passage continuity.

- Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

Condition EGRC SOLENOID VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

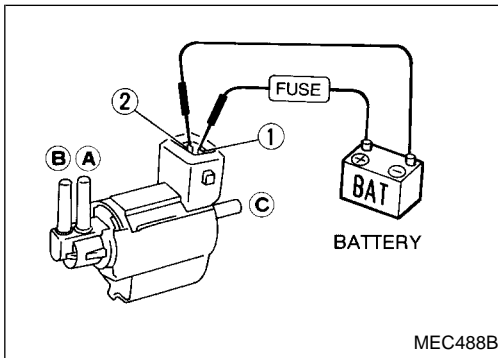
OR



Check solenoid valve, following the table as shown below:

Conditions	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace the solenoid valve.

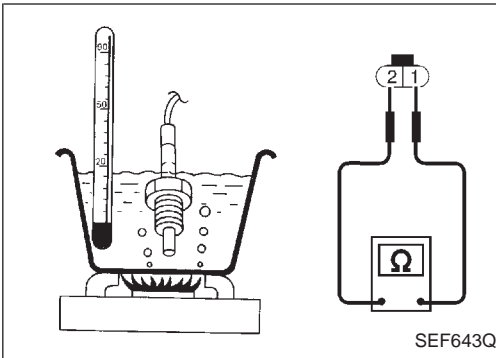


TROUBLE DIAGNOSIS FOR DTC P1402

EGR Function (Open) (Cont'd)

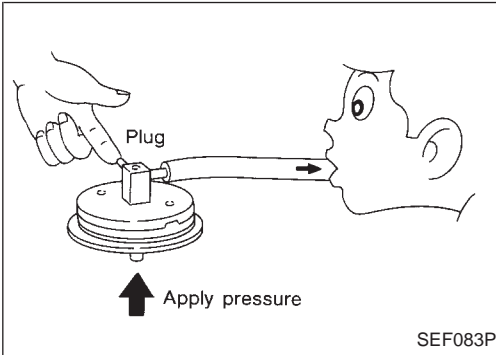
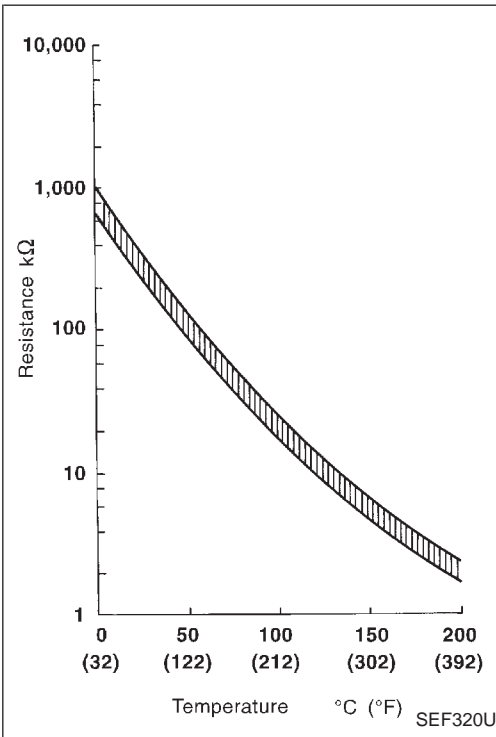
EGR temperature sensor

Check resistance change and resistance value.



EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.092 - 0.12
100 (212)	0.87	0.017 - 0.024

If NG, replace EGR temperature sensor.



EGRC-BPT valve

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 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

GI

MA

EM

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EC

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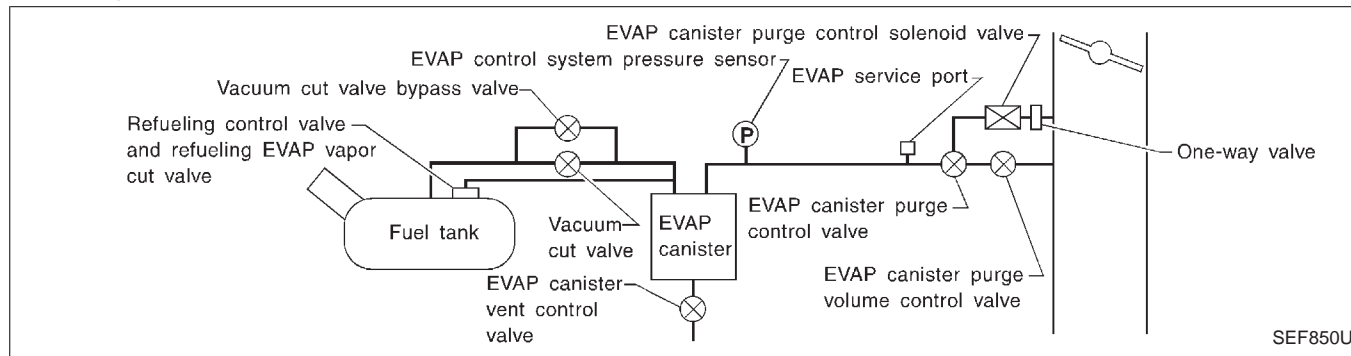
IDX

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure)

Note: If DTC P1448 is displayed with P1440, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. (See EC-462.)

ON BOARD DIAGNOSIS LOGIC

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 control 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 control valve.



ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1440 0213	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● 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 control 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 ● EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge control valve ● EVAP canister purge volume control valve ● EVAP canister purge 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.

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.

TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

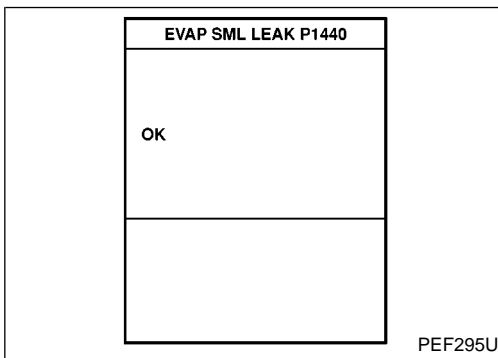
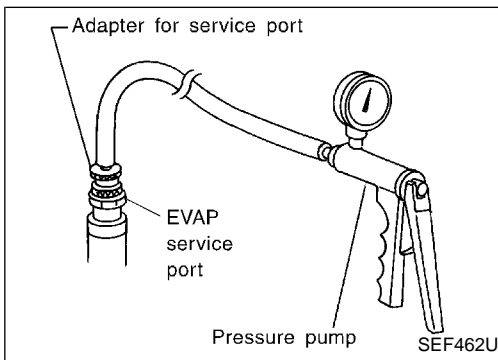
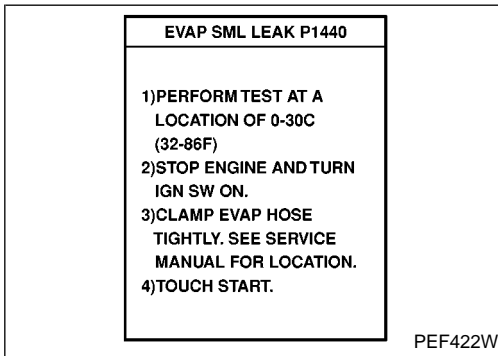
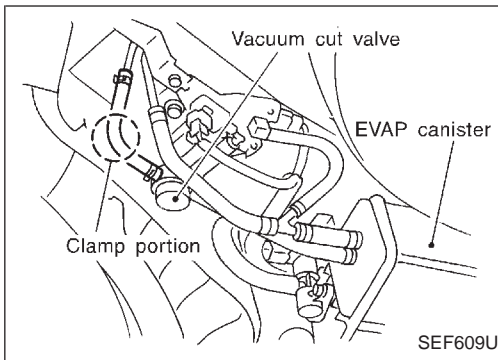
DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

- Never use compressed air or high pressure pump. Otherwise, EVAP system may be damaged.
- Do not start the engine.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
- Always remove service port adapter from service port after applying air up to 0.69 to 1.38 kPa (5.17 to 10.34 mmHg, 0.20 to 0.41 inHg).
- During the test, clamp the EVAP hose tightly as shown at left.
- When clamping the hose, do not clamp other than middle of the hose to prevent loose or damage of the hose.
- If DTC P1448 is displayed with P1440, perform TROUBLE DIAGNOSIS FOR DTC P1448 first. (See EC-462.)



- 1) Turn ignition switch "OFF".
- 2) Clamp the EVAP hose as shown left.
- 3) Turn ignition switch "ON".
- 4) Select "EVAP SML LEAK P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.
- 5) Make sure that "OK" is displayed. If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-433.

OR

- Be sure to read the explanation of "Driving pattern" on EC-56 before driving vehicle.
- It is better that the fuel level is low.



- 1) Start engine.
- 2) Drive vehicle according to "Driving pattern", EC-56.
- 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-56.
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P1447 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1447", EC-455.
 - If P0440 is displayed on the screen, go to "DIAGNOSTIC PROCEDURE", EC-299.
 - If P1440 is displayed on the screen, go to "TROUBLE DIAGNOSIS FOR DTC P1440", EC-433.
 - If P0440 and P1440 are not displayed on the screen, go to the following step.

GI

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IDX

**Evaporative Emission (EVAP) Control System
(Small Leak) (Positive Pressure) (Cont'd)**

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).

OR

- **Be sure to read the explanation of "Driving pattern" on EC-56 before driving vehicle.**
- **It is better that the fuel level is low.**

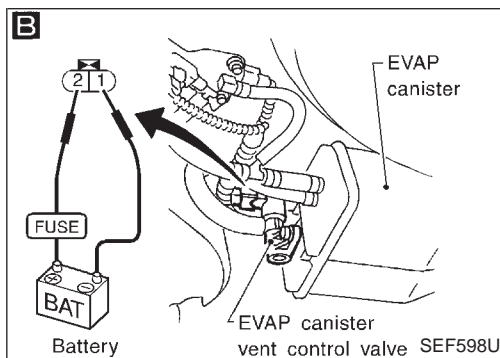
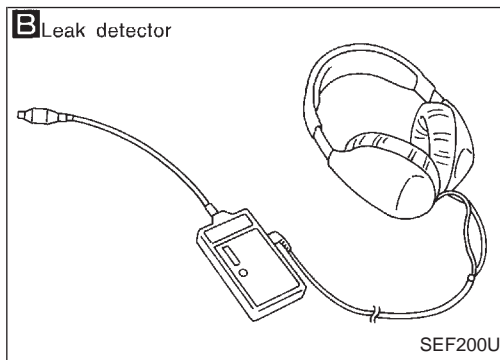
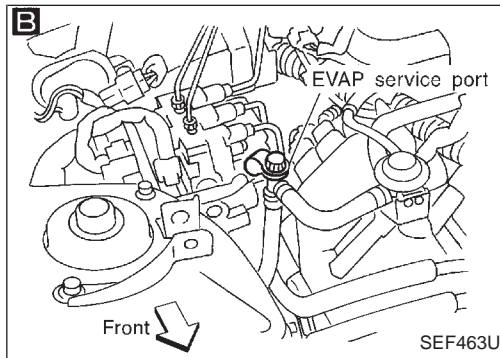
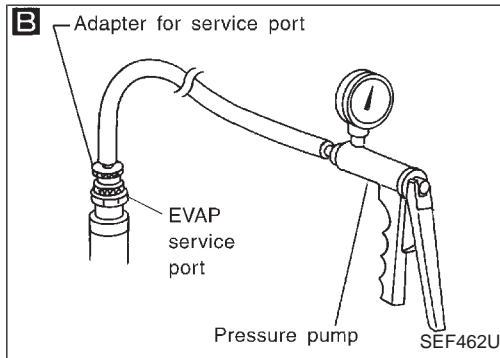
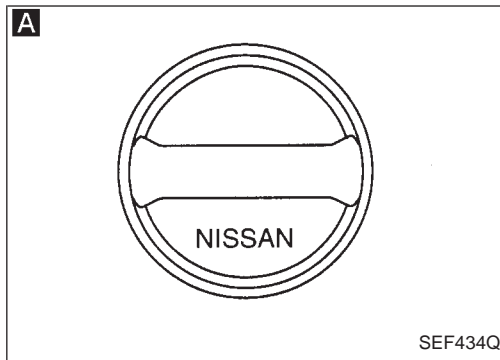


- 1) Start engine.
- 2) Drive vehicle according to "Driving pattern", EC-56.
- 3) Stop vehicle.
- 4) Turn ignition switch "OFF" and wait at least 5 seconds.
- 5) Turn ignition switch "ON" and perform "Diagnostic Test Mode (Self-diagnostic results)" with ECM.
- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-433.

TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK FUEL FILLER CAP.

1. Check for genuine NISSAN fuel filler cap design.
2. Check for air releasing sound while opening the fuel filler cap. If the air releasing sound is heard, go to **B**. If the air releasing sound is not heard, check the following.
 - Was the cap tightened properly?**

If Yes, check fuel filler cap vacuum relief valve. Refer to "EVAPORATIVE EMISSION SYSTEM", EC-27.

If No, open fuel filler cap, then clean cap and filler neck thread using air blower. Retighten until ratcheting sound is heard.

NG

If genuine NISSAN fuel filler cap is not used, replace with genuine NISSAN fuel filler cap.

OK

B

CHECK FOR EVAP LEAK.

- Never use compressed air or a high pressure pump.
- Improper installation of service port may cause a leak.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

To locate the EVAP leak, do the following.

1. Install the EVAP service port adapter and the pressure pump securely.
2. Turn ignition switch "ON". Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply positive pressure to the EVAP line.
4. Using EVAP leak detector, locate the leak. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

NG

Repair or replace.

OR

2. Turn ignition switch "OFF".
3. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
4. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)
5. Pressurize the EVAP line using pressure gauge with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and service port adapter.
6. Locate the leak using a leak detector. Refer to the instruction manual for more details about the leak detector. Refer to "Evaporative Emission Line Drawing", EC-29.

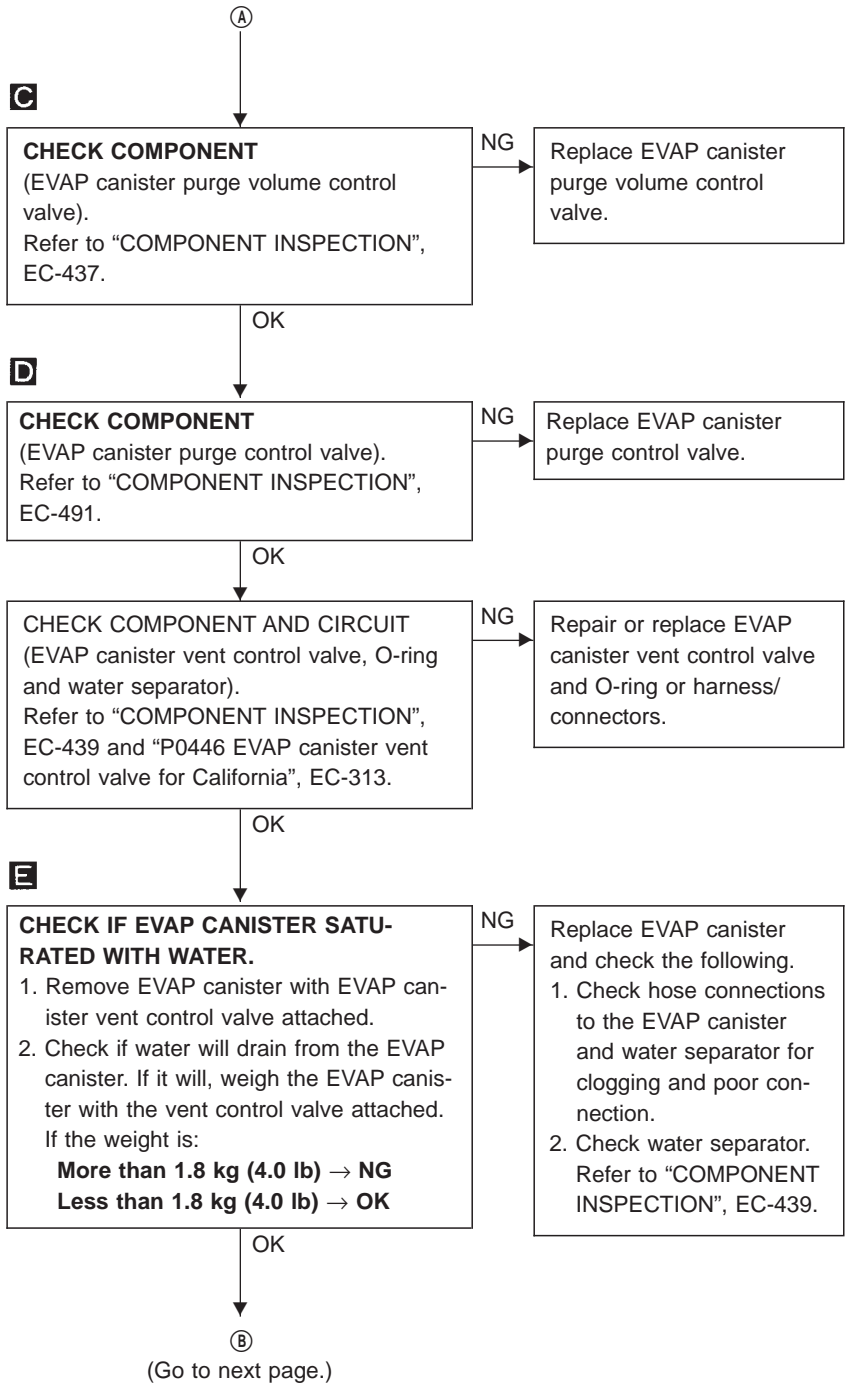
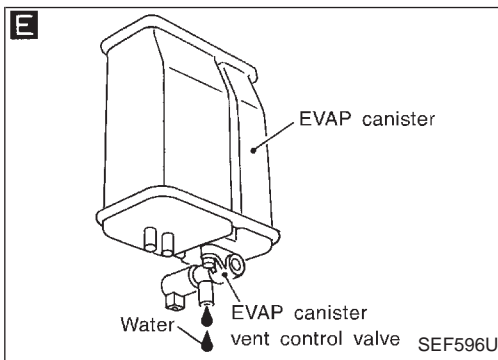
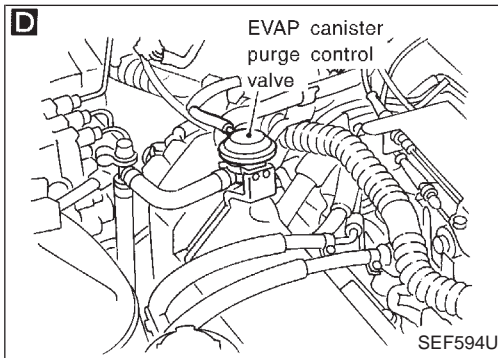
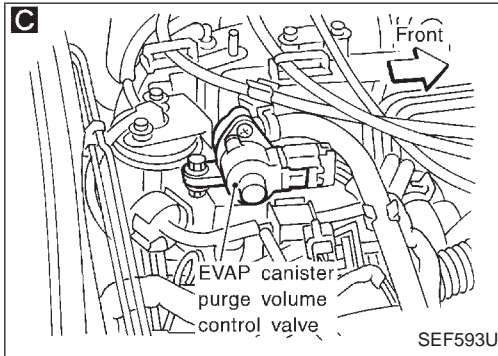
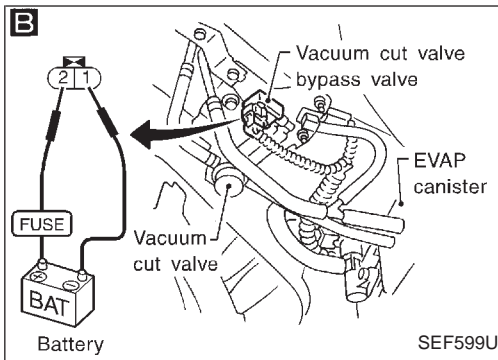
OK

(Go to next page.)

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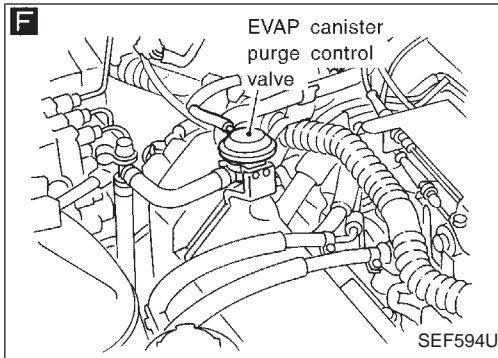
TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P1440

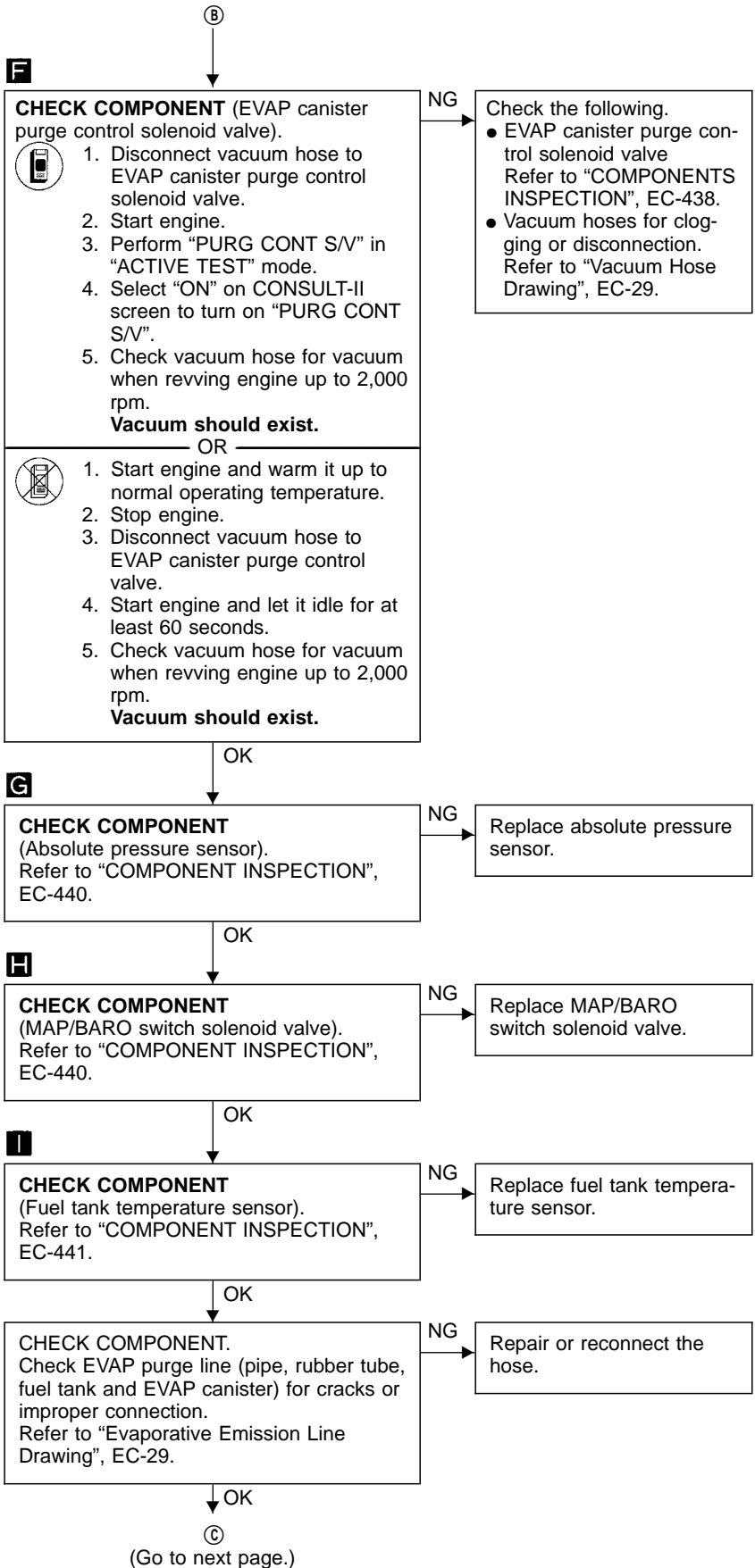
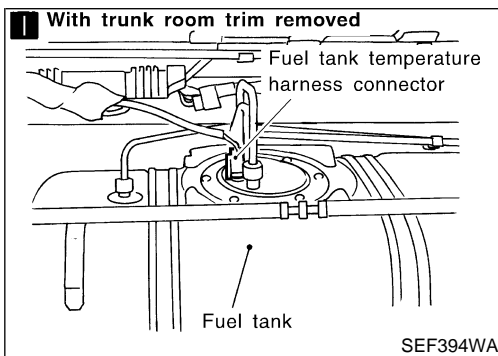
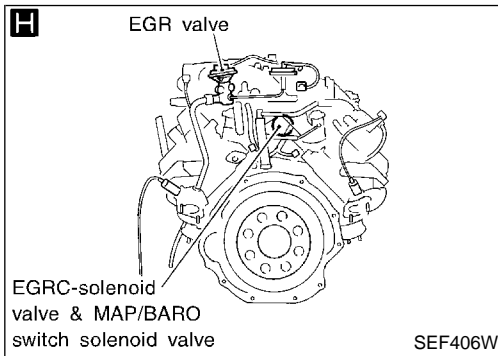
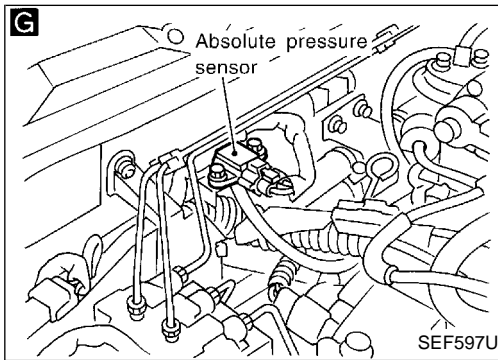
Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)



F

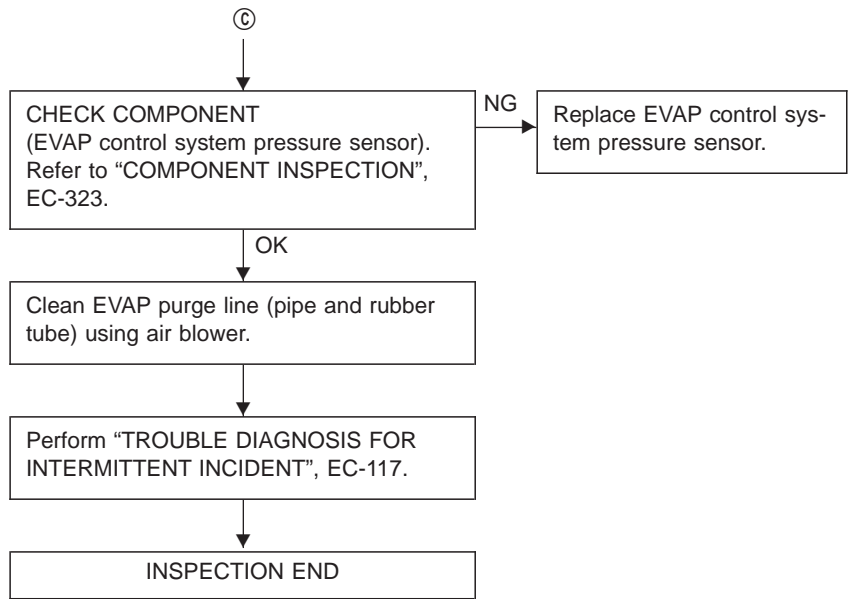
ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

SEF765X



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IDX

**Evaporative Emission (EVAP) Control System
(Small Leak) (Positive Pressure) (Cont'd)**



TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve

1. Disconnect EVAP canister purge volume control valve harness connector. GI
2. Check resistance between the following terminals. MA
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)] EM

3. Reconnect EVAP canister purge volume control valve harness connector. LC
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve. EC

(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)

5. Turn ignition switch "ON". FE
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening. AT
If NG, replace the EVAP canister purge volume control valve. PD

OR

1. Disconnect EVAP canister purge volume control valve harness connector. FA
2. Check resistance between the following terminals. RA
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

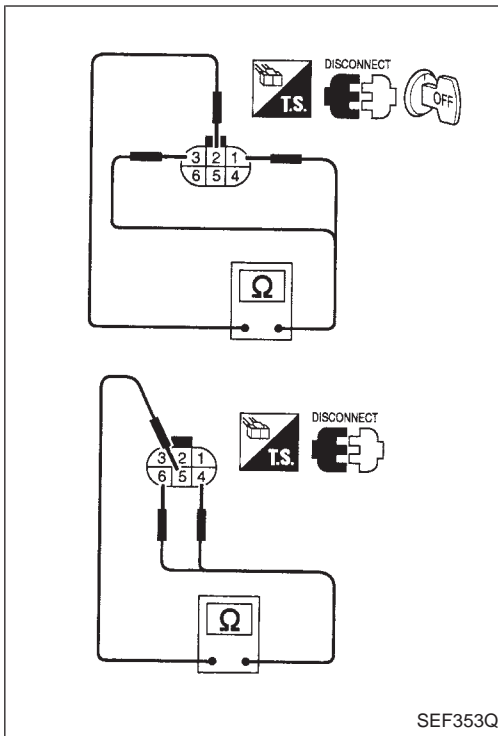
Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)] BR

3. Reconnect EVAP canister purge volume control valve harness connector. ST
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve. RS

(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)

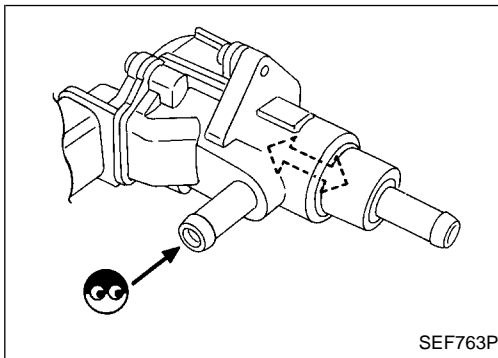
5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position. BT
If NG, replace the EVAP canister purge volume control valve. HA



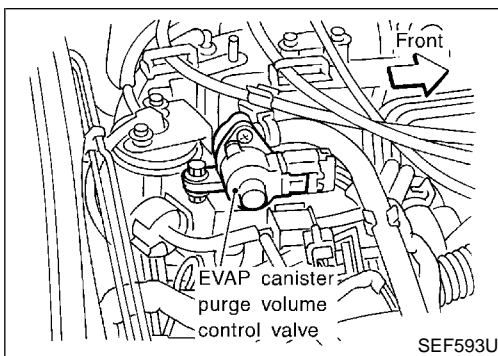
SEF353Q

ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF766X



SEF763P



SEF593U

TROUBLE DIAGNOSIS FOR DTC P1440

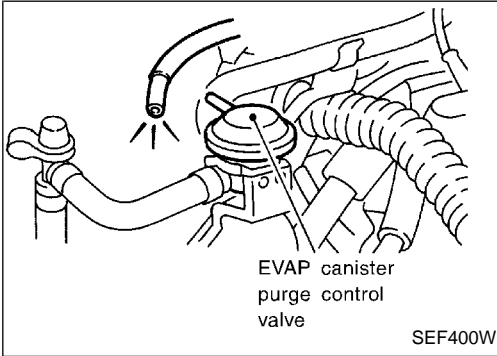
Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

EVAP canister purge control solenoid valve

1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Disconnect vacuum hose at EVAP canister purge control valve.
5. Touch "ON" and "OFF" and check for vacuum passing through the hose.

ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

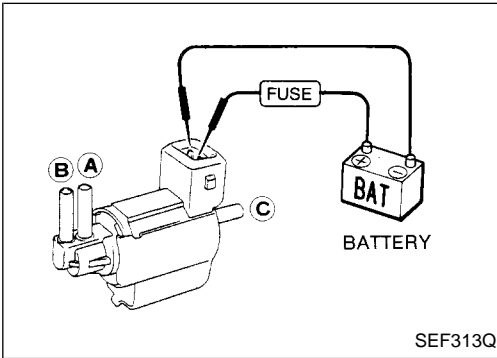
SEF765X



Condition	Vacuum
Idle	Not exist
2,000 rpm	Exist

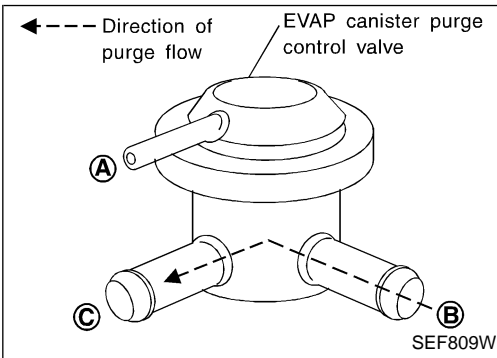
OR

- 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	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace solenoid valve.



EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

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

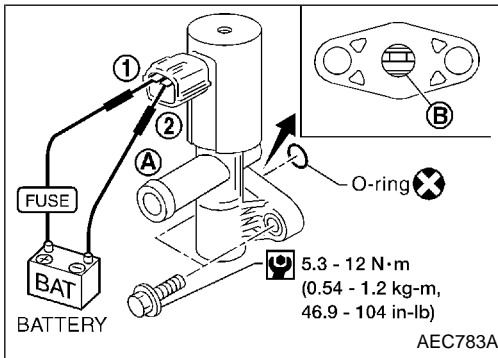
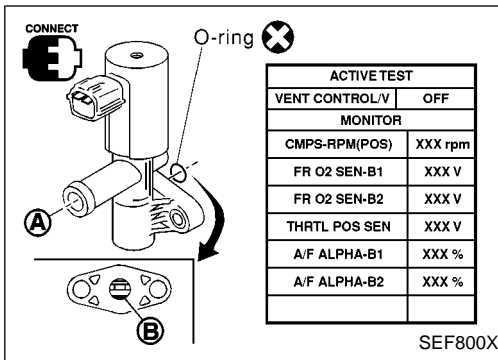
TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V	
ON	No
OFF	Yes

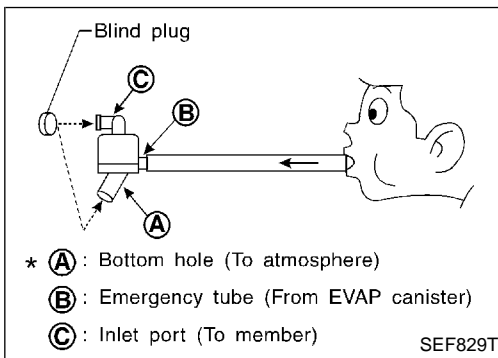
OR

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 the portion (B) is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.



Water separator

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.

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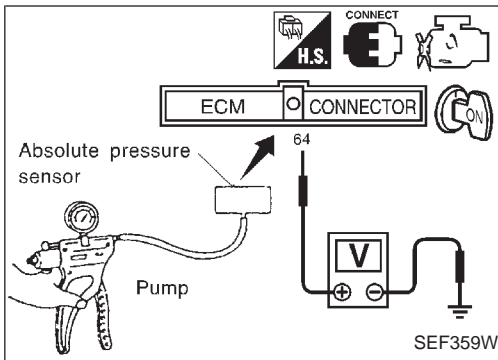
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TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

Absolute pressure sensor



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 terminal 64 and 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.

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

SEF767X

MAP/BARO switch solenoid valve

1. Start engine and warm it up sufficiently.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
 - Condition: At idle under no-load
 - CONSULT-II display

MAP/BARO SW/V	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	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

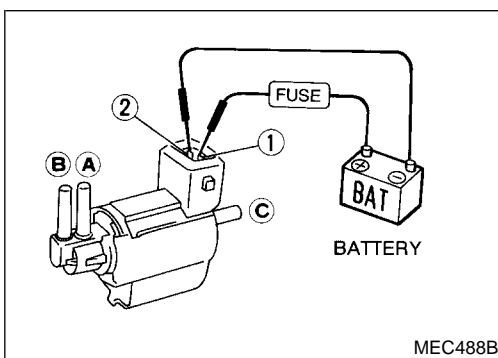
4. If NG, check solenoid valve as shown below.

OR

1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF768X



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

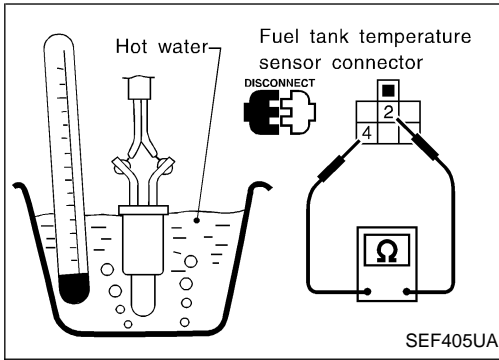
3. If NG or operation takes more than 1 second, replace solenoid valve.

TROUBLE DIAGNOSIS FOR DTC P1440

Evaporative Emission (EVAP) Control System (Small Leak) (Positive Pressure) (Cont'd)

Fuel tank temperature sensor

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.

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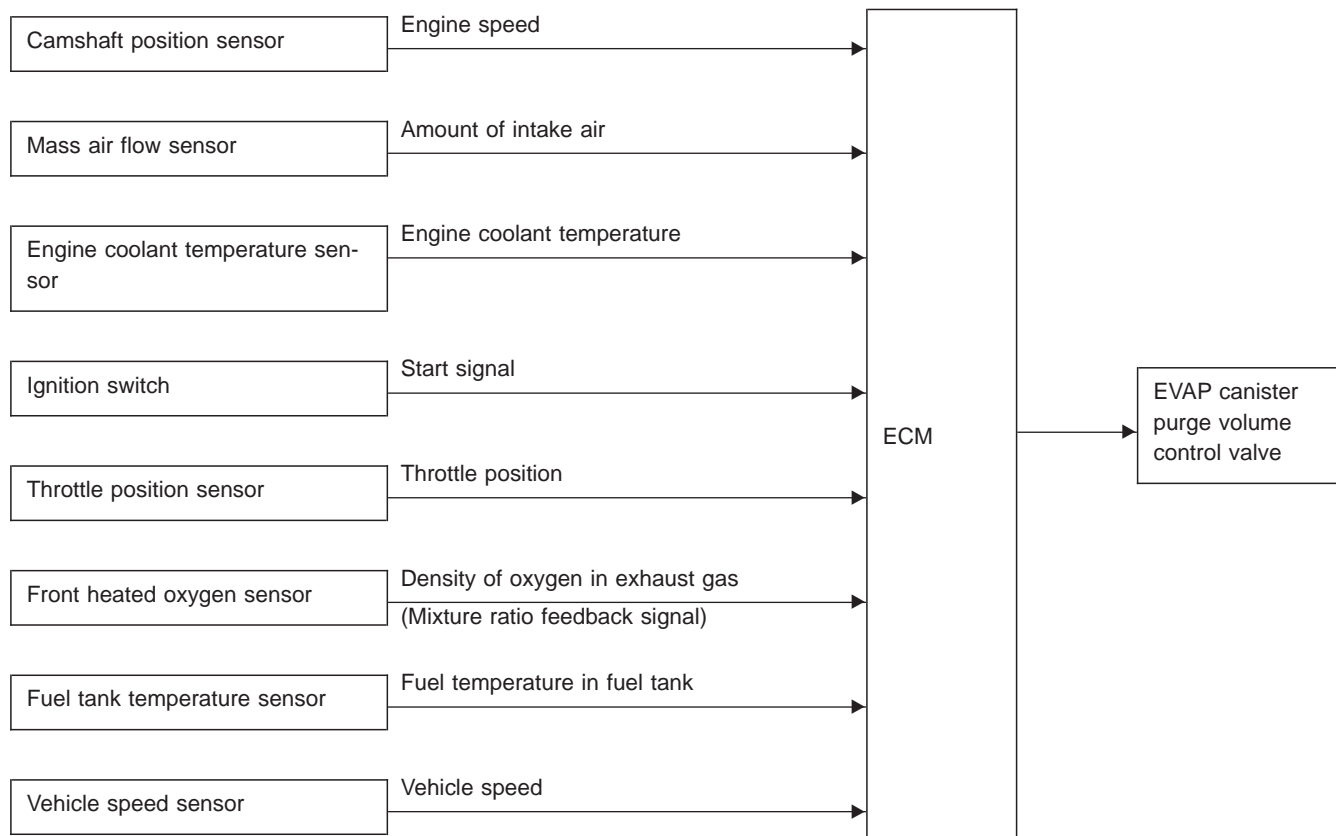
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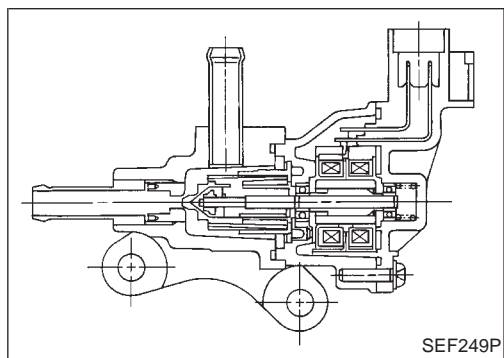
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Evaporative Emission (EVAP) Canister Purge Volume Control Valve

SYSTEM DESCRIPTION



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 valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

The EVAP canister purge volume control valve uses a step motor to control the flow rate of fuel vapor from the EVAP canister. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF"	Idle
		Vehicle running (Shift lever "1")
		0 step
		—

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	W/B	ECCS relay (Self-shutoff)	Engine is running.	0 - 1V
			Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
130	R/G	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
131				
123	W/L	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
28	BR/Y	EVAP canister purge volume control valve	Engine is running.	0 - 0.4V or BATTERY VOLTAGE (11 - 14V)
29	G		└ Idle speed	
35	G/OR	EVAP canister purge volume control valve	Engine is running.	0 - 0.4V or BATTERY VOLTAGE (11 - 14V)
36	L/B		└ Idle speed	

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1444 0214	<ul style="list-style-type: none"> The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control valve is completely closed. 	<ul style="list-style-type: none"> EVAP control system pressure sensor EVAP canister purge volume control valve (The valve is stuck open.) EVAP canister purge control valve Hoses (Hoses are connected incorrectly or clogged.) EVAP canister vent control valve

TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

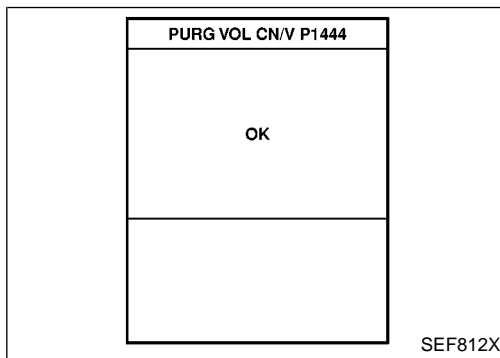
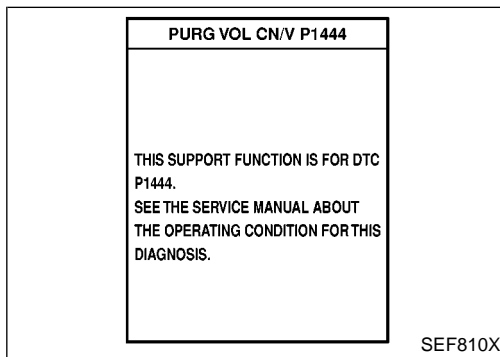
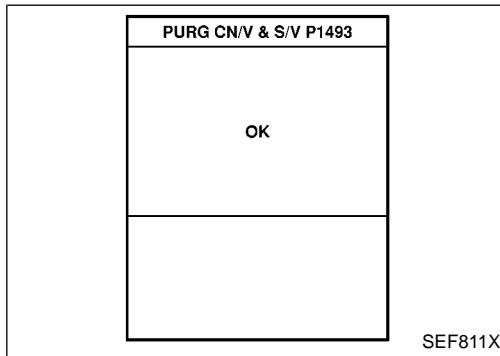
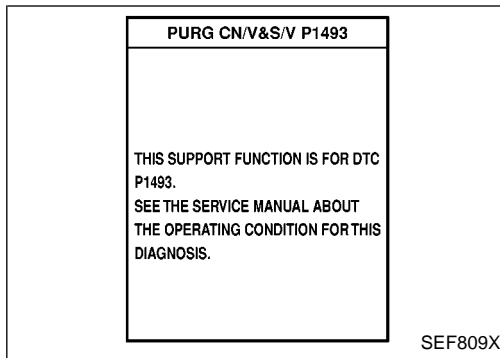
- If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at temperature above 0°C (32°F).



- 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 CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
 - 5) Touch "START".
 - 6) Start engine (TCS switch "OFF") and let it idle for at least 90 seconds.
 - 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take for at least 30 seconds.)
Selector lever: Suitable position
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)
CMPS-RPM (POS): 900 - 6,300 rpm
B/FUEL SCHDL: 2 - 4.8 msec
 - 8) Stop vehicle with engine running.
 - 9) Select "PURG VOL C/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
 - 10) Touch "START".
 If "COMPLETED" is displayed, go to step 12).
 - 11) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take for at least 20 seconds.)
Selector lever: Suitable position
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)
CMPS-RPM (POS): 900 - 6,300 rpm
B/FUEL SCHDL: 2 - 4.8 msec
- If "TESTING" is not displayed after 5 minutes, retry from step 2).
- 12) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-446.



TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

ENGINE SPD	825RPM
COOLANT TEMP	69°C
VEHICLE SPD	0MPH
IGN ADVANCE	8.0°
CALC LOAD	28.2%
MAP	36KPaA
MAF	5.20gm/s
THROTTLE POS	0.0%
INTAKE AIR	27°C
FUEL SYS #1	OLDRIVE
FUEL SYS #2	UNUSED
SHORT FT #1	0.8%
LONG FT #1	0.0%
O2S B1 S1	0.200V
O2FT B1 S1	0.8%
O2S B1 S2	0.010V

SEF519R



- OR
- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
 - 2) Select "MODE 1" with GST.
 - 3) Check coolant temperature.

Coolant temperature: 40 - 100°C (104 - 212°F)

Be sure that water temperature does not exceed 100°C (212°F). If it becomes higher than 100°C (212°F), cool down the engine and perform the procedure again from the beginning.

- 4) Turn ignition switch "OFF" and wait at least 5 seconds.
- 5) Turn ignition switch "ON" and wait at least 15 seconds.
- 6) Restart engine and let it idle for at least 80 seconds.
- 7) Maintain the following conditions for at least 80 seconds.

Gear position: Suitable gear position

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

Engine speed: 900 - 6,300 rpm

Coolant temperature: 40 - 100°C (104 - 212°F)

- 8) Select "MODE 7" with GST.
- 9) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-446.

NOTE:

- Hold the accelerator pedal as steady as possible during driving in steps 7.
- If the driving conditions are not satisfied in steps 7, restart the procedure.
- It is better that the fuel level is low.



- OR
- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
 - 2) Check voltage between ECM terminal ⑥7 and ground

Voltage: 0.8 - 1.5V

Perform the following procedure before the voltage drops below 0.8V. If the voltage drops below 0.8V, cool down the engine and perform the entire procedure all over again.

- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON" and wait at least 15 seconds.
- 5) Restart engine and let it idle for at least 80 seconds.
- 6) Maintain the following conditions for at least 80 seconds.

Gear position: Suitable gear position

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

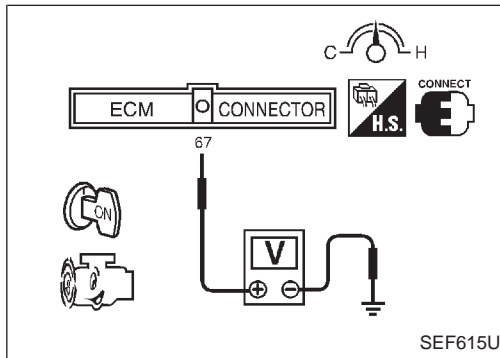
Engine speed: 900 - 6,300 rpm

Check voltage between ECM terminal ⑥7 and ground: 0.8 - 1.5V

- 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-446.

NOTE:

- Hold the accelerator pedal as steady as possible during driving in steps 6.
- If the driving conditions are not satisfied in steps 6, restart the procedure.
- It is better that the fuel level is low.

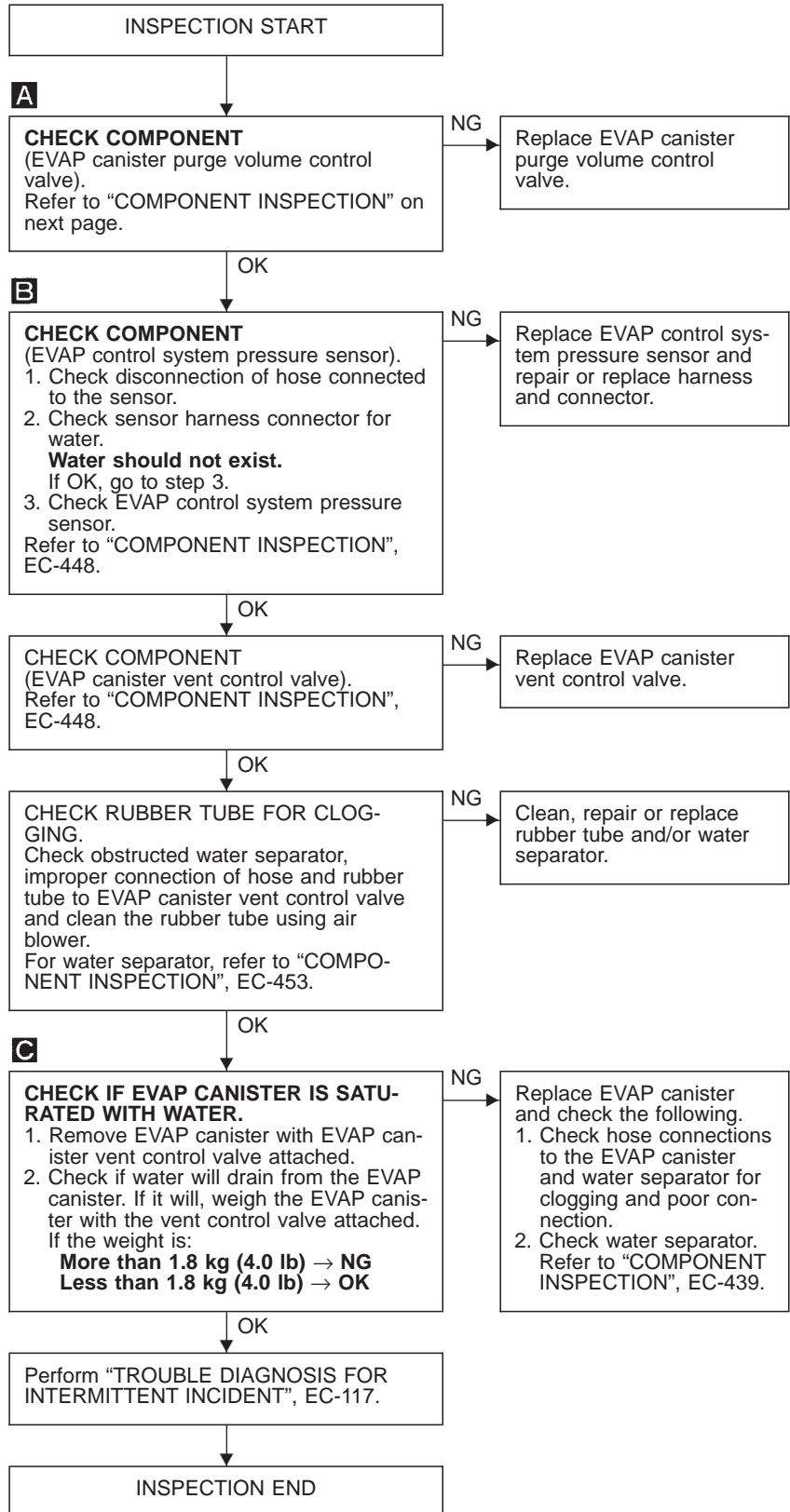
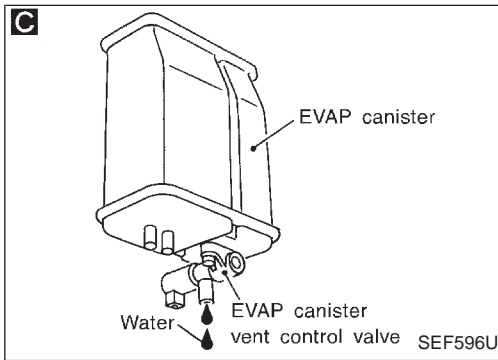
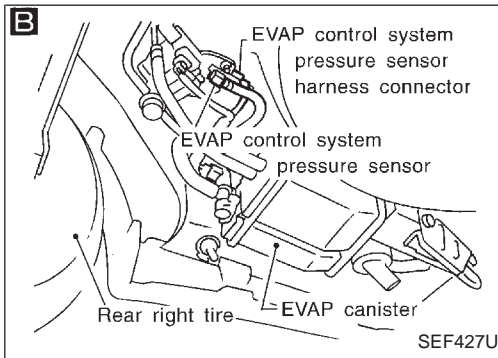
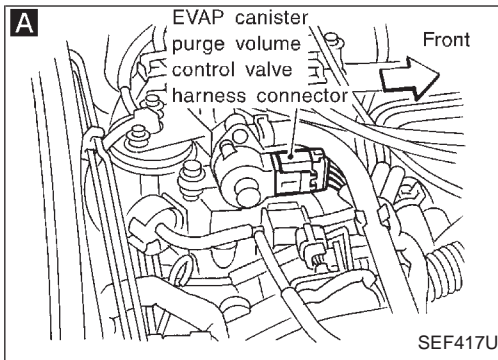


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TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

DIAGNOSTIC PROCEDURE

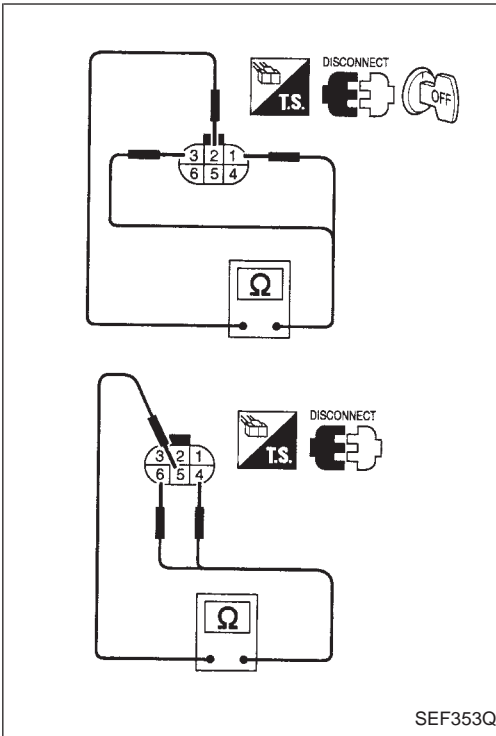


TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

COMPONENT INSPECTION

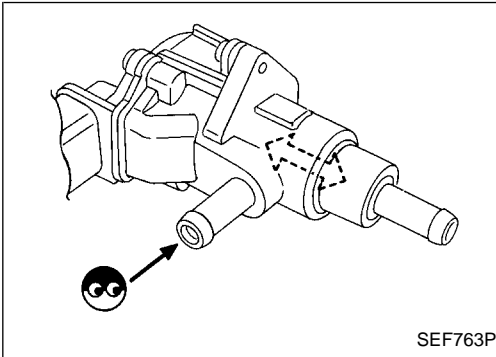
EVAP canister purge volume control valve



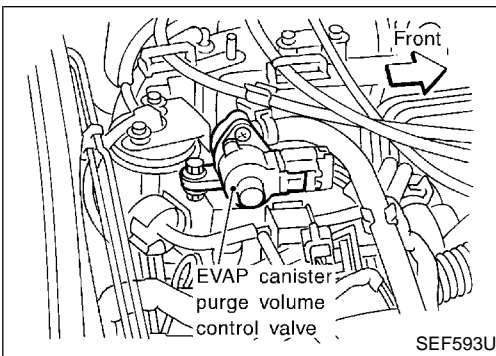
SEF353Q

ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF766X



SEF763P



SEF593U

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

GI

MA

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

EM

3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)

LC

EC

5. Turn ignition switch "ON".
6. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening. If NG, replace the EVAP canister purge volume control valve.

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OR

1. Disconnect EVAP canister purge volume control valve harness connector.
2. Check resistance between the following terminals.
terminal ② and terminals ① , ③
terminal ⑤ and terminals ④ , ⑥

FA

RA

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

BR

3. Reconnect EVAP canister purge volume control valve harness connector.
4. Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)

ST

RS

5. Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position. If NG, replace the EVAP canister purge volume control valve.

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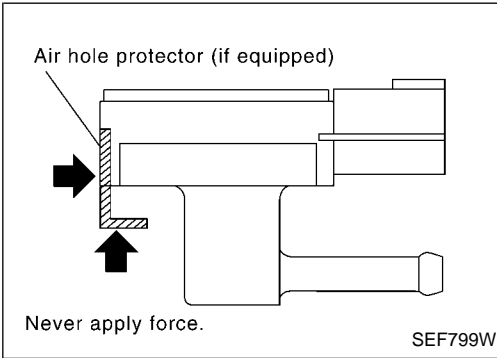
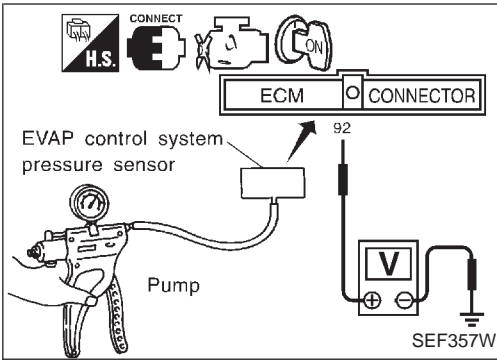
TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

COMPONENT INSPECTION

EVAP control system pressure sensor

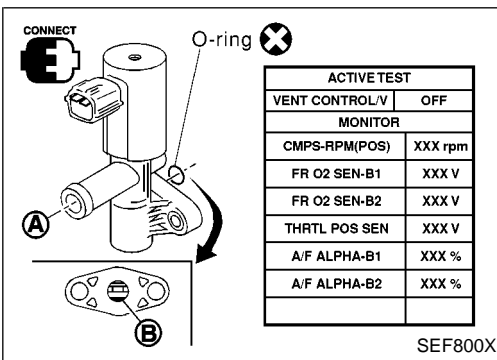
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check output voltage between ECM terminal 92 and ground.



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.
- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure 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.



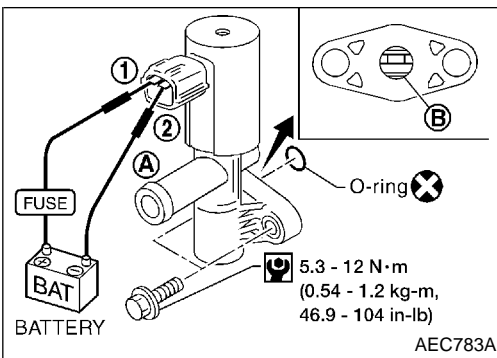
EVAP canister vent control valve

Check air passage continuity.

- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.

Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V	
ON	No
OFF	Yes

OR



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.

TROUBLE DIAGNOSIS FOR DTC P1444

Evaporative Emission (EVAP) Canister Purge Volume Control Valve (Cont'd)

If the portion ③ is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.

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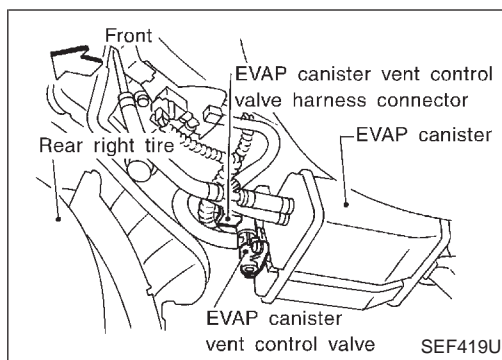
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Evaporative Emission (EVAP) Canister Vent Control Valve (Close)

COMPONENT DESCRIPTION

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid (the EVAP canister vent control 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-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	P/B	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1446 0215	● EVAP canister vent control valve remains closed under specified driving conditions.	<ul style="list-style-type: none"> ● 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.

TROUBLE DIAGNOSIS FOR DTC P1446

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

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- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine (TCS switch "OFF").
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-452.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

OR



Follow the procedure "With CONSULT-II" above.

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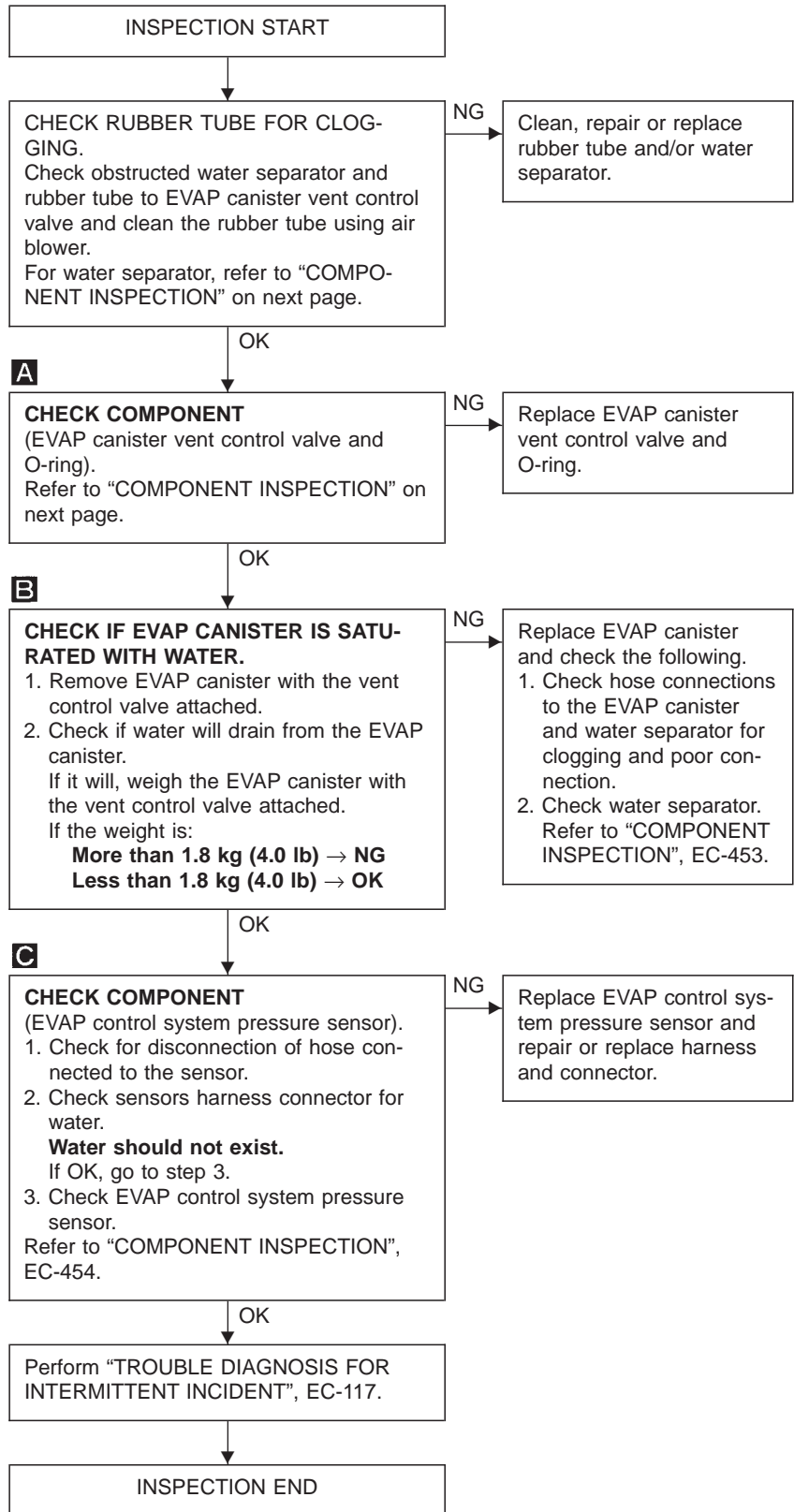
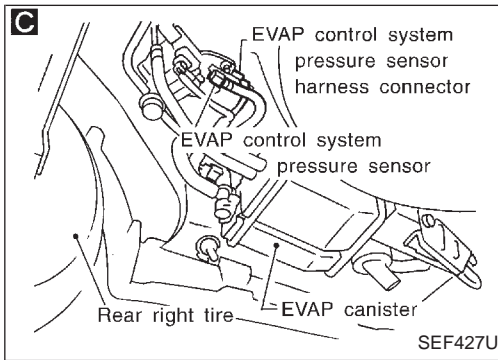
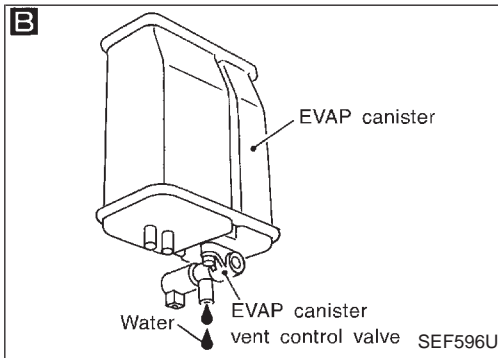
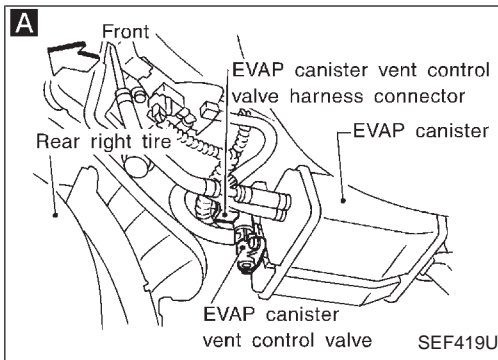
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TROUBLE DIAGNOSIS FOR DTC P1446

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P1446

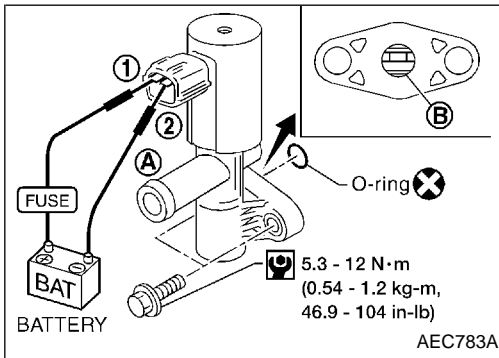
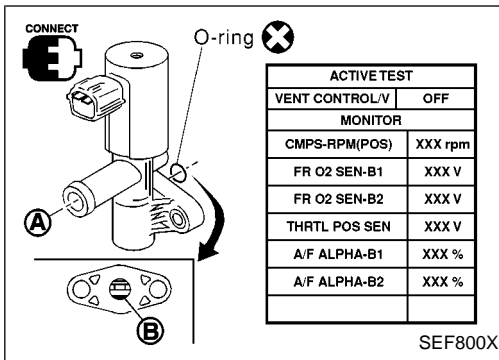
Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V	
ON	No
OFF	Yes

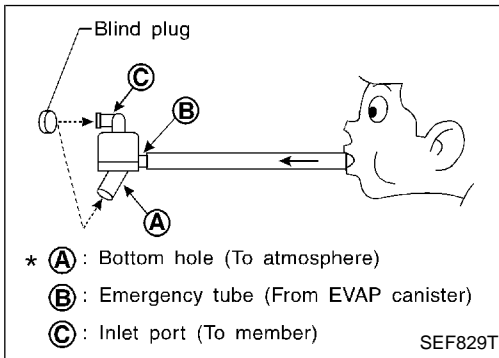
OR

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals ① and ②	No
No supply	Yes

If NG, clean valve using air blower or replace as necessary.

If the portion (B) is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.



Water separator

- Check visually for insect nests in the water separator air inlet.
- Check visually for cracks or flaws in the appearance.
- Check visually for cracks or flaws in the hose.
- Check that (A) and (C) are not clogged by blowing air into (B) with (A), and then (C) plugged.
- In case of NG in items 2 - 4, replace the parts.

NOTE:

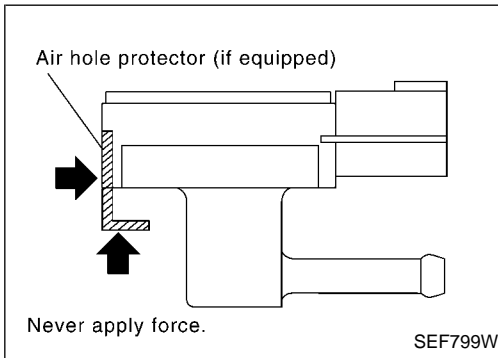
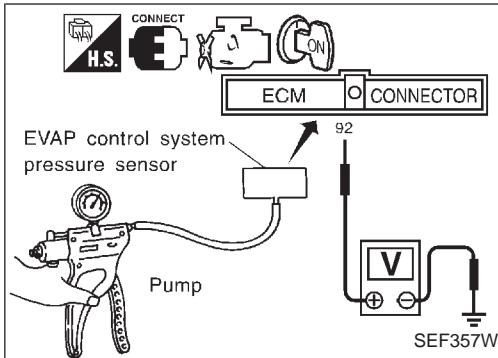
Do not disassemble water separator.

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TROUBLE DIAGNOSIS FOR DTC P1446

Evaporative Emission (EVAP) Canister Vent Control Valve (Close) (Cont'd)

EVAP control system pressure sensor



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 output voltage between ECM terminal 92 and ground.

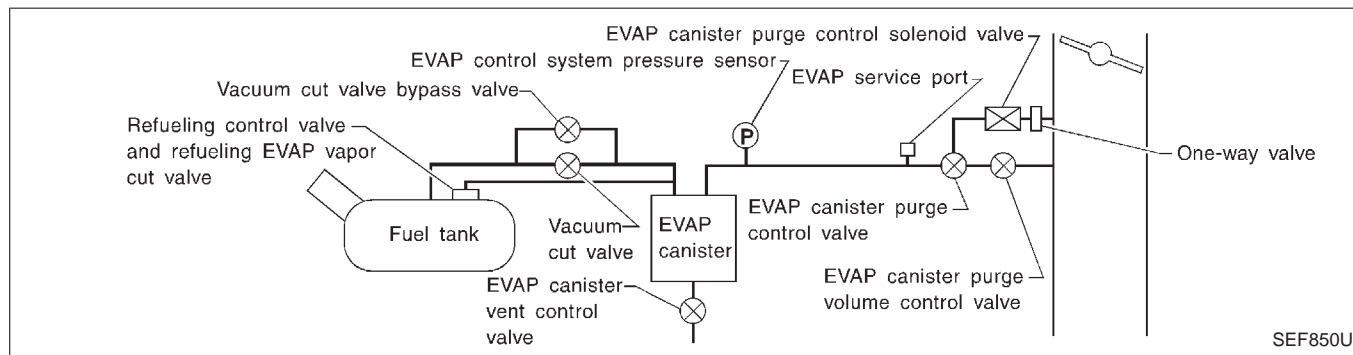
Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

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.
- Never apply force to the air hole protector of the sensor, if equipped.
 - Discard any EVAP control system pressure 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.

Evaporative Emission (EVAP) Control System Purge Flow Monitoring

NOTE: If DTC P1447 is displayed with P0510, perform TROUBLE DIAGNOSIS FOR DTC P0510 first. (See EC-344.)



SYSTEM DESCRIPTION

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 valve and EVAP canister purge control valve are open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

ON BOARD DIAGNOSIS LOGIC

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1447 0111	<ul style="list-style-type: none"> ● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. 	<ul style="list-style-type: none"> ● EVAP canister purge volume control valve stuck closed ● EVAP canister purge control valve stuck closed ● EVAP control system pressure sensor ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● EVAP canister purge control solenoid valve ● Blocked or bent rubber tube to MAP/BARO switch solenoid valve ● Cracked EVAP canister ● EVAP canister purge volume control valve ● Closed throttle position switch ● Improper connection of one-way valve ● Blocked purge port ● EVAP canister vent control valve

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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If “DIAGNOSTIC TROUBLE CODE 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 temperature above 0°C (32°F).



- 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 (TCS switch “OFF”) and let it idle for at least 90 seconds.
 - 4) Select “PURG CN/V & S/V P1493” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
 - 5) Touch “START”.
 - 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)
CMPS-RPM (POS): 900 - 6,300 rpm
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)
B/FUEL SCHDL: 2 - 4.8 msec
Selector lever: Suitable position
- If “TESTING” is not displayed after 5 minutes, retry from step 2).
- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”, EC-489.
 - 8) Select “PURG VOL C/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
 - 9) Touch “START”.
If “COMPLETED” is displayed, go to 11).
 - 10) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 20 seconds.)
CMPS-RPM (POS): 900 - 6,300 rpm
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)
B/FUEL SCHDL: 2 - 4.8 msec
Selector lever: Suitable position
- If “TESTING” is not displayed after 5 minutes, retry from step 2).
- 11) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE” of “TROUBLE DIAGNOSIS FOR DTC P1444”, EC-446.
 - 12) Select “PURG FLOW P1447” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
 - 13) Touch “START”.
 - 14) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the

PURG CN/V&S/V P1493	
THIS SUPPORT FUNCTION IS FOR DTC P1493. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.	

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PURG CN/V & S/V P1493	
OK	

SEF811X

PURG VOL CN/V P1444	
THIS SUPPORT FUNCTION IS FOR DTC P1444. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.	

SEF810X

PURG VOL CN/V P1444	
OK	

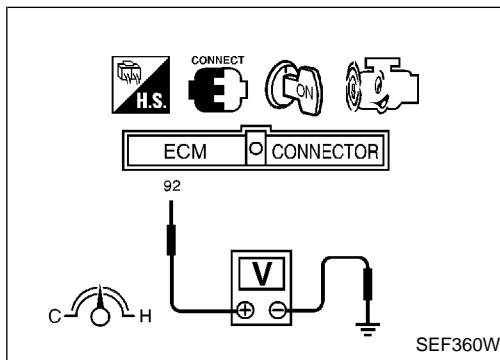
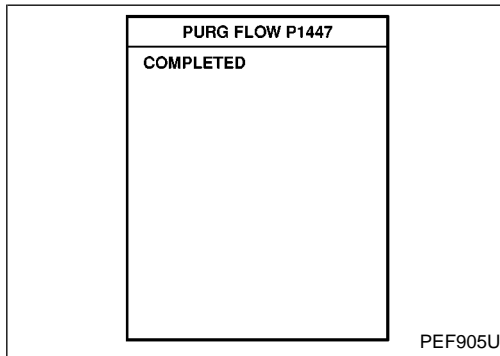
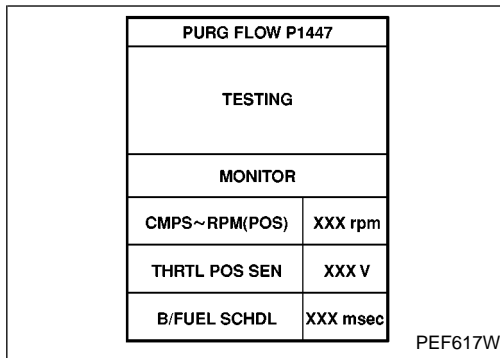
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PURG FLOW P1447	
OUT OF CONDITION	
MONITOR	
CMPS~RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF616W

TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

CMPS-RPM (POS): 900 - 6,300 rpm

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2).

15) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-458.

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OVERALL FUNCTION CHECK

Use this procedure to check the overall monitoring function of the EVAP control system purge flow. During this check, a 1st trip DTC might not be confirmed.



- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF", wait at least 5 seconds.
- 3) Start engine and wait at least 70 seconds.
- 4) Set voltmeter probes to ECM terminals 92 (EVAP control system pressure sensor signal) and 128 (ECM ground).
- 5) Check EVAP control system pressure sensor value at idle speed.
- 6) 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:

Any position other than "P", "N" or "R"

Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed for at least 1 second.

- 7) If NG, go to "DIAGNOSTIC PROCEDURE", EC-458.

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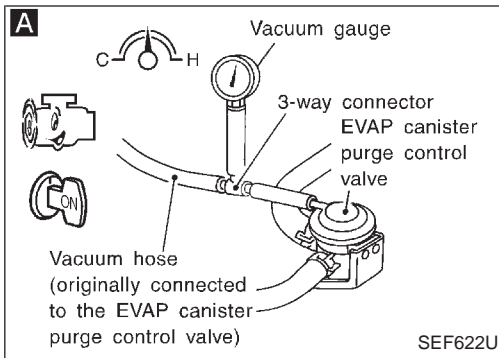
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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

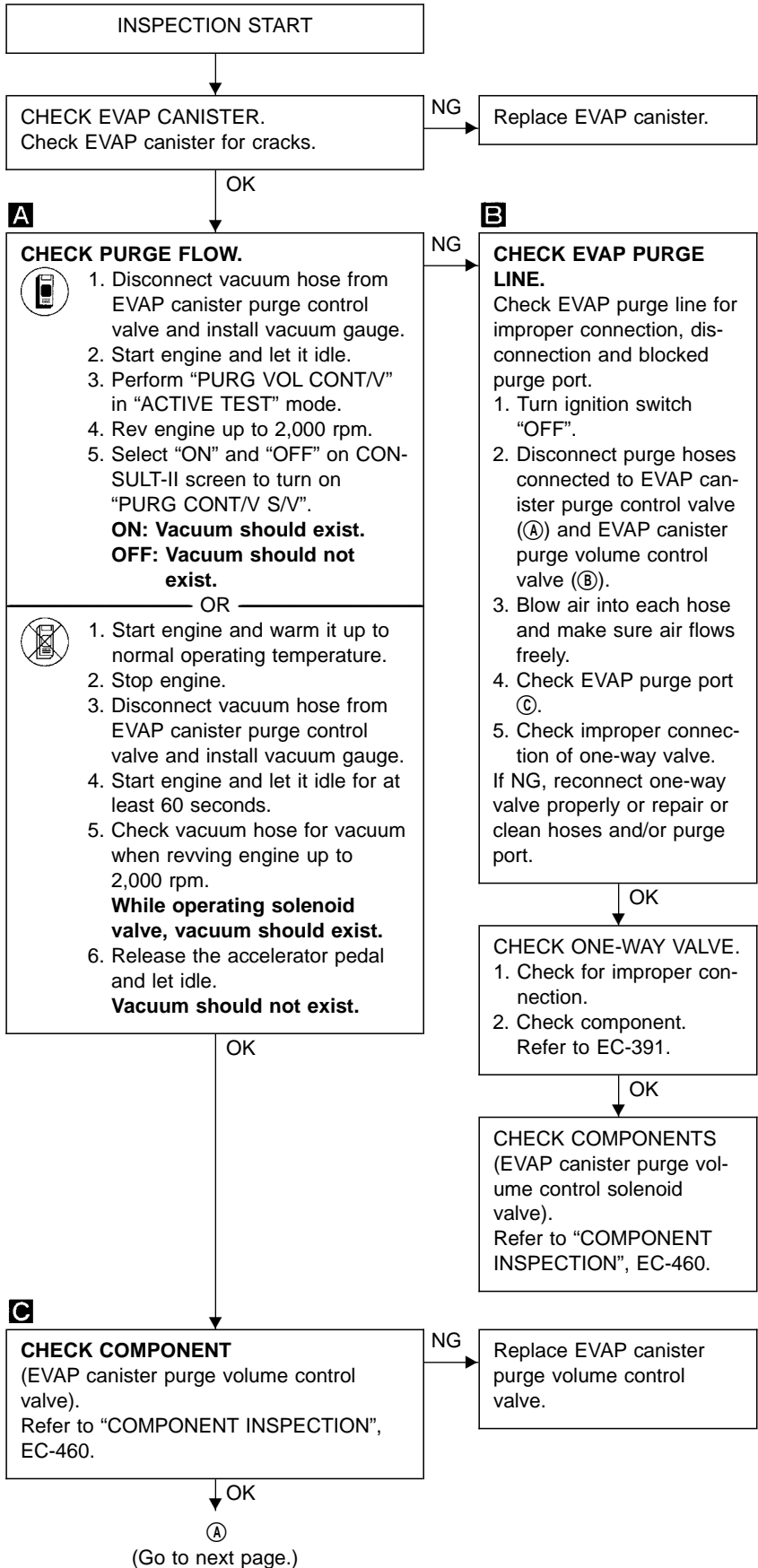
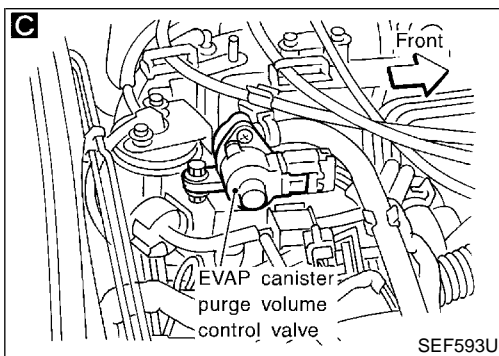
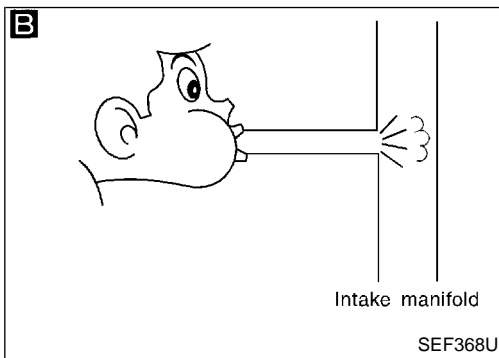
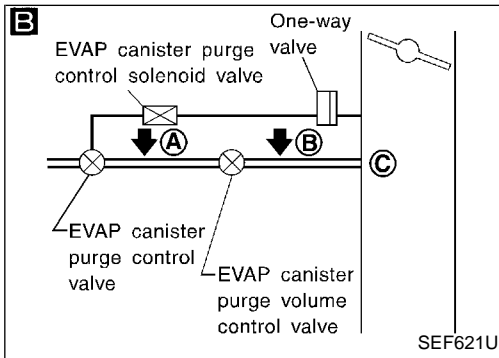
DIAGNOSTIC PROCEDURE



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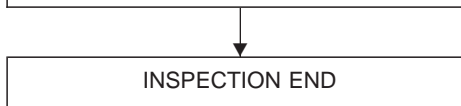
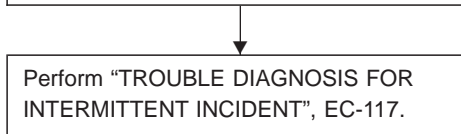
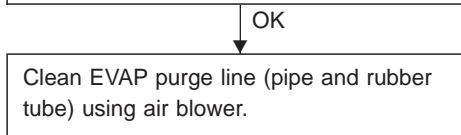
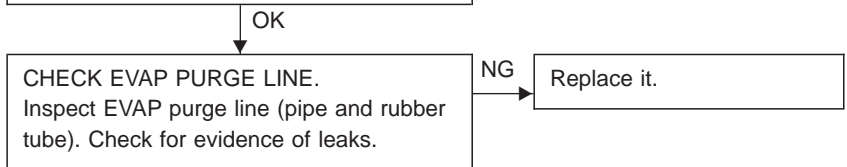
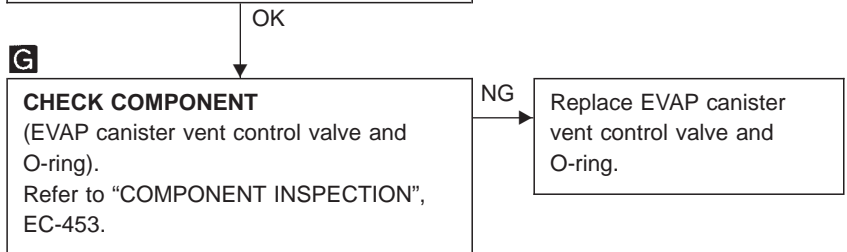
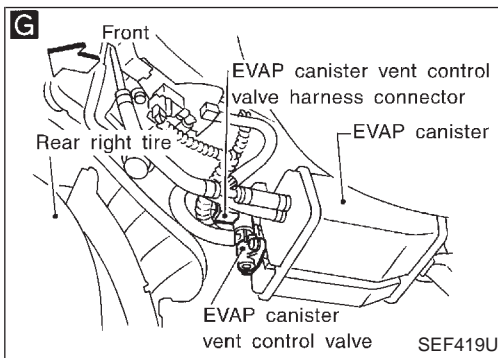
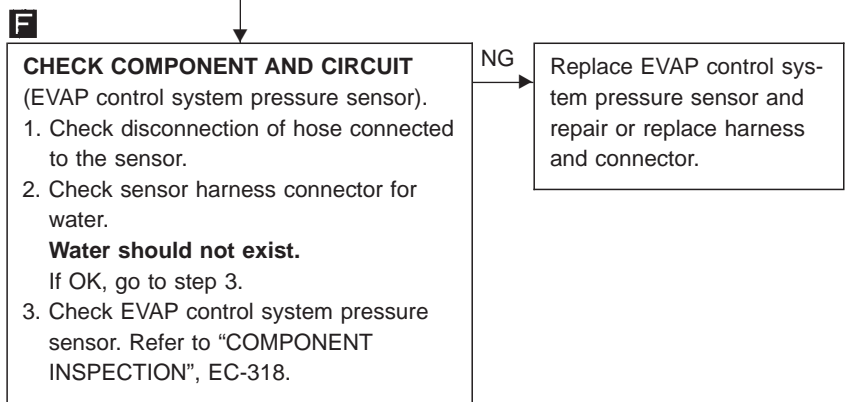
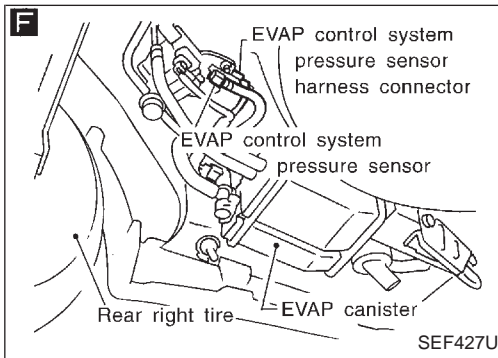
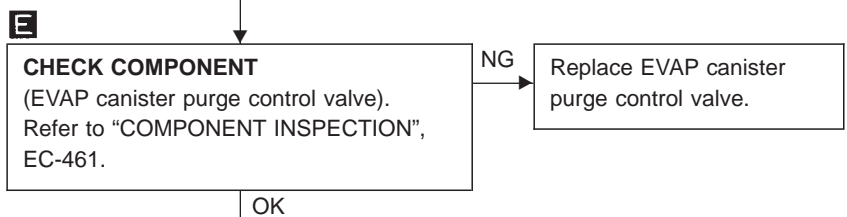
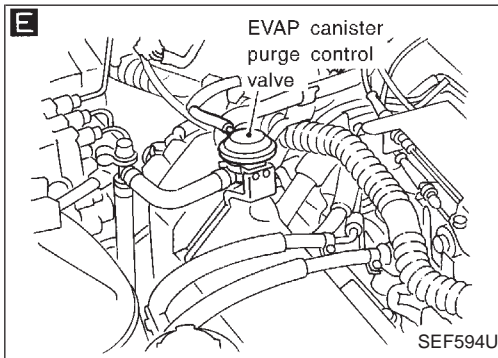
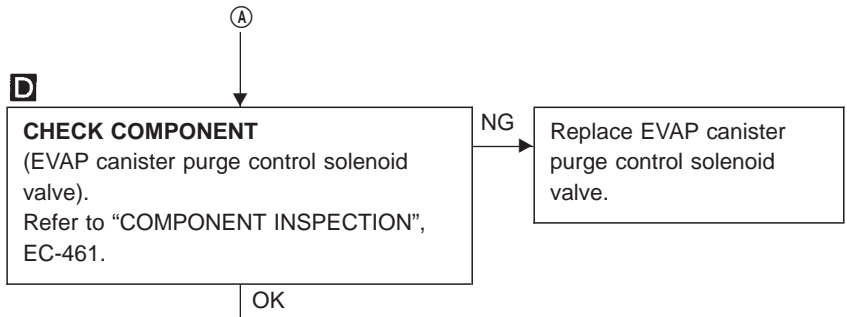
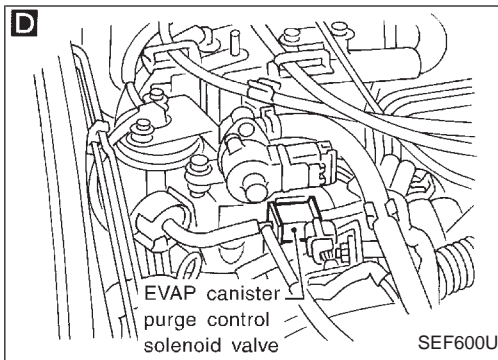
ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

COMPONENT INSPECTION

EVAP canister purge volume control valve

- 1) Disconnect EVAP canister purge volume control valve harness connector.
- 2) Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

- 3) Reconnect EVAP canister purge volume control valve harness connector.
- 4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON".
- 6) Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the valve opening. If NG, replace the EVAP canister purge volume control valve.

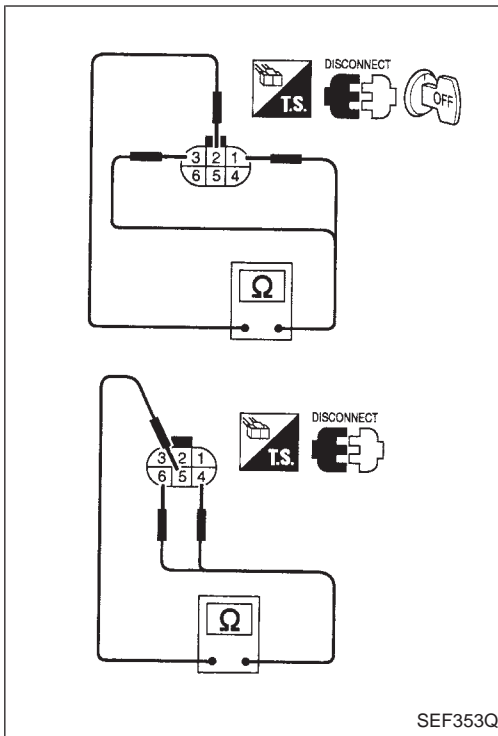
OR

- 1) Disconnect EVAP canister purge volume control valve harness connector.
- 2) Check resistance between the following terminals.
terminal ② and terminals ①, ③
terminal ⑤ and terminals ④, ⑥

Resistance:

Approximately 35 - 43Ω [At 25°C (77°F)]

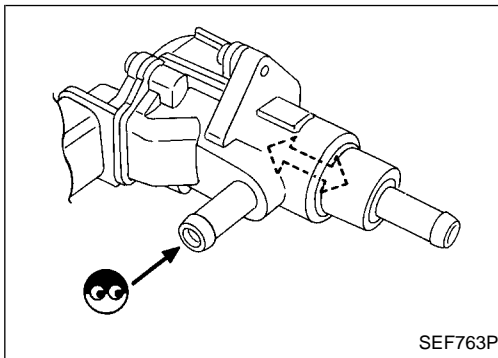
- 3) Reconnect EVAP canister purge volume control valve harness connector.
- 4) Remove EVAP canister purge volume control valve from intake manifold collector and disconnect hoses from the valve.
(Plug the purge hoses. The EVAP canister purge volume control valve harness connector should remain connected.)
- 5) Turn ignition switch "ON" and "OFF". Check that EVAP canister purge volume control valve shaft moves smoothly forward and backward according to the ignition switch position. If NG, replace the EVAP canister purge volume control valve.



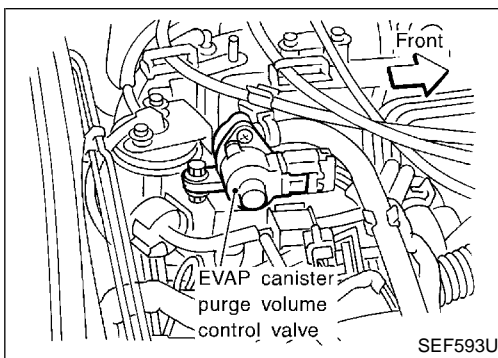
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ACTIVE TEST	
PURG VOL CONT/V	20 step
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	LEAN
FR O2 SEN-B2	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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SEF763P



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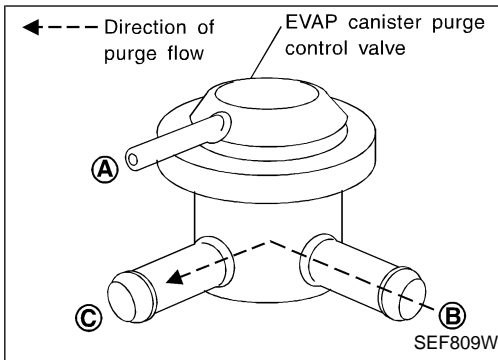
TROUBLE DIAGNOSIS FOR DTC P1447

Evaporative Emission (EVAP) Control System Purge Flow Monitoring (Cont'd)

EVAP canister purge control valve

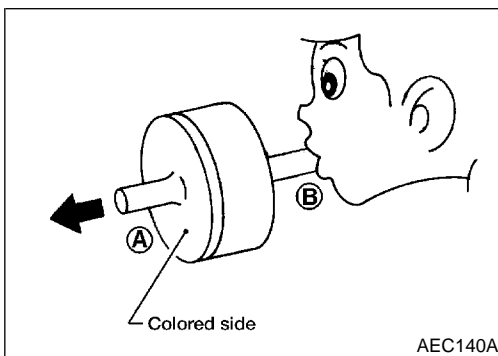
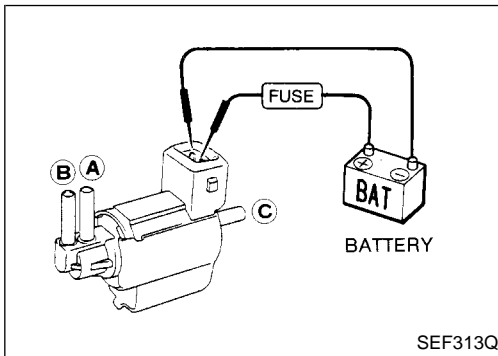
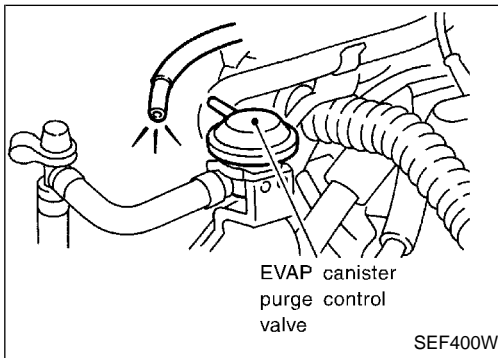
Check EVAP canister purge control valve as follows:

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



ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

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EVAP canister purge control solenoid valve

1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Disconnect vacuum hose at EVAP canister purge control valve.
5. Touch "ON" and "OFF" and check for vacuum passing through the hose.

Condition	Vacuum
Idle	Not exist
2,000 rpm	Exist

OR

- 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	Yes	No
No supply	No	Yes

If NG or operation takes more 1 second, replace solenoid valve.

One-way valve

Check one-way valve air passage continuity.

Condition	Air passage continuity
Blow air into side B to A	Yes
Blow air into side A to B	No

If NG, replace one-way valve.

Make sure to install one-way valve with the colored side facing the vacuum.

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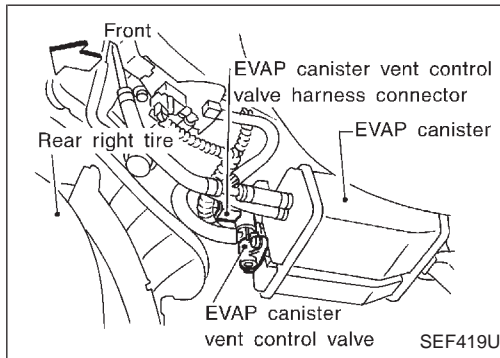
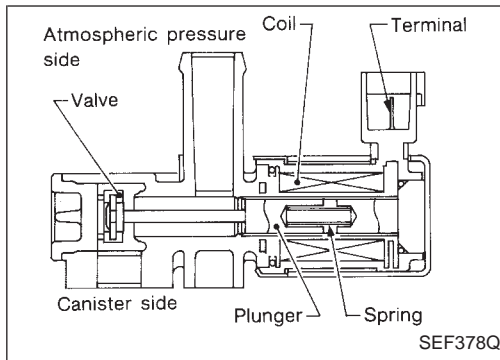
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TROUBLE DIAGNOSIS FOR DTC P1448



Evaporative Emission (EVAP) Canister Vent Control Valve (Open)

COMPONENT DESCRIPTION

NOTE:

If DTC P1448 is displayed with P0440, P1440, 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 (the EVAP canister vent control 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-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	P/B	EVAP canister vent control valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1448 0309	<ul style="list-style-type: none"> ● EVAP canister vent control valve remains opened under specified driving conditions. 	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● EVAP control system pressure sensor ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water. ● Vacuum cut valve

TROUBLE DIAGNOSIS FOR DTC P1448

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

NOTE:

- If DTC P1448 is displayed with P0440, P1440, perform TROUBLE DIAGNOSIS FOR DTC P1448 first.
- If "DIAGNOSTIC TROUBLE CODE 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 a flat level surface.
- Always perform test at temperature of 0 to 30°C (32 to 86°F).
- It is better that fuel level is low.



- 1) Turn ignition switch "ON".
- 2) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.
- 3) Make sure that "OK" is displayed. If "NG" is displayed, go to following step.

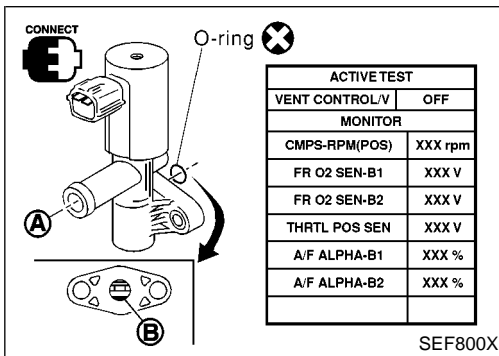
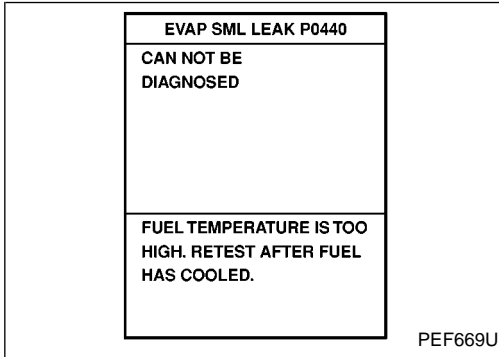
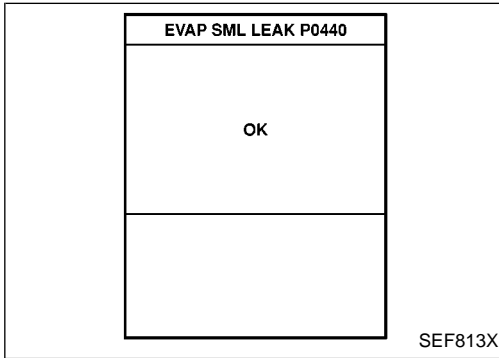
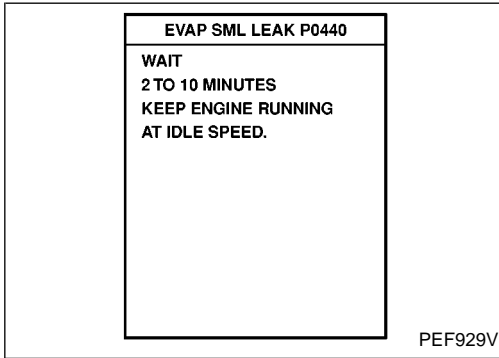
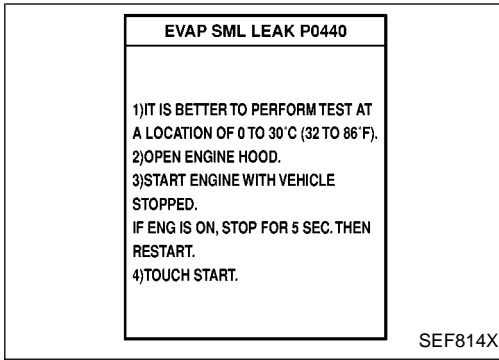
NOTE:

- If the CONSULT-II screen shown at left ("CAN NOT BE DIAGNOSED") 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 on the CONSULT-II screen, go to "BASIC INSPECTION", EC-91.
- 4) Disconnect hose from water separator.
 - 5) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT-II.
 - 6) Touch "ON" and "OFF" alternately.
 - 7) 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-465.

If the result is OK, go to "DIAGNOSTIC PROCEDURE" for "TROUBLE DIAGNOSIS FOR DTC P0440", EC-296.



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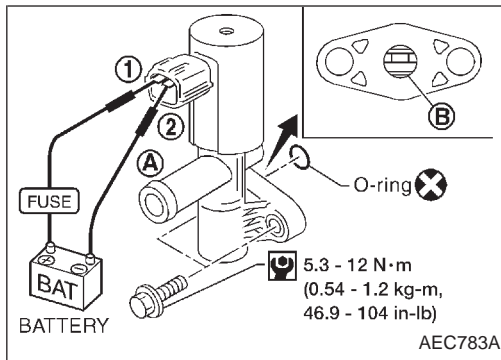
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TROUBLE DIAGNOSIS FOR DTC P1448

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)



OR

OVERALL FUNCTION CHECK

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.

- 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

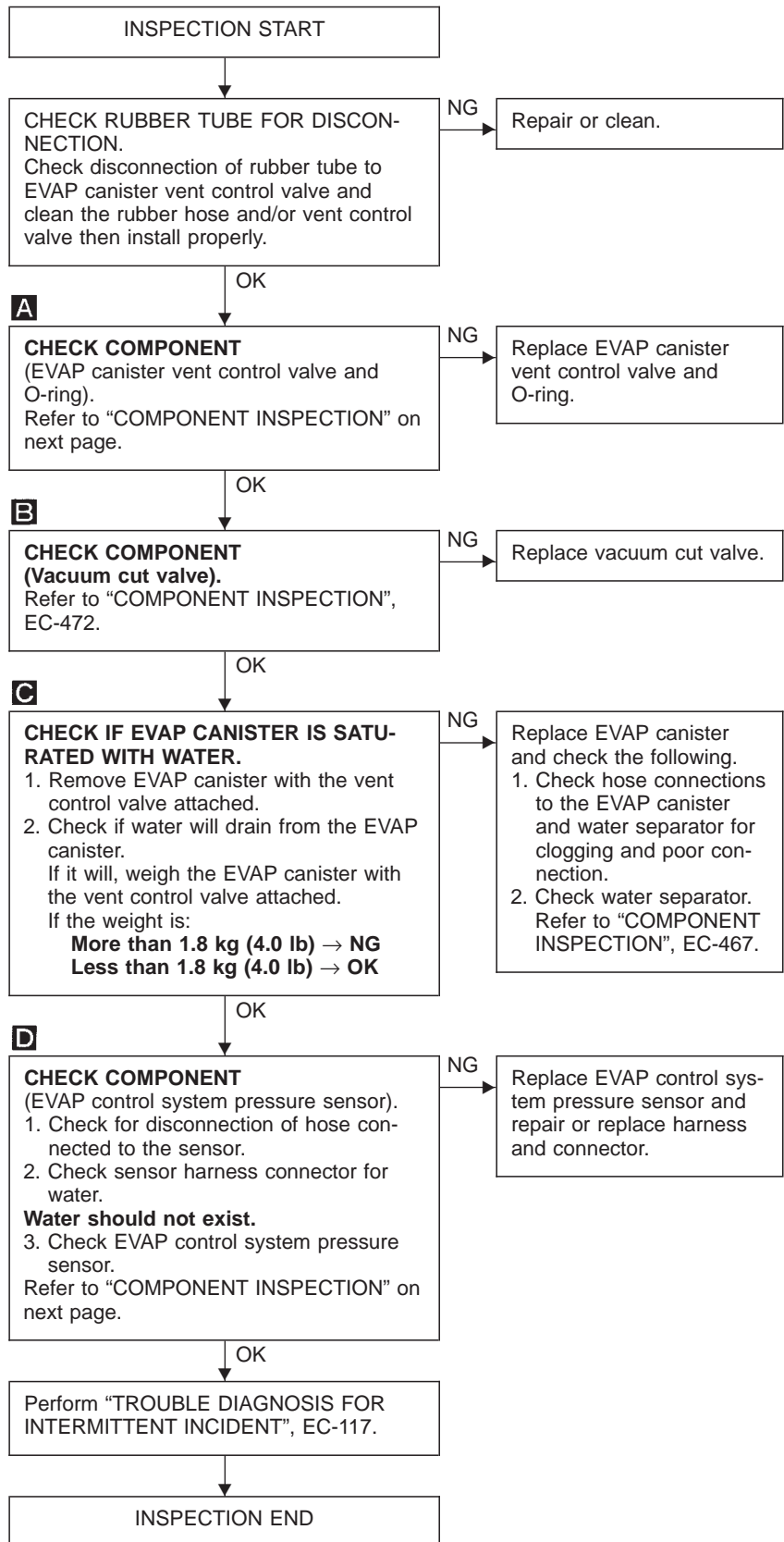
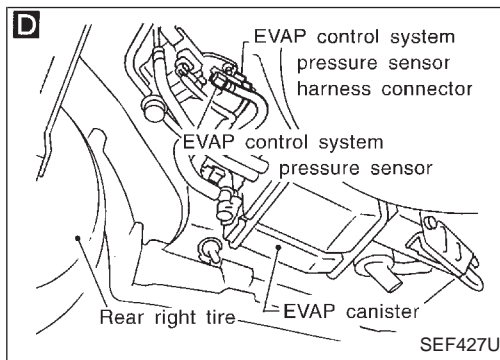
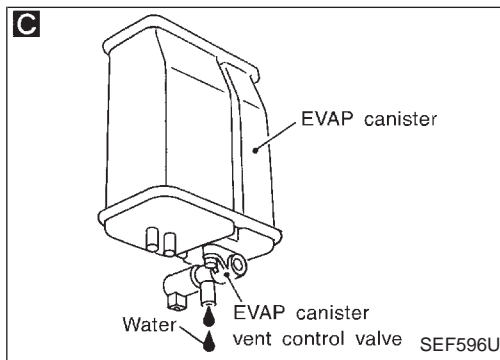
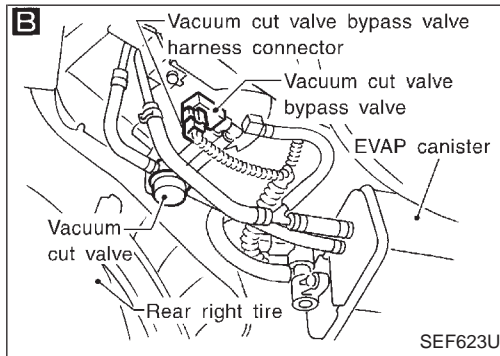
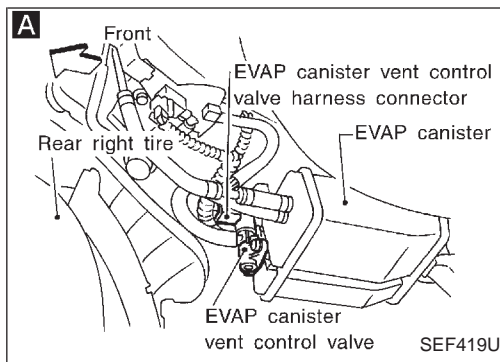
If the result is NG, go to "DIAGNOSTIC PROCEDURE", EC-465.

If the result is OK, go to "TROUBLE DIAGNOSIS FOR DTC P0440", EC-296.

TROUBLE DIAGNOSIS FOR DTC P1448

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P1448

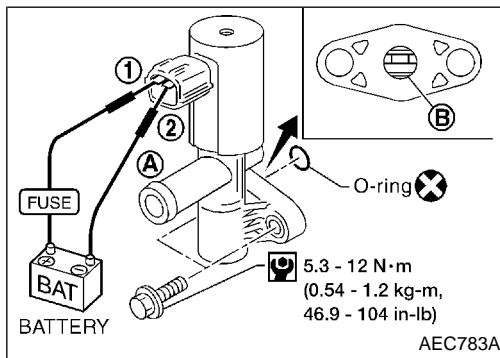
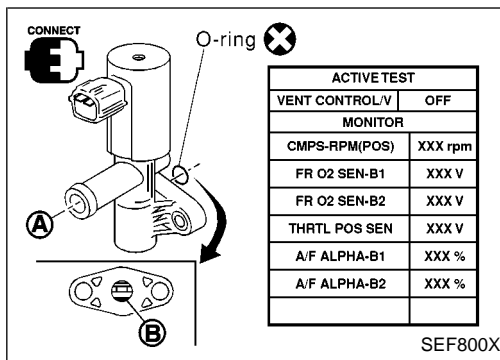
Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)

COMPONENT INSPECTION

EVAP canister vent control valve

Check air passage continuity.

- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V	
ON	No
OFF	Yes

OR

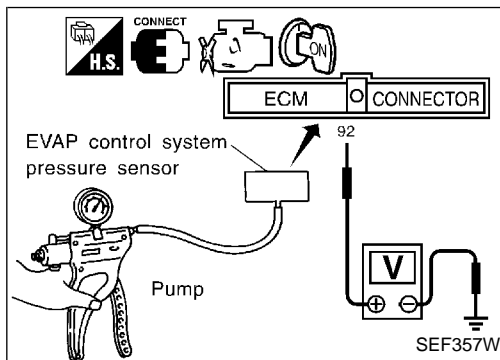


Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals ① and ②	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion (B) is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.



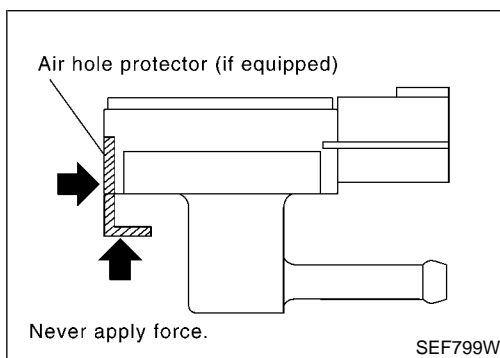
EVAP control system pressure sensor

- Remove EVAP control system pressure sensor with its harness connector connected.
- Remove hose from EVAP control system pressure sensor.
- Turn ignition switch "ON".
- Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
- Check output voltage between ECM terminal ⑨② and ground.

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

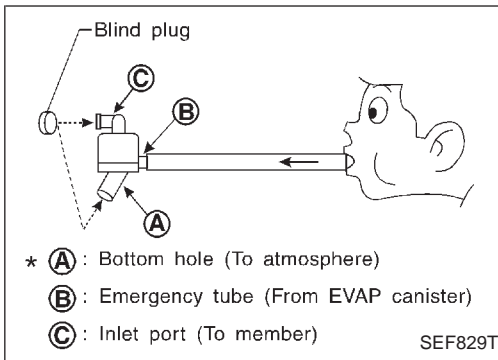
CAUTION:

- 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.
- If NG, replace EVAP control system pressure sensor.
- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure 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.



TROUBLE DIAGNOSIS FOR DTC P1448

Evaporative Emission (EVAP) Canister Vent Control Valve (Open) (Cont'd)



Water separator

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.

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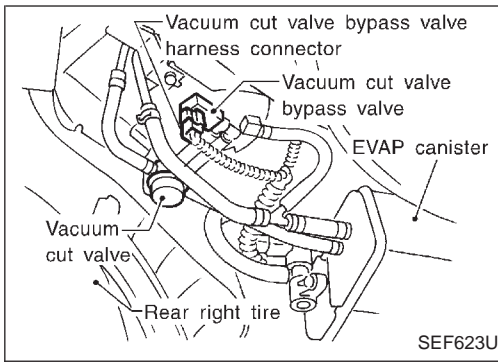
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TROUBLE DIAGNOSIS FOR DTC P1490



Vacuum Cut Valve Bypass Valve (Circuit)

COMPONENT DESCRIPTION

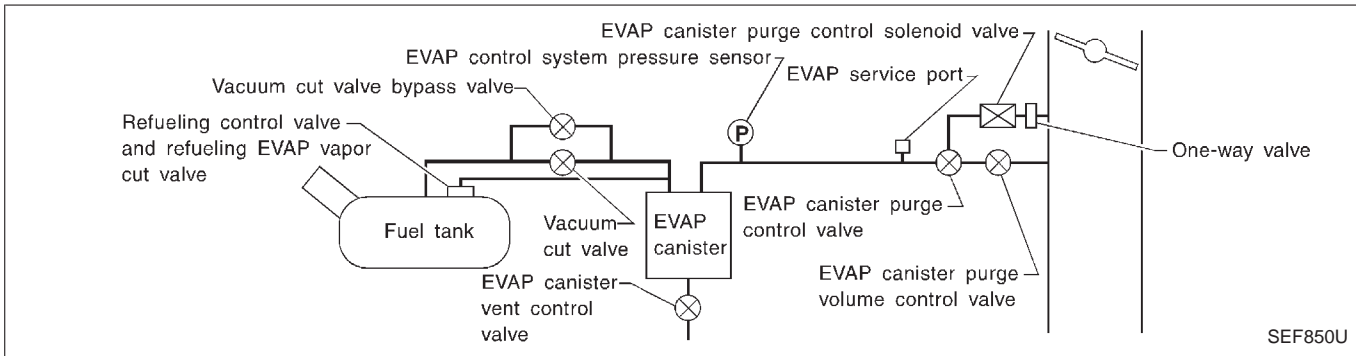
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

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



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	LG/B	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code 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

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

SEF736X

**Vacuum Cut Valve Bypass Valve (Circuit)
(Cont'd)**

**DIAGNOSTIC TROUBLE CODE CONFIRMATION
PROCEDURE**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn the ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-471.

OR



Follow the procedure "With CONSULT-II" above.

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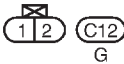
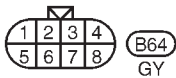
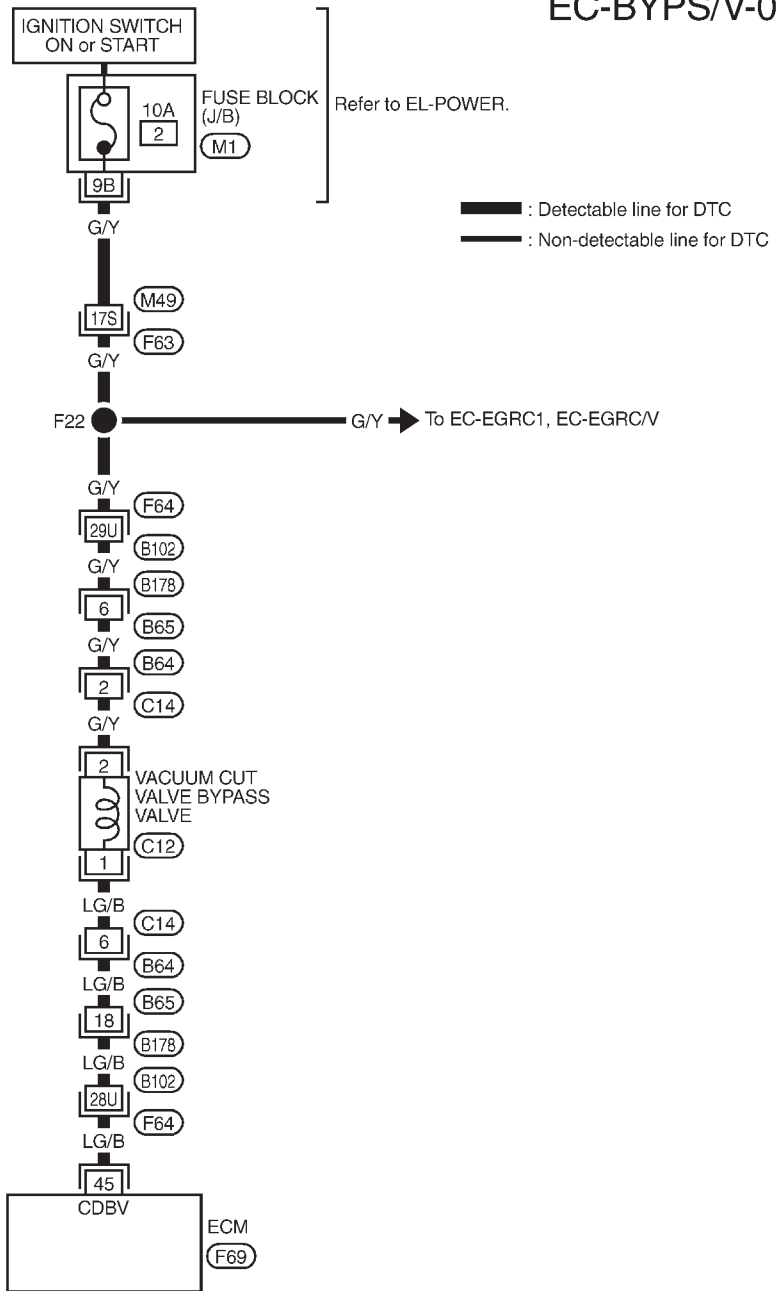
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TROUBLE DIAGNOSIS FOR DTC P1490

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)

EC-BYPS/V-01

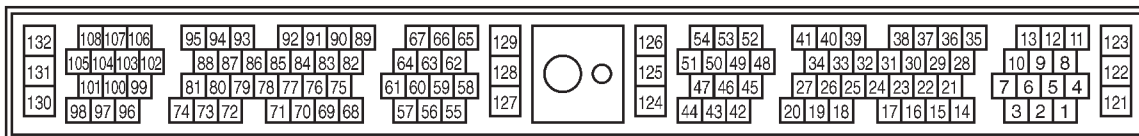


Refer to last page (Foldout page).

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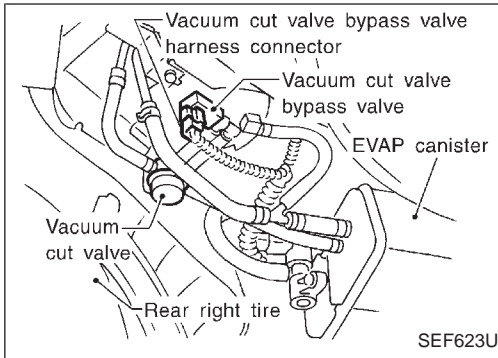
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TROUBLE DIAGNOSIS FOR DTC P1490

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)

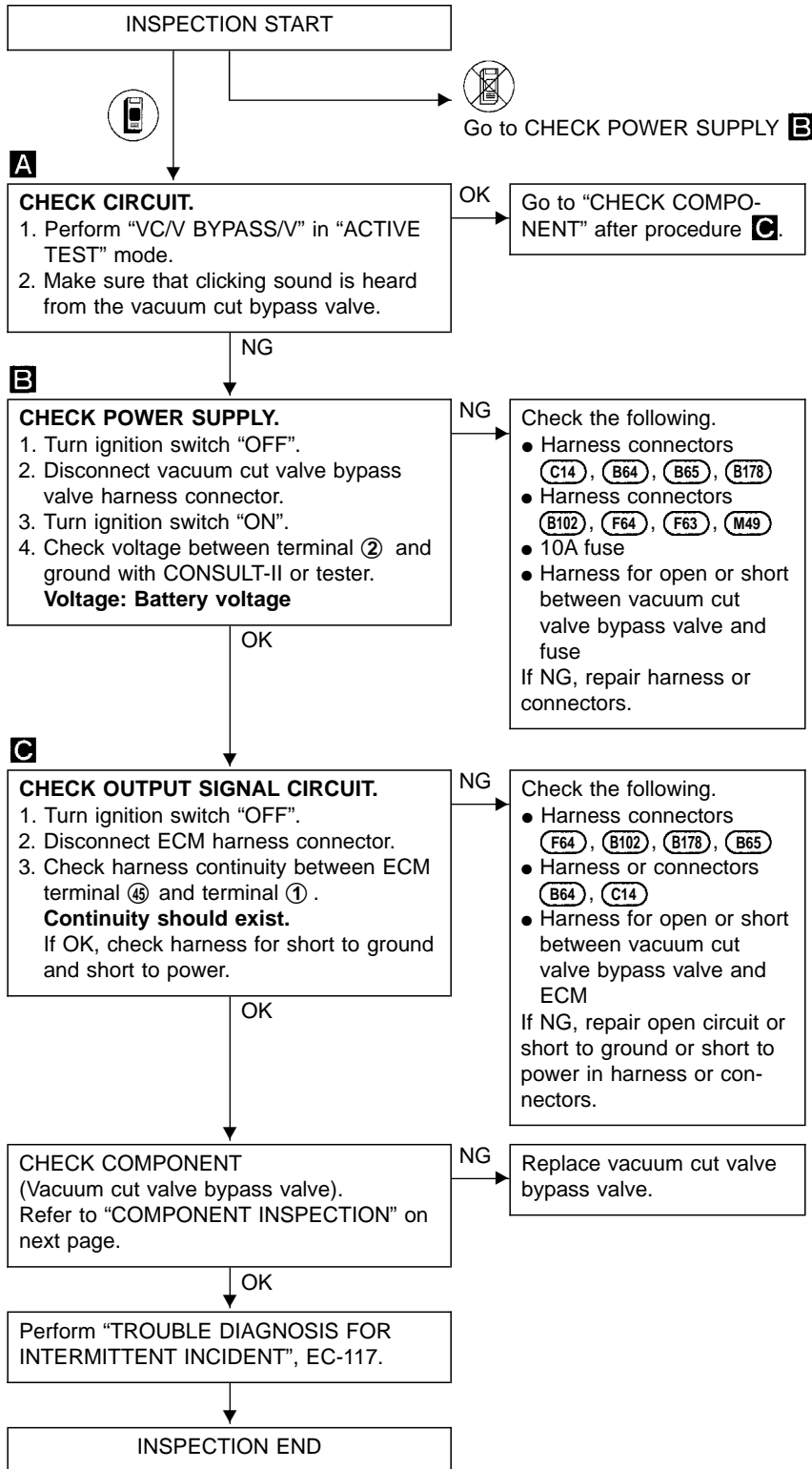
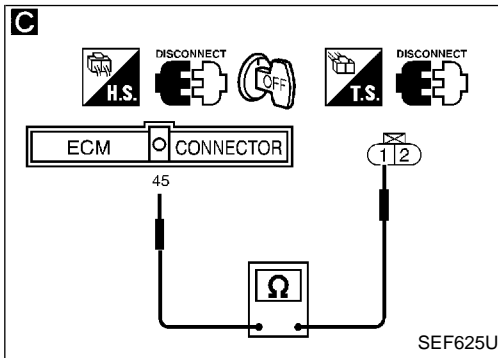
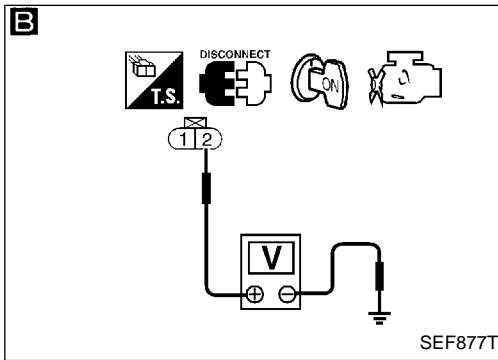
DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	LEAN
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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TROUBLE DIAGNOSIS FOR DTC P1490

Vacuum Cut Valve Bypass Valve (Circuit) (Cont'd)

COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

CONNECT

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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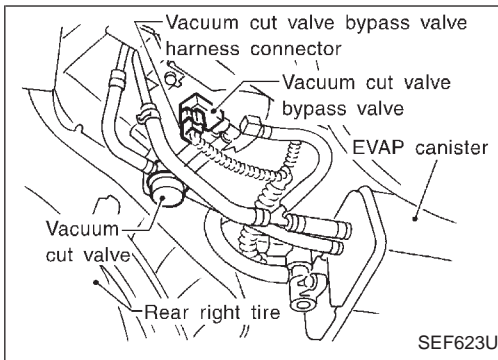
Condition VC/V BYPASS/V	Air passage continuity between (A) and (B)
ON	Yes
OFF	No

OR

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.

TROUBLE DIAGNOSIS FOR DTC P1491



Vacuum Cut Valve Bypass Valve

COMPONENT DESCRIPTION

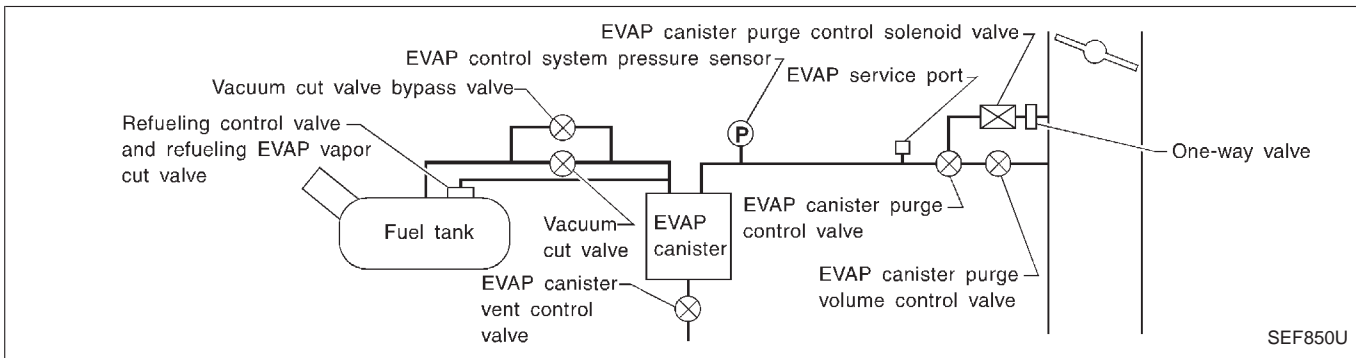
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

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



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	LG/B	Vacuum cut valve bypass valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1491 0311	● Vacuum cut valve bypass valve does not operate properly.	<ul style="list-style-type: none"> ● Vacuum cut valve bypass valve ● Vacuum cut valve ● Bypass hoses for clogging ● EVAP control system pressure sensor ● 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

TROUBLE DIAGNOSIS FOR DTC P1491

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE 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 temperature of 0 to 30°C (32 to 86°F).



- Turn ignition switch "ON".
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Start engine (TCS switch "OFF") and let it idle for at least 90 seconds.
- Select "PURG CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS-RPM (POS): 900 - 6,300 rpm

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

B/FUEL SCHDL: 2 - 4.8 msec

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 3).

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "TROUBLE DIAGNOSIS FOR DTC P1493", EC-486.
- Select "PURG VOL C/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.

- Touch "START".
If "COMPLETED" is displayed on CONSULT-II screen, go to step 12).

- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 20 seconds.)

CMPS-RPM (POS): 900 - 6,300 rpm

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

B/FUEL SCHDL: 2 - 4.8 msec

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 3).

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "TROUBLE DIAGNOSIS FOR DTC P1444", EC-442.

- Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.

- Touch "START".

- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the

PURG CN/V&S/V P1493
THIS SUPPORT FUNCTION IS FOR DTC P1493. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.

SEF809X

PURG VOL CN/V P1444
THIS SUPPORT FUNCTION IS FOR DTC P1444. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.

SEF810X

VC CUT/V BP/V P1491	
TESTING	
MONITOR	
CMPS~RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF619W

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
CMPS~RPM(POS)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF618W

VC CUT/V BP/V P1491	
COMPLETED	

PEF912U

Vacuum Cut Valve Bypass Valve (Cont'd)

conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS-RPM (POS): 900 - 6,300 rpm

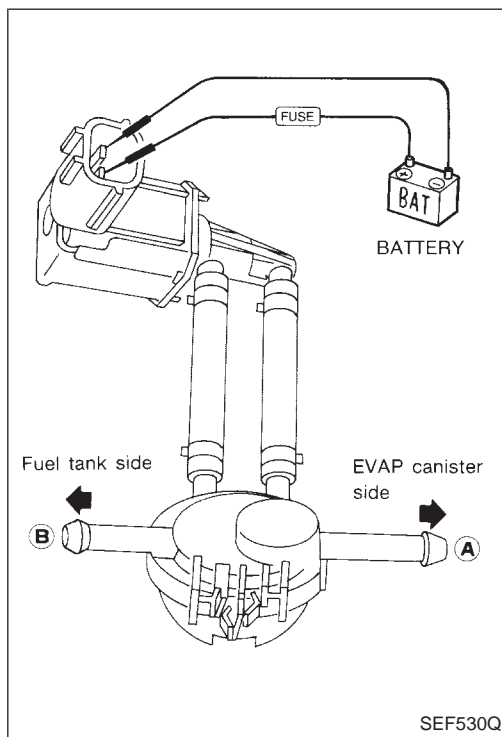
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

B/FUEL SCHDL: 0.5 - 4.5 msec

Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 3).

16) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-476.



OR

OVERALL FUNCTION CHECK



- 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-476.

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TROUBLE DIAGNOSIS FOR DTC P1491

Vacuum Cut Valve Bypass Valve (Cont'd)

DIAGNOSTIC PROCEDURE

A

CONNECT

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF801X

A

FUSE

BATTERY

Fuel tank side

EVAP canister side

SEF530Q

B

Vacuum cut valve bypass valve harness connector

Vacuum cut valve bypass valve

EVAP canister

Vacuum cut valve

Rear right tire

SEF623U

C

EVAP control system pressure sensor harness connector

EVAP control system pressure sensor

Rear right tire

EVAP canister

SEF427U

INSPECTION START

A

CHECK COMPONENT.

- Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- Apply vacuum to port **A** and check that there is no suction from port **B**.
- Apply vacuum to port **B** and check that there is suction from port **A**.
- Blow air in port **B** and check that there is a resistance to flow out of port **A**.
- Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON".
OR
5. Supply battery voltage to the terminal.
- Blow air in port **A** and check that air flows freely out of port **B**.
- Blow air in port **B** and check that air flows freely out of port **A**.

OK

Check the following.

- EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
- EVAP canister Refer to EC-26.
- EVAP purge port of fuel tank for clogging

If NG, repair or replace.

OK

Go to **C** below.

NG

Check bypass hoses for clogging.

NG

Repair or replace hoses.

B

CHECK COMPONENT
(Vacuum cut valve, vacuum cut valve bypass valve).
Refer to "COMPONENT INSPECTION" on next page.

NG

Replace malfunctioning parts.

C

CHECK COMPONENT
(EVAP control system pressure sensor).

- Check for disconnection of hose connected to the sensor.
- Check sensor harness connector for water.
Water should not exist.
If OK, go to the following step.
- Check EVAP control system pressure sensor.
Refer to "COMPONENT INSPECTION" on next page.

NG

Repair or replace harness, connectors and/or replace EVAP control system pressure sensor.

CHECK COMPONENT
(EVAP canister vent control valve).
Refer to "COMPONENT INSPECTION", EC-478.

NG

Repair or replace.

OK

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P1491

Vacuum Cut Valve Bypass Valve (Cont'd)

COMPONENT INSPECTION

Vacuum cut valve bypass valve

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 MNTR-B1	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

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BATTERY

SEF351Q

SEF379Q

SEF357W

SEF799W



Condition VC/V BYPASS/V	Air passage continuity between (A) and (B)
ON	Yes
OFF	No

OR



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

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).

EVAP control system pressure sensor

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 output voltage between ECM terminal (92) and ground.

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.
- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure 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.

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TROUBLE DIAGNOSIS FOR DTC P1491

Vacuum Cut Valve Bypass Valve (Cont'd)

EVAP canister vent control valve

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
CMPS-RPM(POS)	XXX rpm
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF800X

Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	No
OFF	Yes

OR

5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)

AEC783A

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals ① and ②	No
No supply	Yes

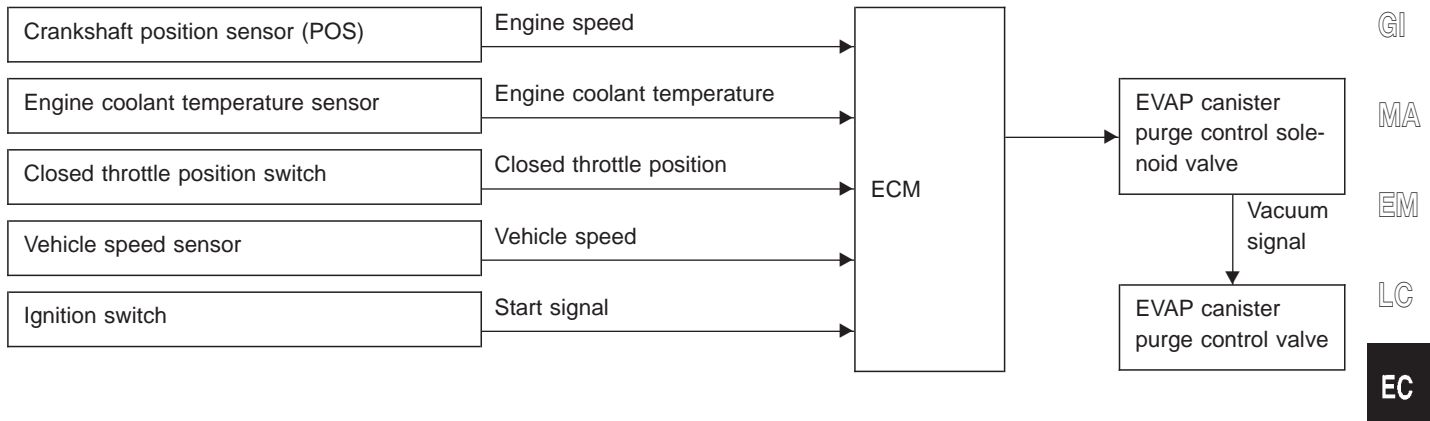
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion (B) is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.

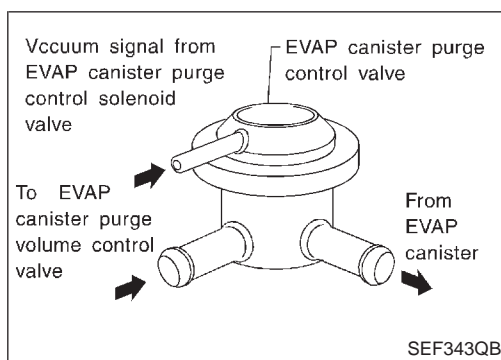
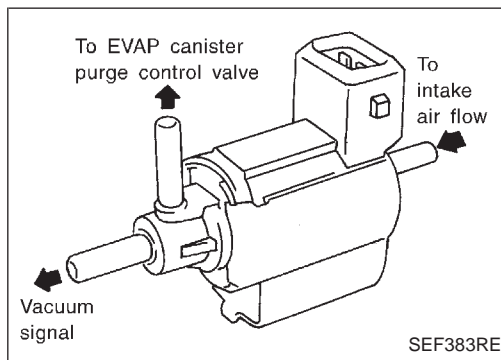
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit)

SYSTEM DESCRIPTION



This system controls the vacuum signal applied to the EVAP canister purge control valve. When the ECM detects any of the following conditions, current does not flow through the EVAP canister purge control solenoid valve. The solenoid valve cuts the vacuum signal so that the EVAP canister purge control valve remains closed.

- Start switch "ON"
- Closed throttle position
- Low or high engine coolant temperature
- During deceleration
- Engine stopped
- For 60 seconds after starting engine (After warming up to normal operating temperature)



COMPONENT DESCRIPTION

EVAP canister purge control solenoid valve

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

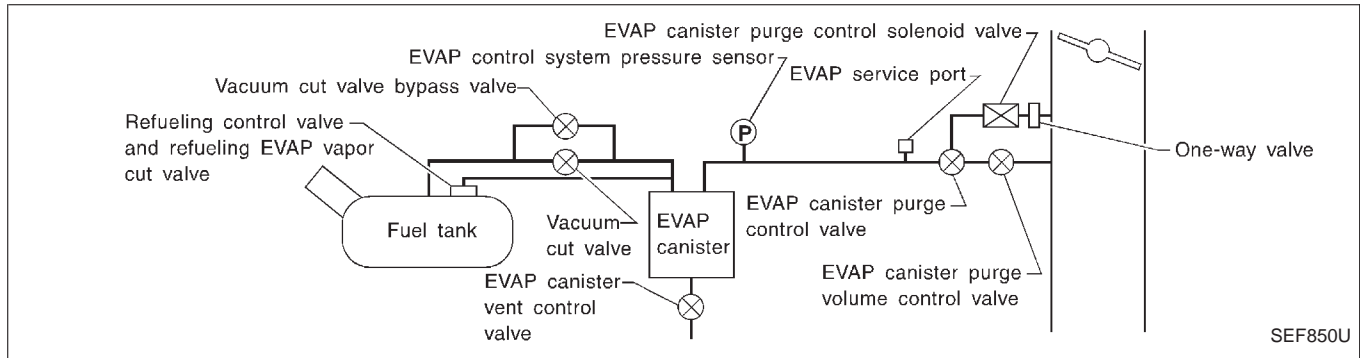
EVAP canister purge control valve

When the vacuum signal is cut by EVAP canister purge control solenoid valve, EVAP canister purge control valve shuts off the EVAP purge line.

TROUBLE DIAGNOSIS FOR DTC P1492

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit) (Cont'd)

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG CONT S/V	● Engine: After warming up	Idle
		2,000 rpm
		OFF
		ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	Y	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1492 0807	<ul style="list-style-type: none"> The improper voltage signal is sent to ECM through EVAP canister purge control solenoid valve. 	<ul style="list-style-type: none"> Harness or connectors (The EVAP canister purge control solenoid valve circuit is open or shorted.) EVAP canister purge control solenoid valve

DATA MONITOR	
MONITORING	NO DTC
CMPS-RPM(POS)	XXX rpm

SEF736X

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit) (Cont'd)

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn the ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-483.

OR



Follow the procedure "With CONSULT-II" above.

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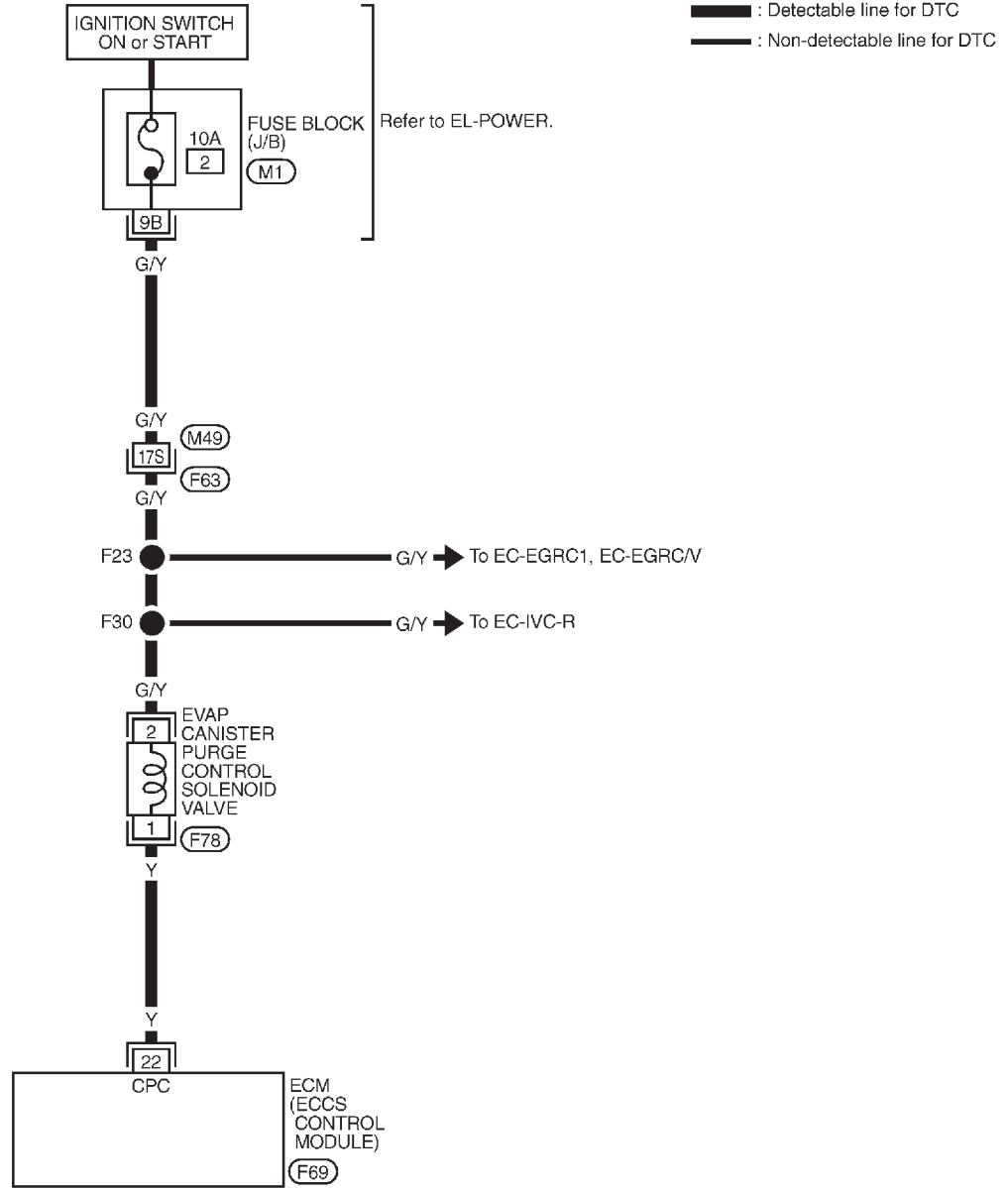
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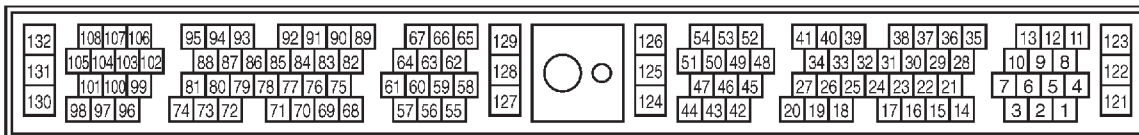
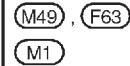
TROUBLE DIAGNOSIS FOR DTC P1492

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit) (Cont'd)

EC-CANI/V-01



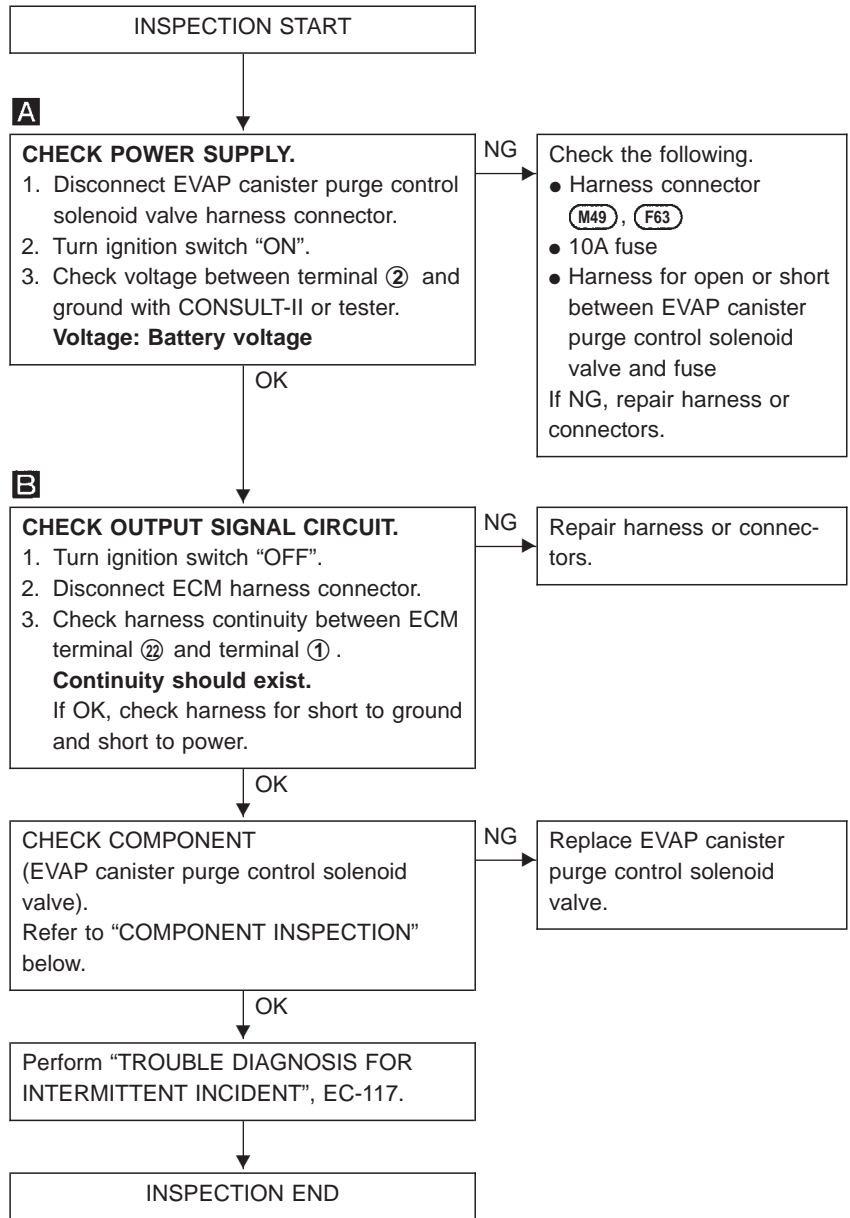
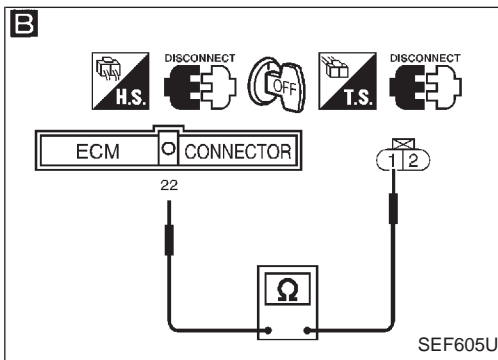
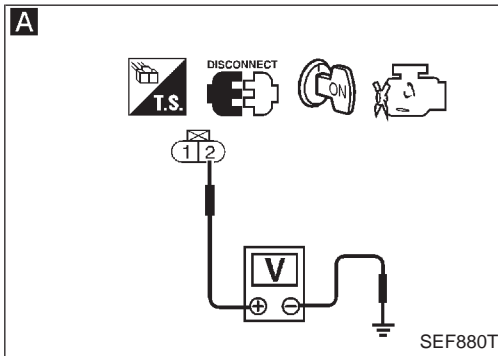
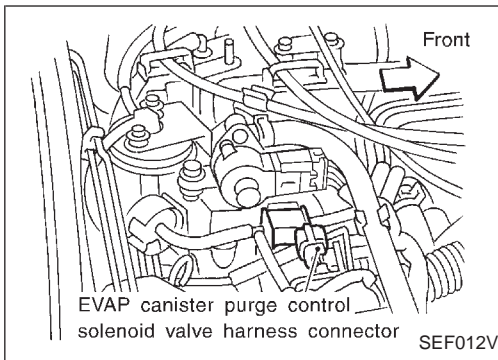
Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P1492

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit) (Cont'd)

DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P1492

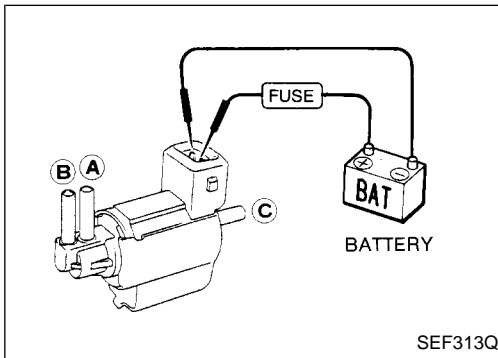
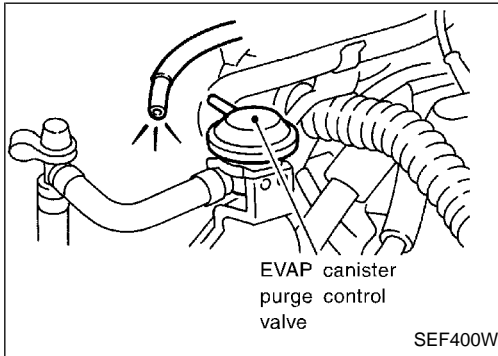
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Circuit) (Cont'd) COMPONENT INSPECTION

EVAP canister purge control solenoid valve

1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Disconnect vacuum hose at EVAP canister purge control valve.
5. Touch "ON" and "OFF" and check for vacuum passing through the hose.

ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

SEF765X



Condition	Vacuum
Idle	Not exist
2,000 rpm	Exist

OR

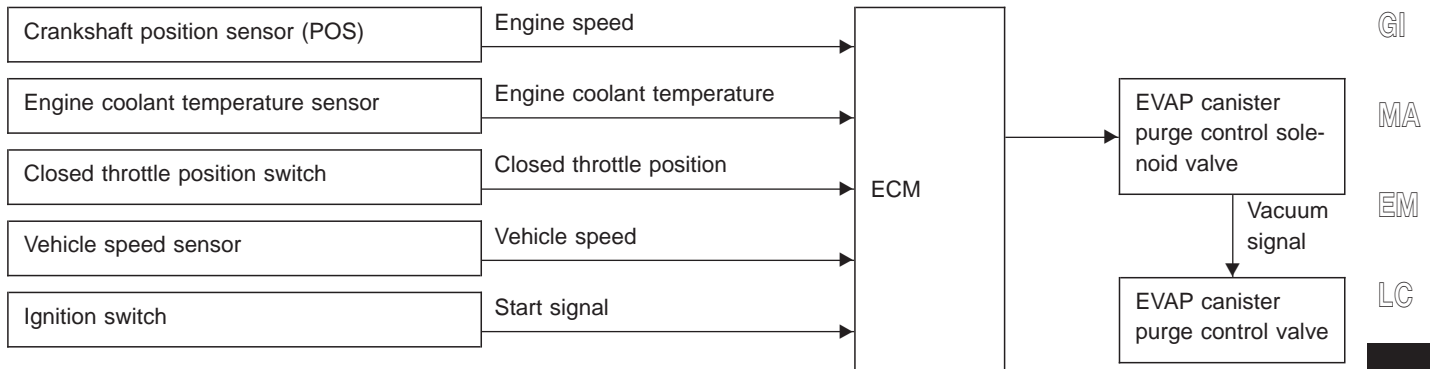
- Check air passage continuity.

Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals	Yes	No
No supply	No	Yes

If NG or operation takes more than 1 second, replace solenoid valve.

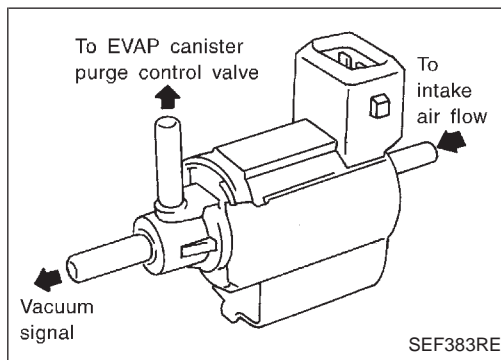
Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve

SYSTEM DESCRIPTION



This system controls the vacuum signal applied to the EVAP canister purge control valve. When the ECM detects any of the following conditions, current does not flow through the EVAP canister purge control solenoid valve. The solenoid valve cuts the vacuum signal so that the EVAP canister purge control valve remains closed.

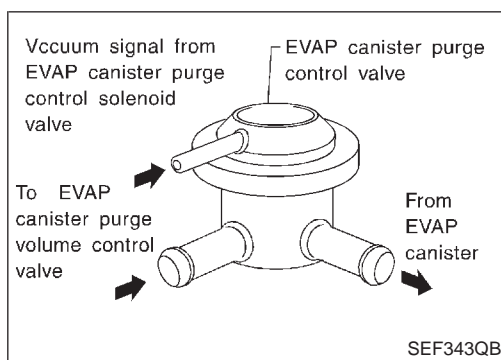
- Start switch "ON"
- Closed throttle position
- Low or high engine coolant temperature
- During deceleration
- Engine stopped
- For 60 seconds after starting engine (After warming up to normal operating temperature)



COMPONENT DESCRIPTION

EVAP canister purge control solenoid valve

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



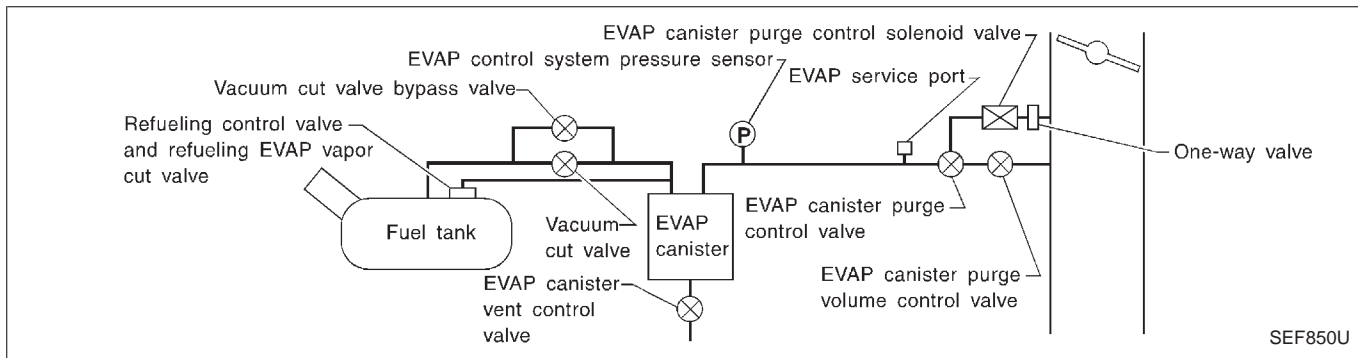
EVAP canister purge control valve

When the vacuum signal is cut by EVAP canister purge control solenoid valve, EVAP canister purge control valve shuts off the EVAP purge line.

TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG CONT S/V	● Engine: After warming up	Idle
		2,000 rpm
		OFF
		ON

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	Y	EVAP canister purge control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1493 0312	● EVAP canister purge control valve does not operate properly (stuck open).	<ul style="list-style-type: none"> ● EVAP canister purge control valve ● EVAP canister purge control solenoid valve ● Vacuum hoses for clogging or disconnection ● EVAP control system pressure sensor ● EVAP canister vent control valve ● Water separator ● EVAP canister saturated with water

TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC P1492 is displayed with P1493, first perform "TROUBLE DIAGNOSIS FOR DTC P1492". Refer to EC-480.
- If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 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 CN/V & S/V P1493" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
- 6) Start engine (TCS switch "OFF") and let it idle for at least 90 seconds.
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds.)

Vehicle speed: 36 - 120 km/h (23 - 75 MPH)

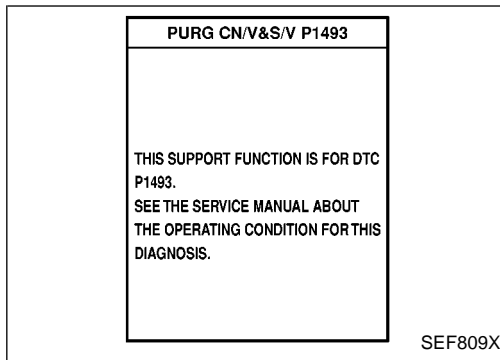
CMPS-RPM (POS): 900 - 6,300 rpm

B/FUEL SCHDL: 2 - 4.8 msec

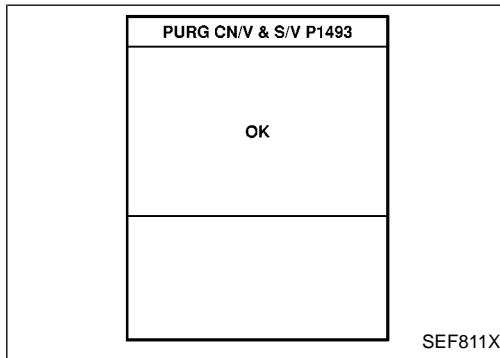
Selector lever: Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2).

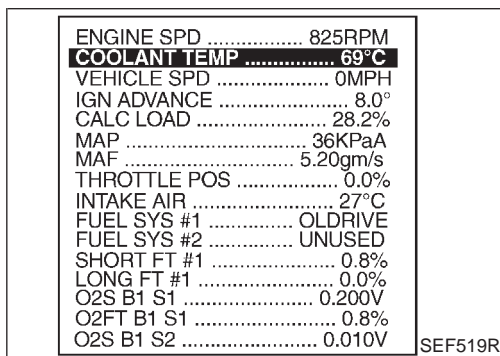
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-489.



SEF809X



SEF811X



SEF519R



- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check coolant temperature.

Coolant temperature: 30 - 100°C (86 - 212°F)

Be sure that water temperature does not exceed 100°C. If it becomes higher than 100°C, cool down the engine and perform the procedure again from the beginning.

- 4) Turn ignition switch "OFF" and wait at least 5 seconds.
- 5) Turn ignition switch "ON" and wait at least 15 seconds.

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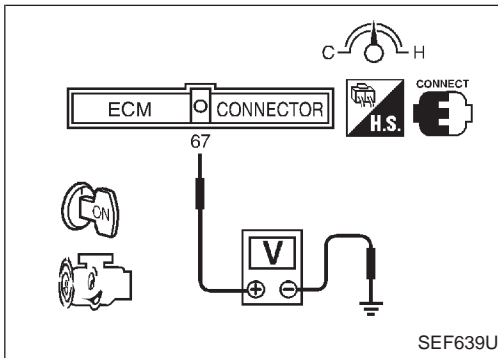
TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

- 6) Restart engine and let it idle for at least 90 seconds.
- 7) Maintain the following conditions for at least 30 seconds.
Vehicle speed: 36 - 120 km/h (23 - 75 MPH)
Engine speed: 900 - 6,300 rpm
Gear position: Suitable gear position
Coolant temperature: 30 - 100°C (86 - 212°F)
- 8) Select "MODE 7" with GST.
- 9) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-489.

NOTE:

- Hold the accelerator pedal as steady as possible during driving in steps 7.
- If the driving conditions are not satisfied in steps 7, restart the procedure.
- It is better that the fuel level is low.



OR



- 1) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 2) Check voltage between ECM terminal 67 and ground
Voltage: 3.12 - 0.8V
 Perform the following procedure before the voltage drops below 0.8V. If the voltage drops below 0.8V, cool down the engine and perform the entire procedure all over again.
- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON" and wait at least 15 seconds.
- 5) Restart engine and let it idle for at least 90 seconds.
- 6) Maintain the following conditions for at least 30 seconds.
Vehicle speed: 40 - 120 km/h (25 - 75 MPH)
Engine speed: 1,000 - 2,100 rpm
Gear position: Suitable gear position
Check voltage between ECM terminal 67 and ground: 3.12 - 0.8V
- 7) Stop the vehicle, 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-489.

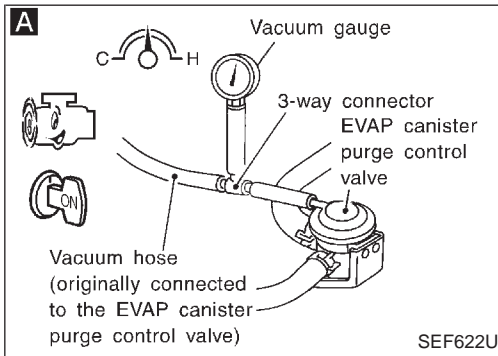
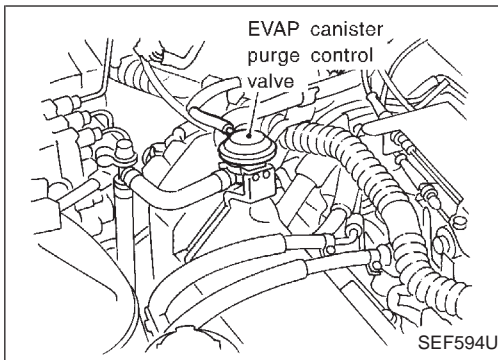
NOTE:

- Hold the accelerator pedal as steady as possible during driving in steps 6.
- If the driving conditions are not satisfied in steps 6, restart the procedure.
- It is better that the fuel level is low.

TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

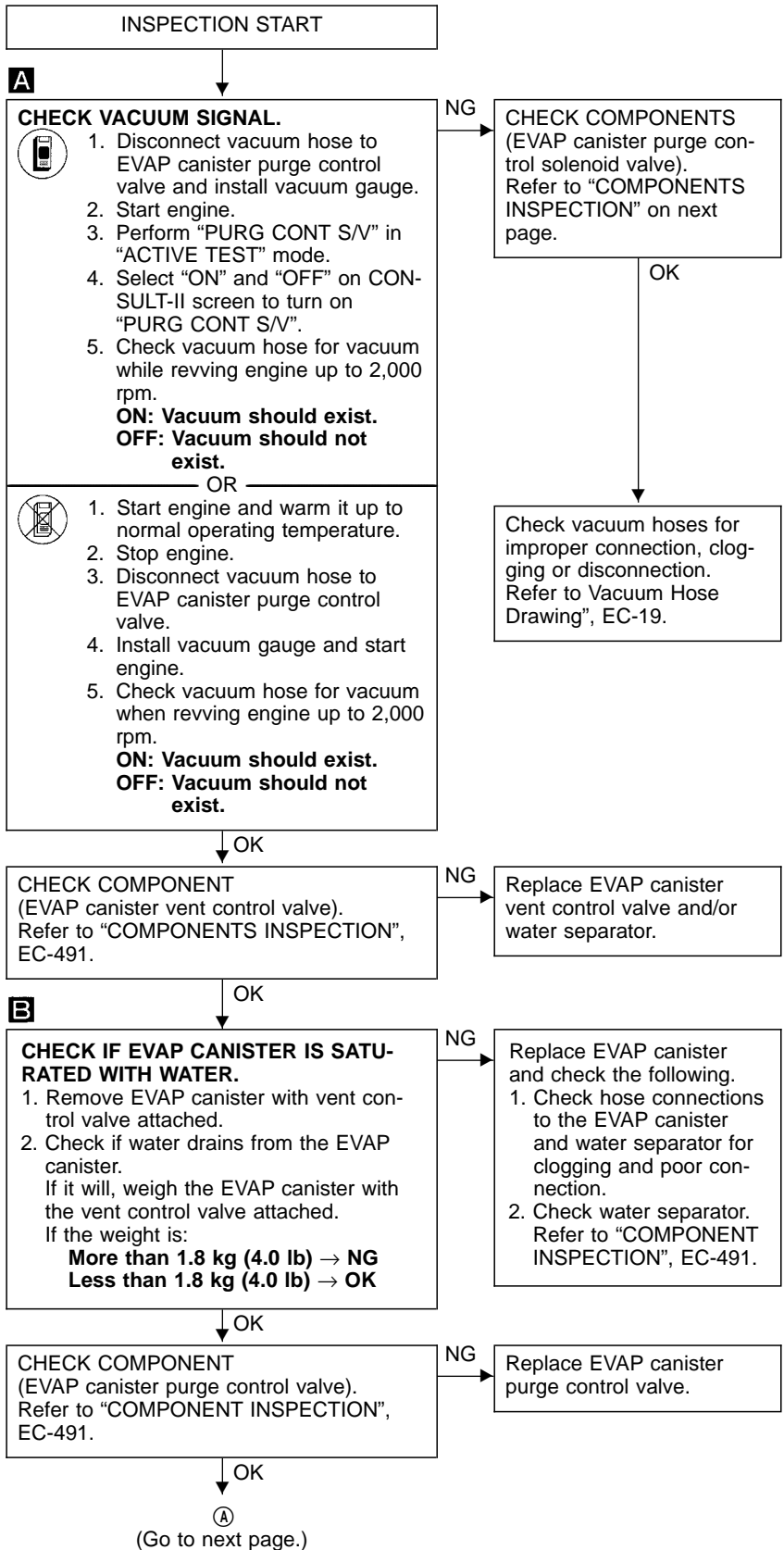
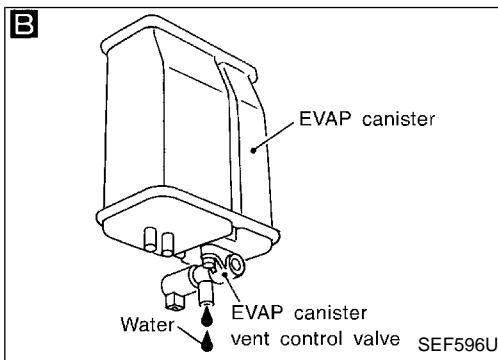
DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

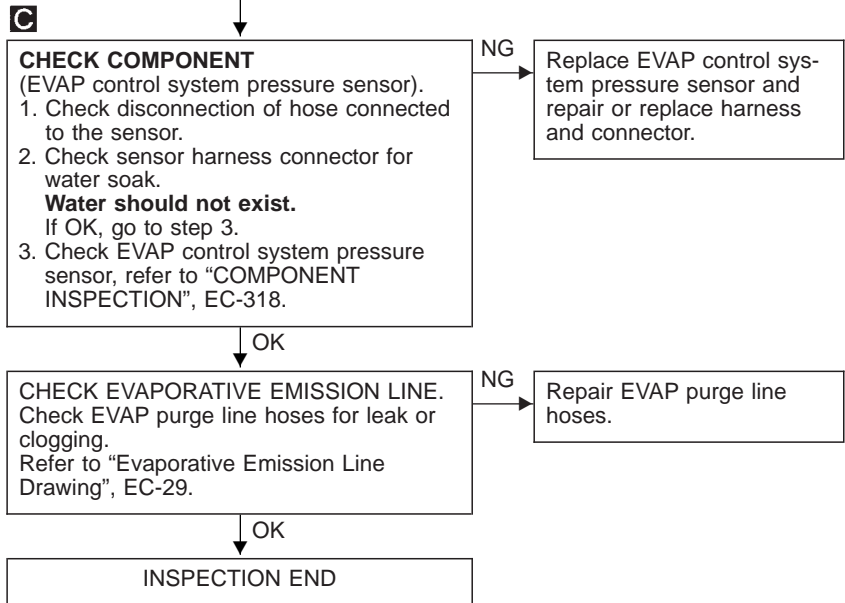
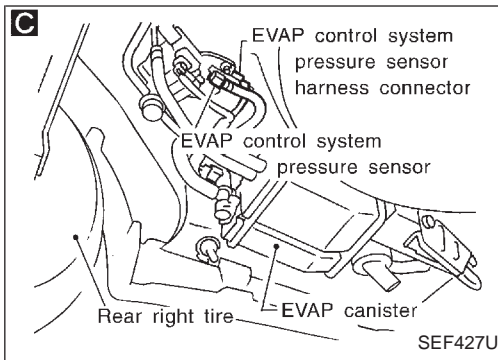
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TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)



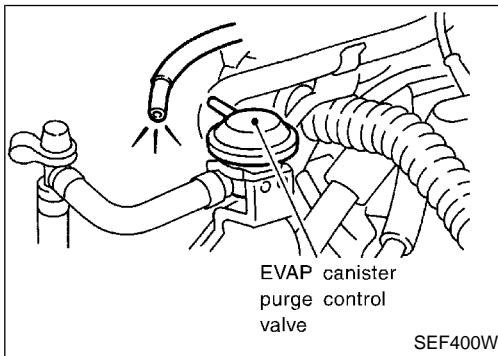
ACTIVE TEST	
PURG CONT S/V	ON
MONITOR	
CMPS-RPM(POS)	XXX rpm
EVAP SYS PRES	XXX V
PURG CONT S/V	ON
ABSOL PRES/SE	XXX V

SEF765X

COMPONENT INSPECTION

EVAP canister purge control solenoid valve

- Turn ignition switch "ON".
- Select "PURG CONT S/V" of "ACTIVE TEST" mode with CONSULT-II.
- Start engine and warm it up to normal operating temperature.
- Disconnect vacuum hose at EVAP canister purge control valve.
- Touch "ON" and "OFF" and check for vacuum passing through the hose.

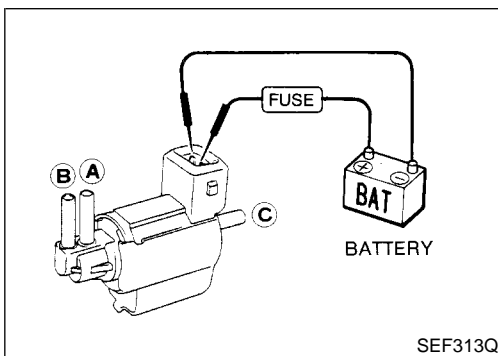


Condition	Vacuum
Idle	Not exist
2,000 rpm	Exist

OR

- 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	Yes	No
No supply	No	Yes



If NG or operation takes more than 1 second, replace solenoid valve.

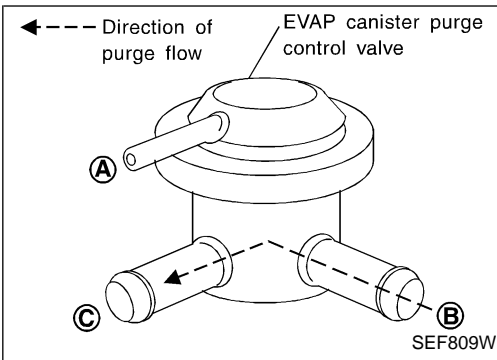
TROUBLE DIAGNOSIS FOR DTC P1493

Evaporative Emission (EVAP) Canister Purge Control Valve/Solenoid Valve (Cont'd)

EVAP canister purge control valve

Check EVAP canister purge control valve as follows:

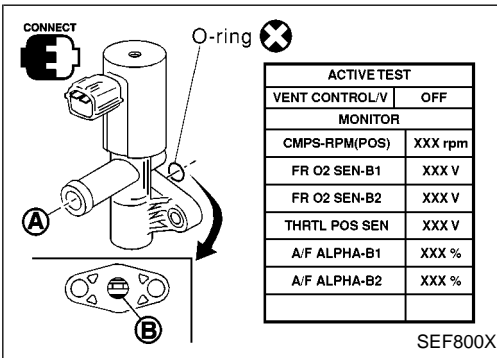
1. Blow air in port (A) and (C), then ensure that there is no leakage.
2. Blow air in port (B), then ensure that there is a resistance to flow out of port (C).
3. Apply vacuum to port (A). [Approximately -13.3 to -20.0 kPa (-100 to -150 mmHg, -3.94 to -5.91 inHg)]
Blow air in port (C) and ensure free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



EVAP canister vent control valve

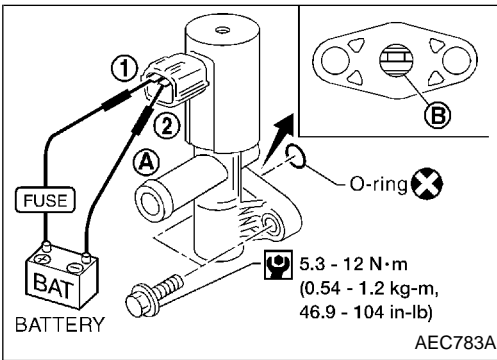
Check air passage continuity.

- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.



Condition	Air passage continuity between (A) and (B)
VENT CONTROL/V ON	No
VENT CONTROL/V OFF	Yes

OR

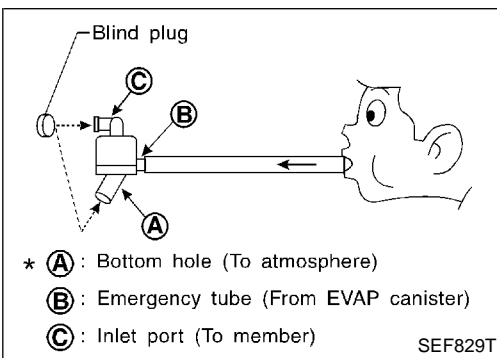


Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals ① and ②	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion (B) is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.

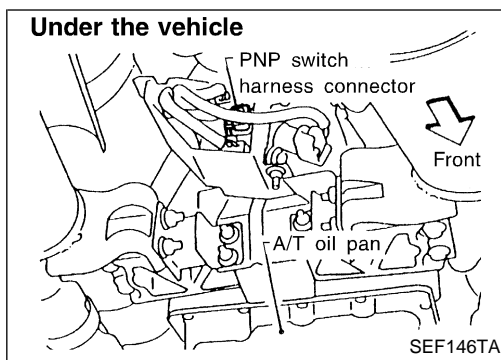


Water separator

1. Check visually for insect's nest 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.



Park/Neutral Position (PNP) Switch

COMPONENT DESCRIPTION

When the gear position is in “P” or “N”, park/neutral position (PNP) switch is “ON”. ECM detects the position because the continuity of the line (the “ON” signal) exists.

The PNP switch assembly also includes a transmission range switch to detect the selector lever position.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
101	G/OR	PNP switch	Ignition switch “ON” └ Gear position is “N” or “P”.	Approximately 0V
			Ignition switch “ON” └ Except the above gear position	Approximately 5V

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1706 1003	<ul style="list-style-type: none"> The signal of the park/neutral position switch is not changed in the process of engine starting and driving. 	<ul style="list-style-type: none"> Harness or connectors (The PNP switch circuit is open or shorted.) Harness or connectors (The park/neutral position relay circuit is open or shorted.) PNP switch Park/neutral position relay

TROUBLE DIAGNOSIS FOR DTC P1706

Park/Neutral Position (PNP) Switch (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.



- 1) Turn ignition switch "ON".
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" positions	ON
Except the above position	OFF

If NG, go to "DIAGNOSTIC PROCEDURE", EC-495.

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 5) Maintain the following conditions for at least 60 consecutive seconds.

CMPS-RPM (REF): 1,500 - 2,200 rpm

COOLAN TEMP/S: More than 70°C (158°F)

B/FUEL SCHDL: 1.4 - 5.8 msec

VHCL SPEED SE: 70 - 100 km/h (43 - 62 MPH)

Selector lever: Suitable position

- 6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-495

OR

OVERALL FUNCTION CHECK

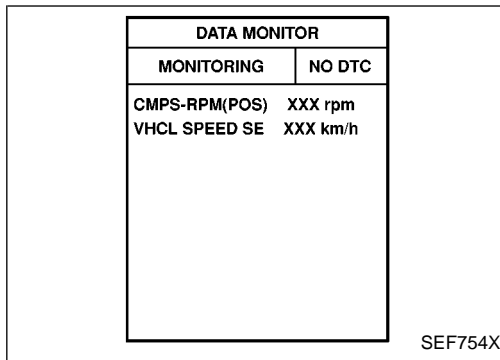
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.



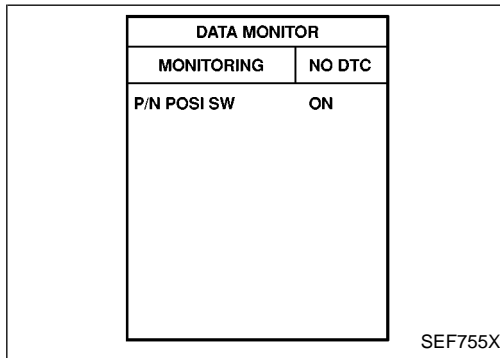
- 1) Turn ignition switch "ON".
- 2) Check voltage between ECM terminal (101) and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

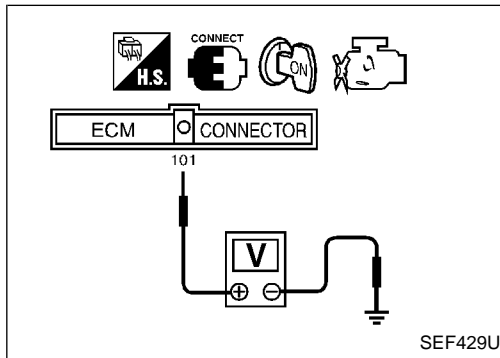
- 3) If NG, go to "DIAGNOSTIC PROCEDURE", EC-495.



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SEF755X



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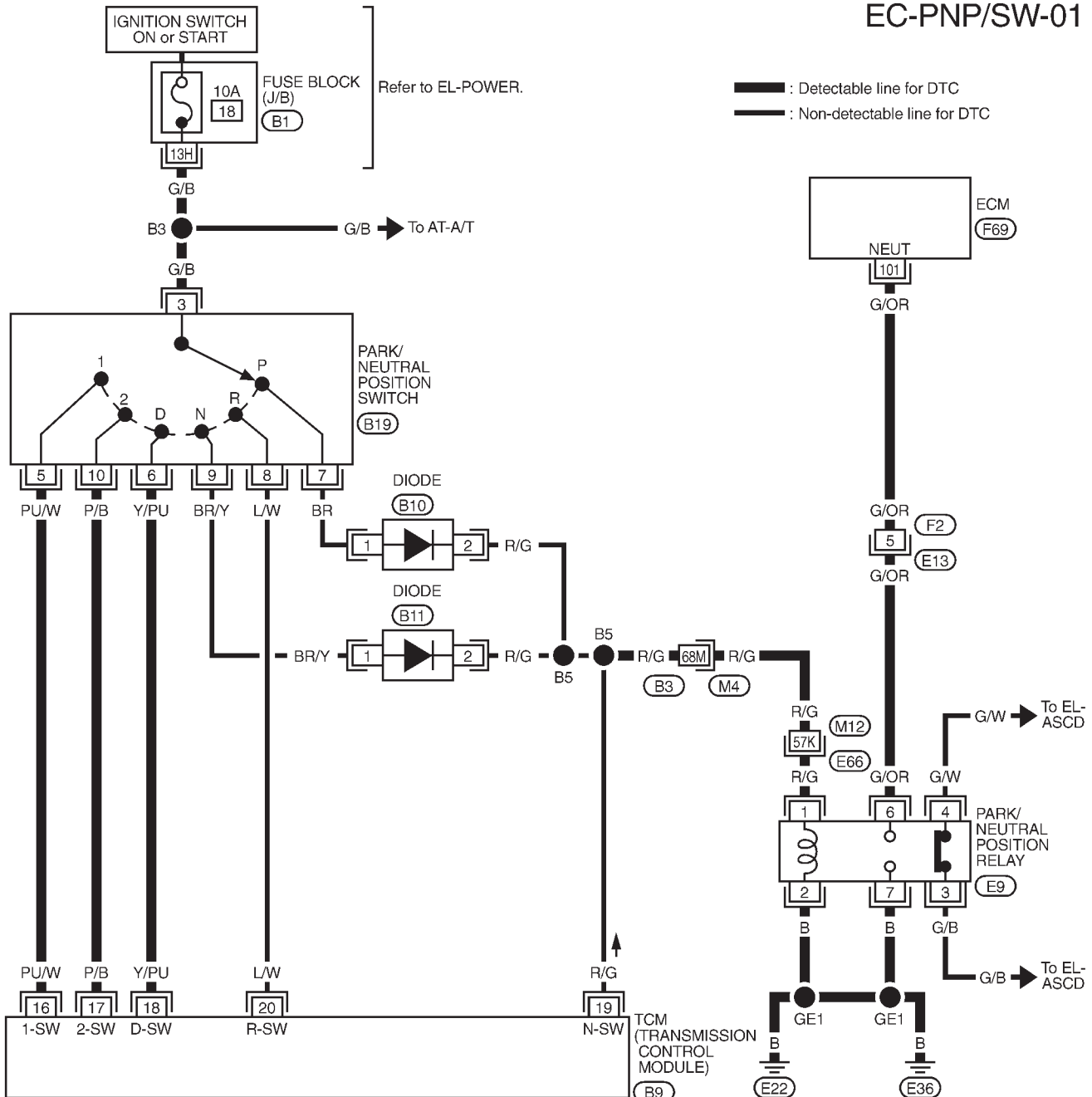
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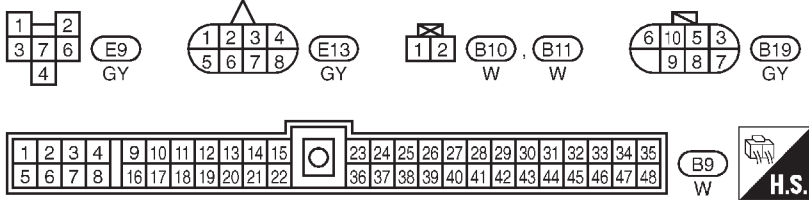
TROUBLE DIAGNOSIS FOR DTC P1706

Park/Neutral Position (PNP) Switch (Cont'd)

EC-PNP/SW-01

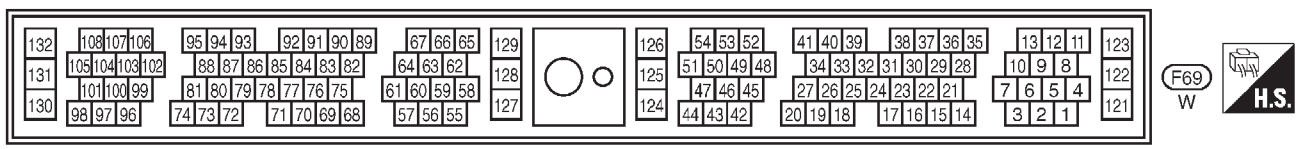


: Detectable line for DTC
 : Non-detectable line for DTC



Refer to last page (Foldout page).

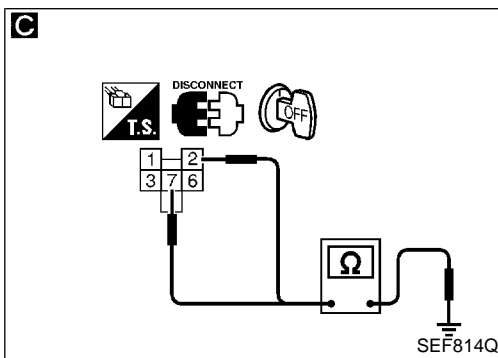
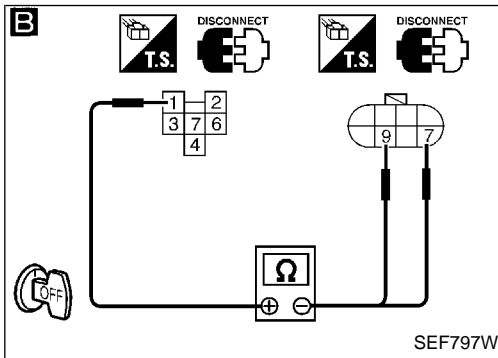
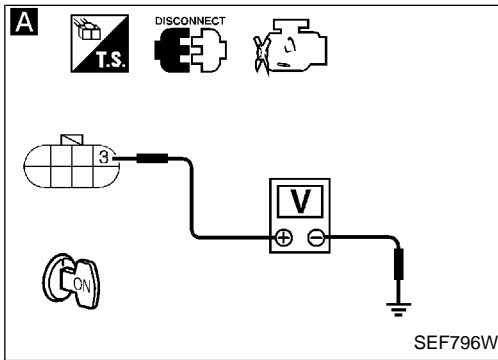
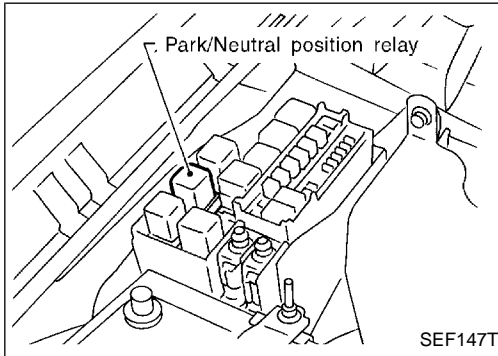
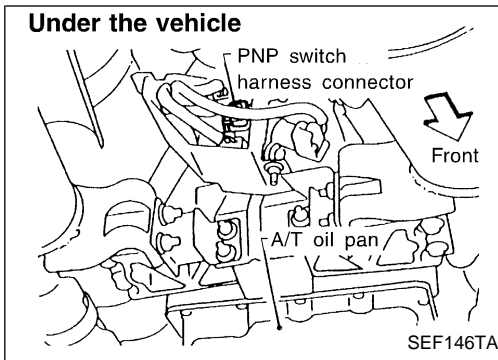
- E66 , M12
- M4 , B3
- B1



TROUBLE DIAGNOSIS FOR DTC P1706

Park/Neutral Position (PNP) Switch (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.

1. Disconnect PNP switch harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG

Check the following.

- 10A fuse
- Harness for open or short between PNP switch and fuse

If NG, repair harness or connectors.

OK

B

CHECK OUTPUT SIGNAL CIRCUIT-I.

1. Turn ignition switch "OFF".
2. Disconnect park/neutral position relay harness connector.
3. Check harness continuity between relay terminal ① and PNP switch terminals ⑦, ⑨.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (E66), (M12)
- Harness connectors (M4), (B3)
- Harness connectors (diodes) (B10), (B11)
- Harness for open or short between PNP switch and relay

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK

C

CHECK GROUND CIRCUIT.

1. Check harness continuity between relay terminals ②, ⑦ and engine ground.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Repair harness or connectors.

OK

D

CHECK OUTPUT SIGNAL CIRCUIT-II.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (101) and relay terminal ⑥.

Continuity should exist.

If OK, check harness for short to ground and short to power.

NG

Check the following.

- Harness connectors (E13), (F2)
- Harness for open or short between ECM and relay

If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK

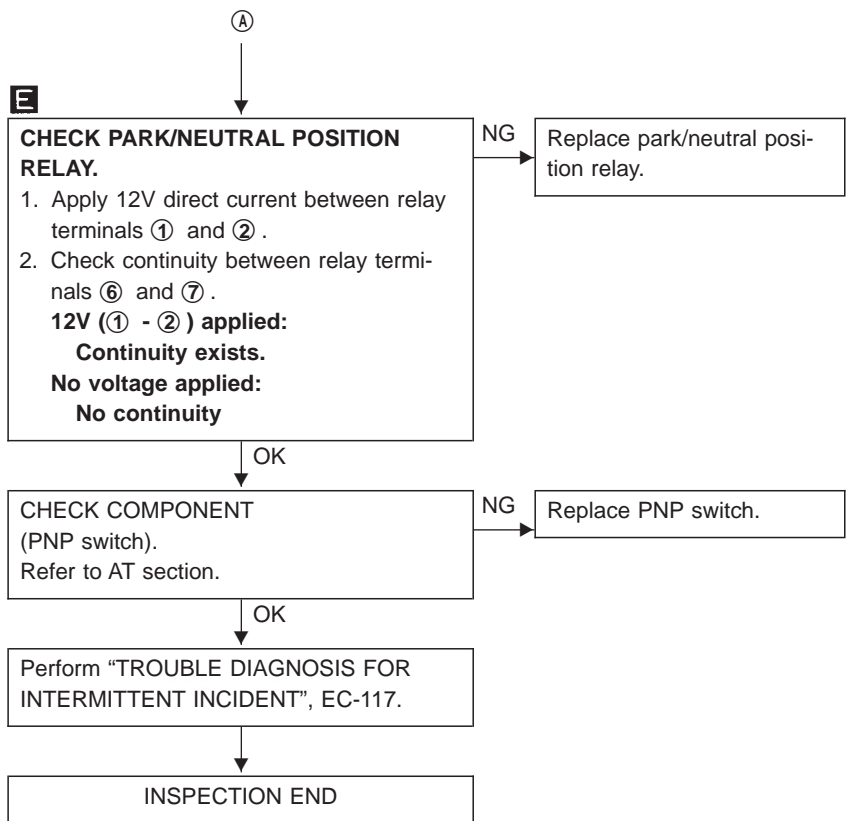
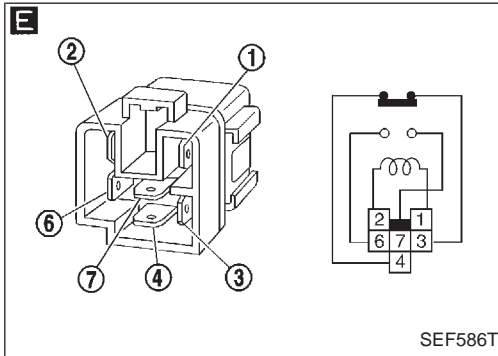
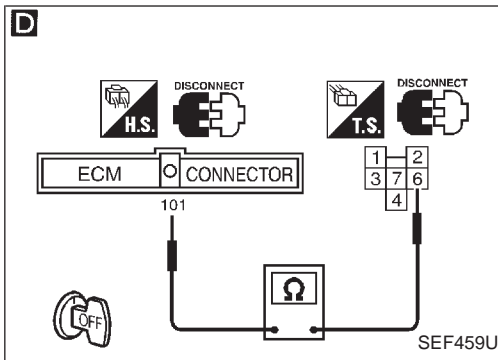
A

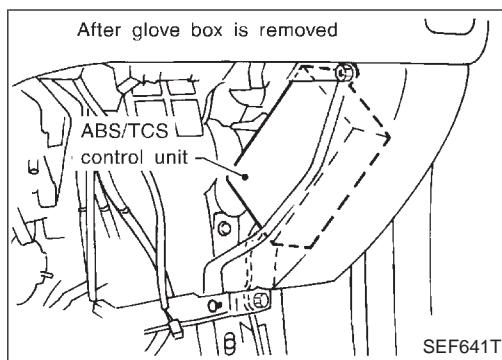
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TROUBLE DIAGNOSIS FOR DTC P1706

Park/Neutral Position (PNP) Switch (Cont'd)





ABS/TCS Control Unit

The malfunction information related to ABS/TCS control unit is transferred through the line (LAN) from ABS/TCS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ABS/TCS control unit but also for ECM after the ABS/TCS related repair.

Freeze frame data is not stored in the ECM for the ABS/TCS control unit. The MIL will not light up for ABS/TCS control unit.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
—* 0107	<ul style="list-style-type: none"> ECM receives incorrect voltage from ABS/TCS control unit continuously. 	<ul style="list-style-type: none"> Harness or connectors (The circuit between ECM and ABS/TCS control unit is open or shorted.) ABS/TCS control unit

*: SAE J2012 number is not applicable

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

- 1) Turn ignition switch "ON".
 - 2) Select "DATA MONITOR" mode with CONSULT-II.
 - 3) Start engine and let it idle for at least 40 seconds.
 - 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-500.
- OR
- 1) Start engine and let it idle for at least 40 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-500.

DTC erasing procedure for ABS/TCS related repair

Erase DTC code by following procedure:

- 1) Turn ignition switch "OFF" and then turn it "ON".
- 2) Connect CONSULT-II and select "ABS".
- 3) Insert UE990 card and install it.
- 4) Select "ABS" and touch "SELF-DIAG RESULTS".
- 5) Touch "ERASE".
- 6) Touch "BACK" then erase malfunction code which has been stored in the TCM or ECM.

DIAGNOSTIC PROCEDURE

Refer to "DIAGNOSTIC PROCEDURE", EC-500.

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ABS/TCS Communication Line

This circuit line is used to control the smooth engine operation of ABS/TCS during the TCS operation. Pulse signals are exchanged between ECM and ABS/TCS control unit.

Be sure to erase the malfunction information such as DTC not only in ABS/TCS control unit but also ECM after the ABS/TCS related repair. Refer to BR section (Self-diagnosis for ABS/TCS control unit, “HOW TO ERASE SELF DIAGNOSTIC RESULTS”).

Freeze frame data is not stored in the ECM for the ABS/TCS communication line. The MIL will not light up for the ABS/TCS communication line.

ON BOARD DIAGNOSIS LOGIC

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
—* 0404	<ul style="list-style-type: none"> ECM receives incorrect voltage from ABS/TCS control unit continuously. 	<ul style="list-style-type: none"> Harness or connectors (The communication line circuit between ECM and ABS/TCS control unit is open or shorted.) ABS/TCS control unit Dead (Weak) battery

*: SAE J2012 number is not applicable.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Before performing the following procedure, confirm that battery voltage is more than 10.5V.



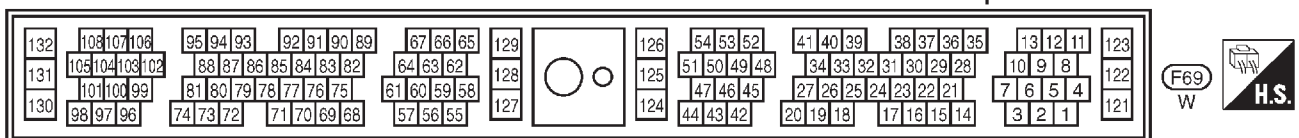
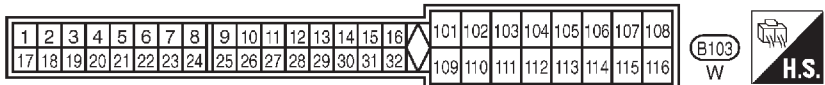
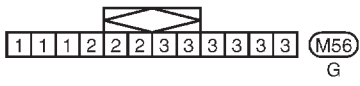
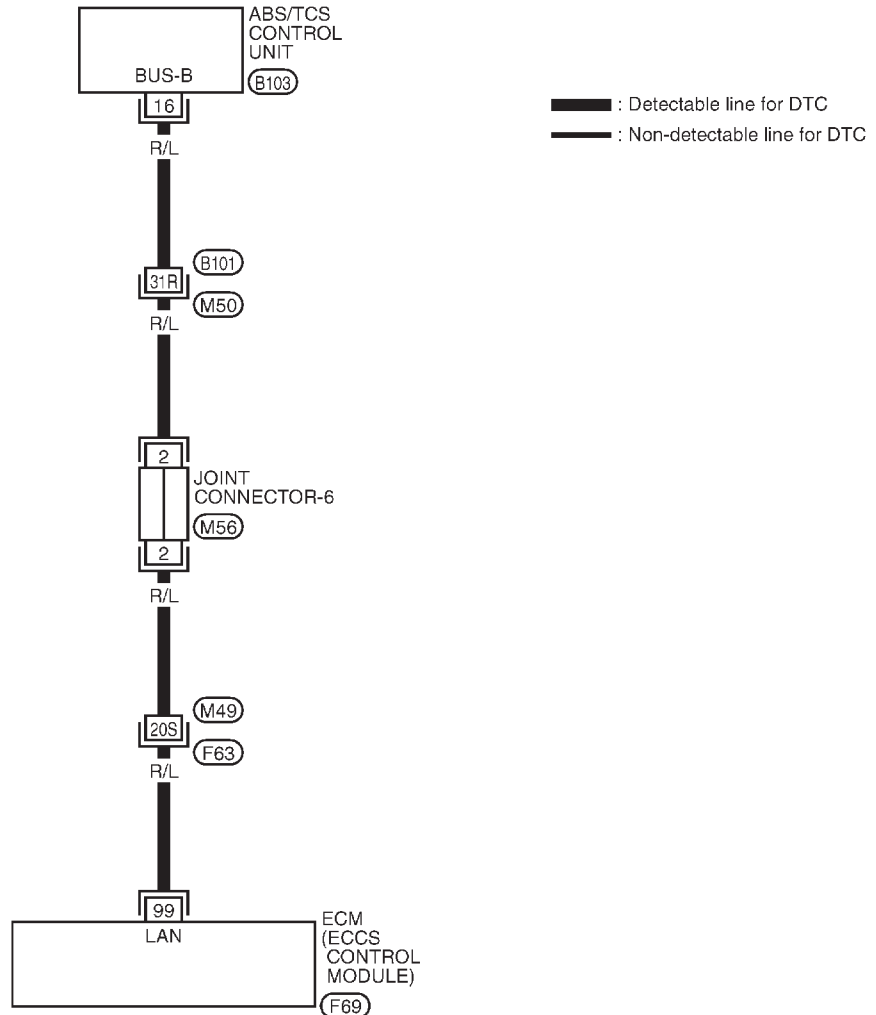
- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and let it idle for at least 3 seconds.
- 4) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE”, EC-500.

OR



- 1) Start engine and let it idle for at least 3 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-500.

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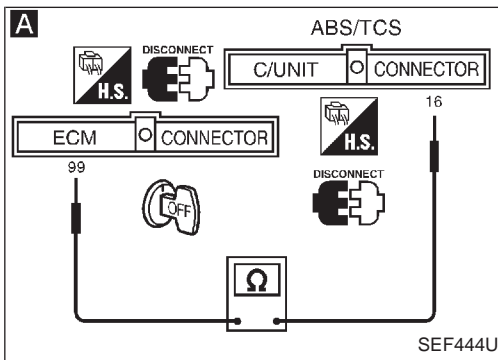
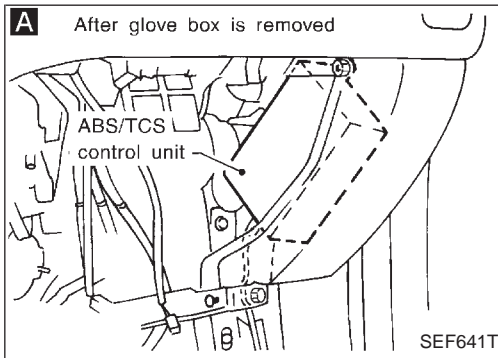
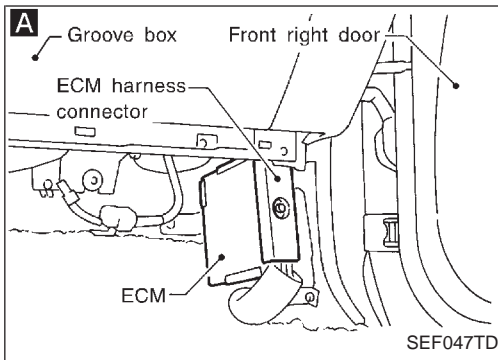
Refer to last page (Foldout page).

(M49), (F63)
(M50), (B101)

TROUBLE DIAGNOSIS FOR ECM — ABS/TCS COMM NG

ABS/TCS Communication Line (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector and ABS/TCS control unit harness connector.
 3. Check harness continuity between ECM terminal 99 and terminal 16.
Continuity should exist.
 If OK, check harness for short to ground and short to power.

NG → Check the following.
 ● Harness connectors (M50), (B101)
 ● Harness connectors (F63), (M49)
 ● Joint connector-6
 ● Check harness for open or short between ECM and ABS/TCS control unit.
 If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK

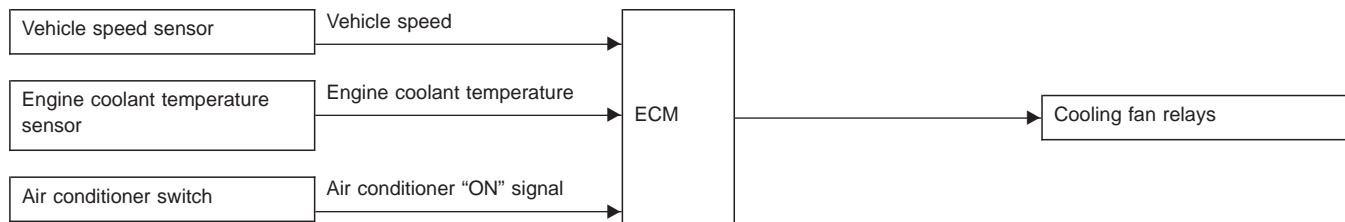
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

Overheat

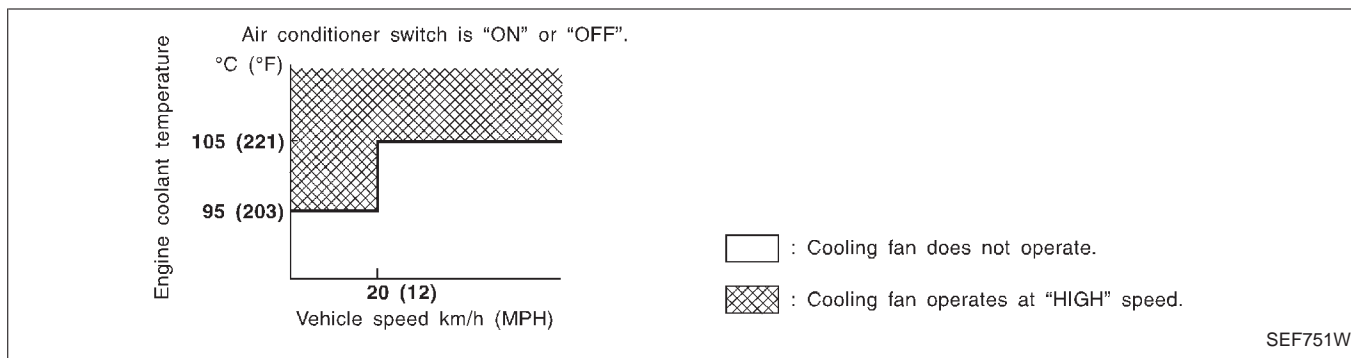
SYSTEM DESCRIPTION

Input/output signal line



The ECM controls the cooling fan corresponding to vehicle speed, engine coolant temperature and air conditioner ON signal.

Operation



- The cooling fan operates at HIGH if diagnostic test mode II (self-diagnostic results) for engine coolant temperature sensor is "NG" or when the ECM fail-safe is activating.
- When A/C line pressure reaches the specified value, the triple-pressure switch turns on to operate cooling fans at low speed.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> • After warming up engine, idle the engine. • Air conditioner switch: "OFF" 	Engine coolant temperature is 94°C (201°F) or less OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F) at vehicle speeds less than 80 km/h HIGH
		Engine coolant temperature is 105°C (221°F) or more HIGH

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
34 27	LG LG/R	Cooling fan relay-1 (High) Cooling fan relay-2 (High)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan is operating.	0 - 1V

TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Air conditioner switch: "OFF"	OFF
		Air conditioner switch: "ON" (Compressor operates.)	ON
COOLING FAN	<ul style="list-style-type: none"> After warming up engine, idle the engine. Air conditioner switch: "OFF" 	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F) at vehicle speed less than 20 km/h (12 MPH)	HIGH
		Engine coolant temperature is 105°C (221°F) or more	

ON BOARD DIAGNOSIS LOGIC

This diagnosis continuously monitors the engine coolant temperature.

If the cooling fan or another component in the cooling system malfunctions, the engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic trouble code No.	Malfunction is detected when ...	Check Items (Possible Cause)
OVERHEAT 0208	<ul style="list-style-type: none"> Engine coolant reaches an abnormally high temperature. 	<ul style="list-style-type: none"> Harness or connectors. (The cooling fan circuit is open or shorted.) Cooling fan Radiator hose Radiator Radiator cap Water pump Thermostat <p>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-511).</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.

TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

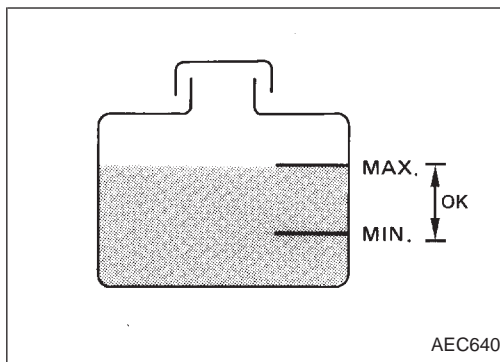
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the cooling fan. During this check, a 1st trip DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

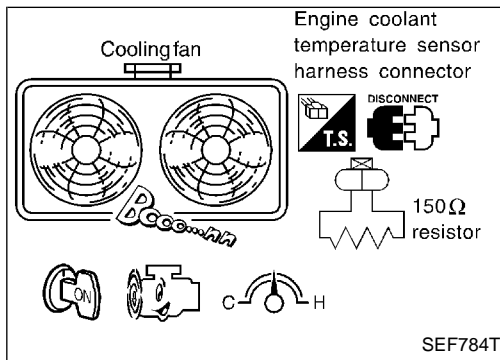
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



AEC640

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF792X



SEF784T

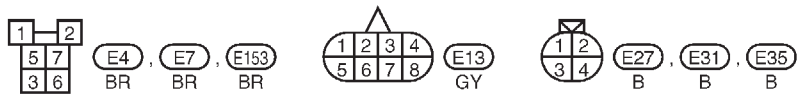
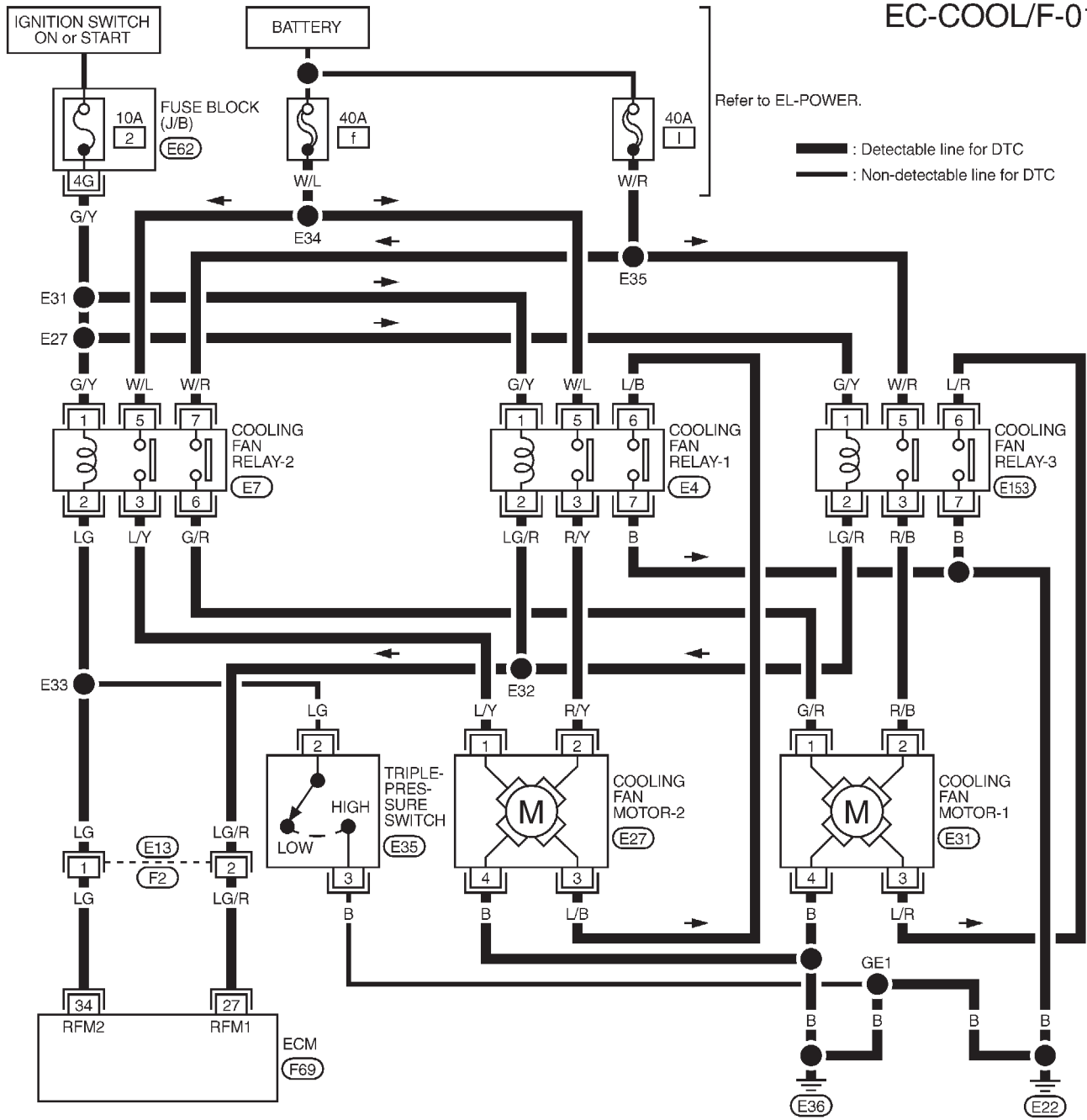
- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-505.
 - 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-505.
 - 3) Turn ignition switch "ON".
 - 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
 - 5) If NG, go to "DIAGNOSTIC PROCEDURE", EC-505.
- OR
- 3) Disconnect engine coolant temperature sensor harness connector.
 - 4) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
 - 5) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
 - 6) If NG, go to "DIAGNOSTIC PROCEDURE", EC-505.

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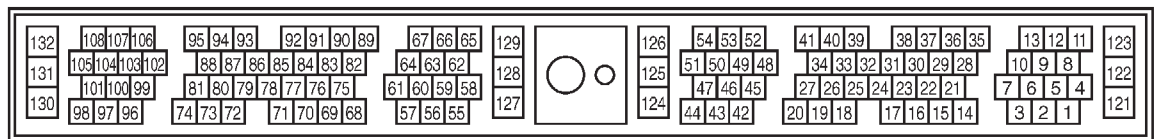
TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

EC-COOL/F-01

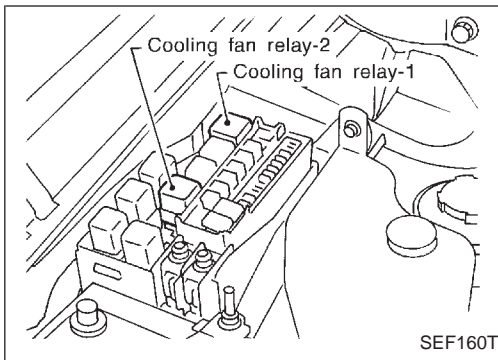


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TROUBLE DIAGNOSIS FOR OVERHEAT

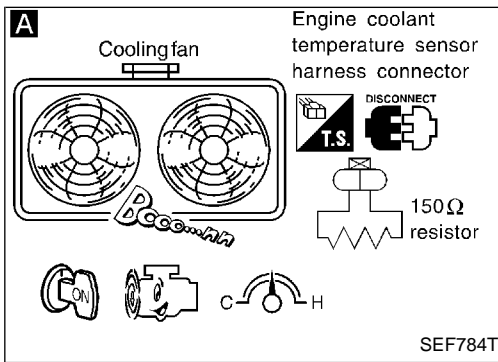
Overheat (Cont'd) DIAGNOSTIC PROCEDURE



A

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF792X



INSPECTION START

A

CHECK COOLING FAN MOTOR OPERATION-I.

1. Disconnect cooling fan relay-1 and -3.
2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

Cooling fans should operate.

OR

2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Start engine and wait at least 15 seconds.
5. Make sure that cooling fan motors operate.

Be careful not to overheat engine.

NG → Check cooling fan motor-I speed control circuit.
(Go to PROCEDURE A.)

OK

A
(Go to next page.)

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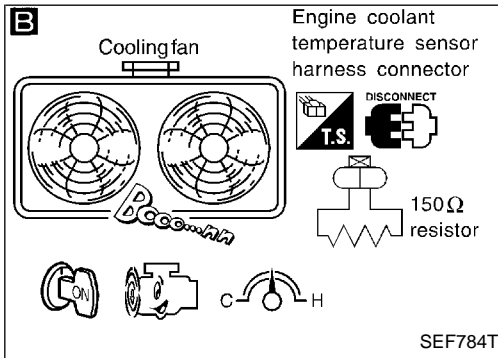
TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

B

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLANT TEMP/S	XXX °C

SEF792X



A

B

CHECK COOLING FAN MOTOR OPERATION-II.

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relay-1 and -3.
3. Disconnect cooling fan relay-2.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

Cooling fans should operate.

NG → Check cooling fan motor-II control circuit. (Go to PROCEDURE B.)

OR

4. Restart engine and wait at least 15 seconds.
5. Make sure that cooling fan motors operate.

Be careful not to overheat engine.

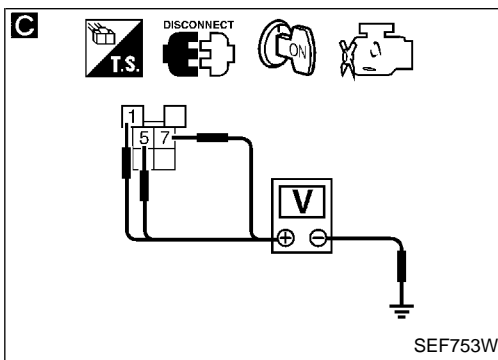
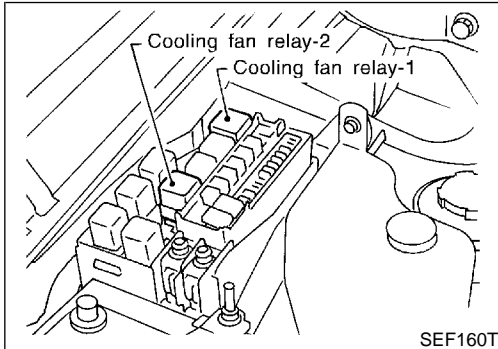
OK →

CHECK COMPONENT (Triple-pressure switch). Refer to HA section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

NG → Replace triple-pressure switch.

OK →

B
(Go to EC-510.)



PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-2.
3. Turn ignition switch "ON".
4. Check voltage between terminals ①, ⑤, ⑦ and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and battery

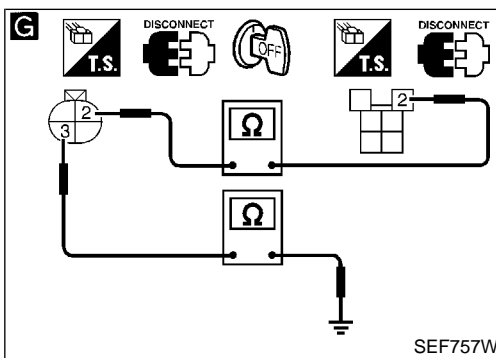
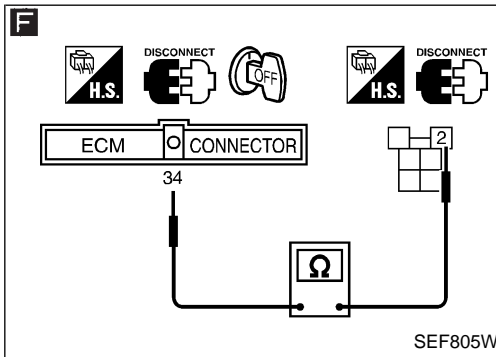
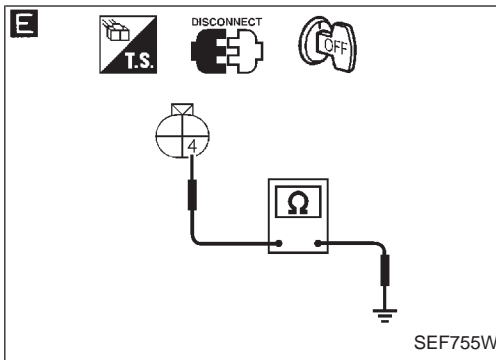
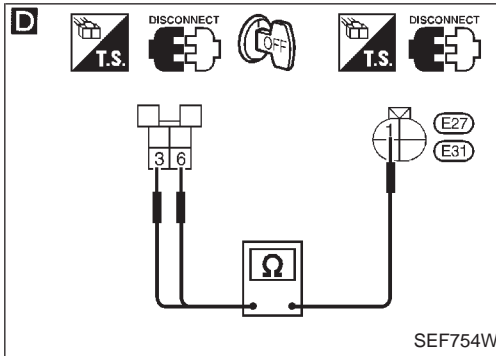
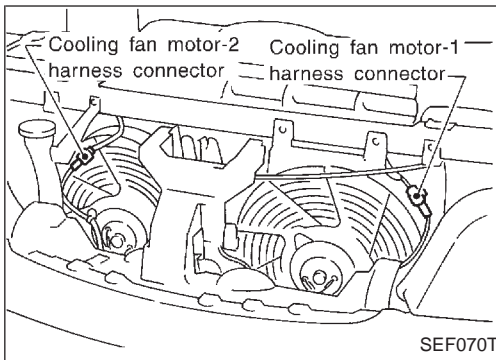
If NG, repair harness or connectors.

OK →

A
(Go to next page.)

TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)



A

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor harness connector.

D 3. Check harness continuity between relay terminals ③, ⑥ and cooling fan motor terminal ①.
Continuity should exist.
If OK, check harness for short.

E 4. Check harness continuity between fan motor terminal ④ and engine ground.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

F

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ③④ and relay-2 terminal ②.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check the following.
 • Harness connectors (F2, E13)
 • Harness for open or short between cooling fan relay-2 and ECM
 If NG, repair open circuit or short to ground or short to power in harness or connectors.

G

CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAY-2 AND GROUND.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-2.
3. Disconnect triple-pressure switch harness connector.
4. Check harness continuity between relay-2 terminal ② and switch terminal ③ and engine ground.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG → Check harness for open or short between triple-pressure switch and relay-2 or ground.
If NG, repair open circuit or short to ground or short to power in harness or connectors.

CHECK COMPONENT (Triple-pressure switch).
Refer to "Magnet Clutch Circuit" in HA section.

NG → Replace triple-pressure switch.

CHECK COMPONENT (Cooling fan relay-2).
Refer to "COMPONENT INSPECTION", EC-512.

NG → Replace cooling fan relay.

CHECK COMPONENT (Cooling fan motors).
Refer to "COMPONENT INSPECTION", EC-512.

NG → Replace cooling fan motors.

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

PROCEDURE B

INSPECTION START

H

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1 and 3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 and -3 terminals ①, ⑤ and ground with CONSULT-II or tester.
Voltage: Battery voltage

NG

Check the following.

- 40A fusible links
 - 10A fuse
 - Harness continuity between cooling fan relay-1 and -3 and fuse
 - Harness continuity between cooling fan relay-1 and -3 and battery
- If NG, repair harness or connectors.

OK

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 and -2 harness connectors.
- I** 3. Check harness continuity between relay-1 and -3 terminal ③ and cooling fan motor-1 and -2 terminal ②.
Continuity should exist.
If OK, check harness for short.
- J** 4. Check harness continuity between relay-1, -3 terminal ⑥ and fan motor-1 and -2 terminal ③.
Continuity should exist.
If OK, check harness for short to ground and short to power.
- K** 5. Check harness continuity between relay -1, -3 terminal ⑦ and engine ground.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG

Repair harness or connectors.

OK

L

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑳ and fan relay-1, -3 terminal ②.
Continuity should exist.
If OK, check harness for short to ground and short to power.

NG

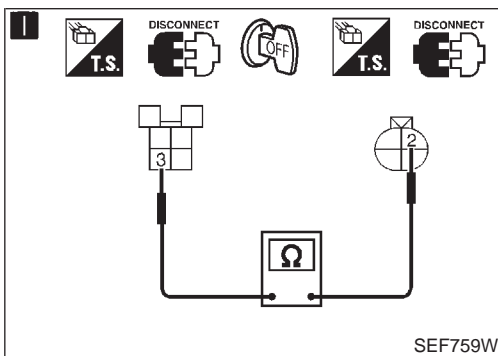
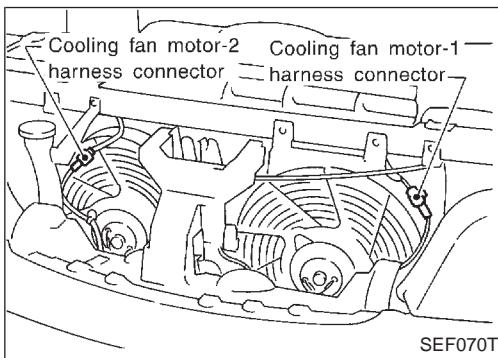
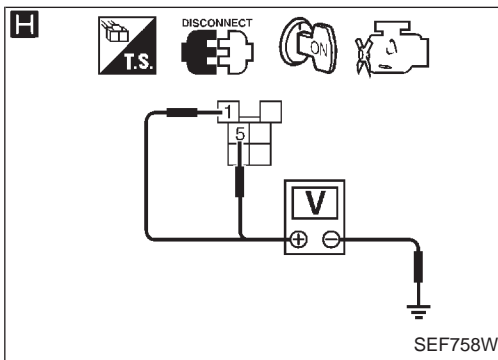
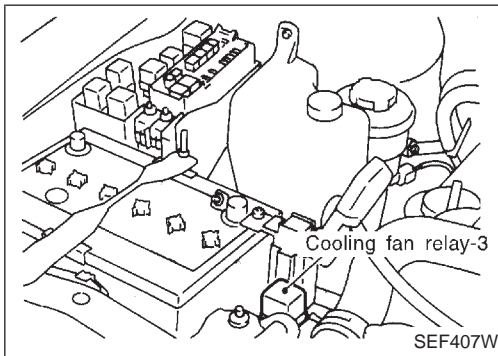
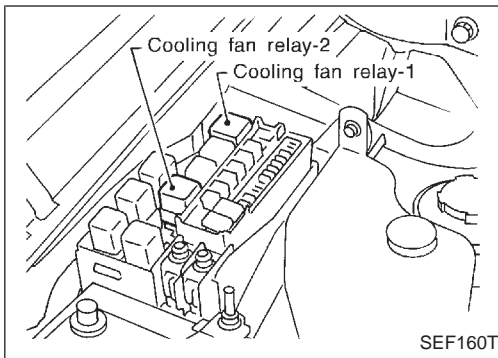
Check the following.

- Harness connectors **(F2), (E13)**
 - Harness for open or short between cooling fan relay-1, -3 and ECM
- If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK

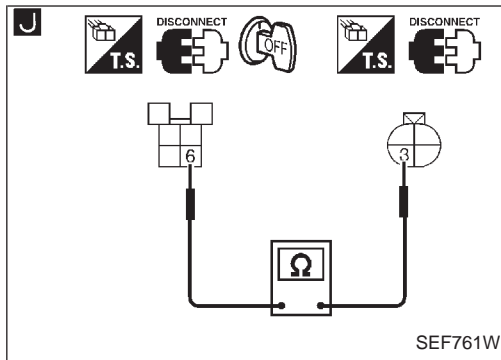
B

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TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)



(B)

CHECK COMPONENT
(Cooling fan relay-1 and -3).
Refer to "COMPONENT INSPECTION",
EC-512.

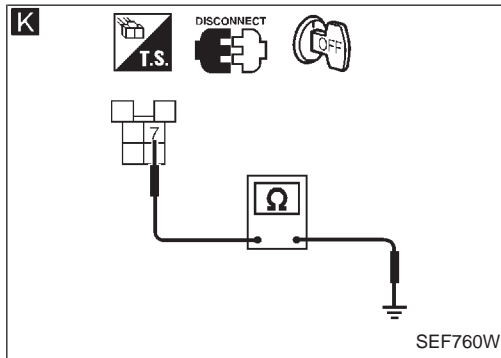
NG → Replace cooling fan relays.

OK ↓

CHECK COMPONENTS
(Cooling fan motors).
Refer to "COMPONENT INSPECTION",
EC-512.

NG → Replace cooling fan motors.

OK ↓



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

↓

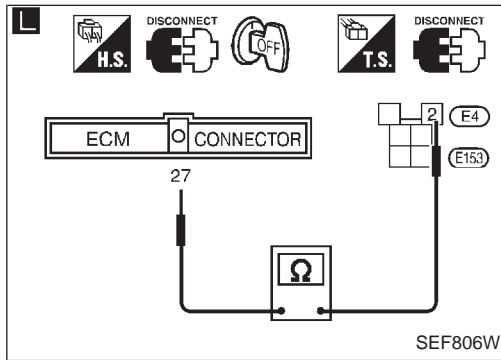
Trouble is not fixed.

↓

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

↓

INSPECTION END



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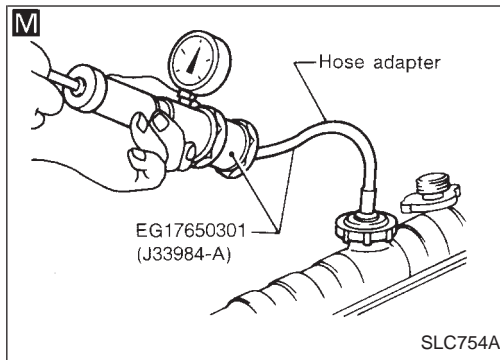
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TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)



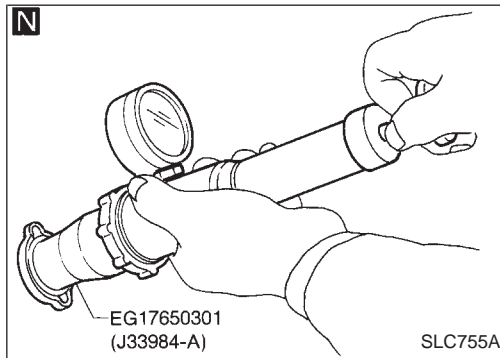
M

CHECK COOLING SYSTEM FOR LEAK.
Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure:
157 kPa (1.6 kg/cm², 23 psi)
Pressure should not drop.
CAUTION:
Higher than the specified pressure may cause radiator damage.

NG → Check the following for leak.

- Hose
- Radiator
- Water pump

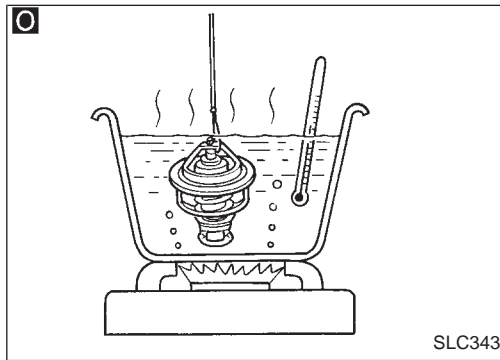
Refer to LC section ("Water Pump").



N

CHECK RADIATOR CAP.
Apply pressure to cap with a tester.
Radiator cap relief pressure:
Standard
98 - 118 kPa (1.0 - 1.2 kg/cm², 14 - 17 psi)
Limit
59 - 118 kPa (0.6 - 1.2 kg/cm², 9 - 17 psi)

NG → Replace radiator cap.



O

CHECK THERMOSTAT.

1. Check valve seating condition at normal room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.
Valve opening temperature:
82°C (180°F) [standard]
Maximum valve lift:
More than 8.6 mm/95°C (0.339 in/203°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to LC section ("Thermostat").

NG → Replace thermostat.

OK → Check engine coolant temperature sensor. Refer to "COMPONENT INSPECTION", EC-149.

NG → Replace engine coolant temperature sensor.

OK → If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-511.

INSPECTION END

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

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

TROUBLE DIAGNOSIS FOR OVERHEAT

Overheat (Cont'd)

MAIN 12 CAUSES OF OVERHEATING

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	98 - 118 kPa (1.0 - 1.2 kg/cm ² , 14 - 17 psi) 59 - 118 kPa (0.6 - 1.2 kg/cm ² , 9 - 17 psi) (Limit)	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section
ON*1	7	<ul style="list-style-type: none"> Cooling fan 	<ul style="list-style-type: none"> CONSULT-II 	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" (EC-501)
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
OFF*4	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.

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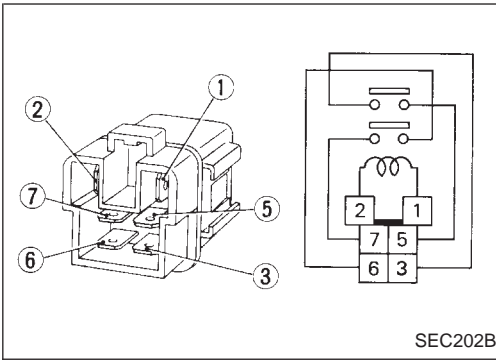
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TROUBLE DIAGNOSIS FOR OVERHEAT

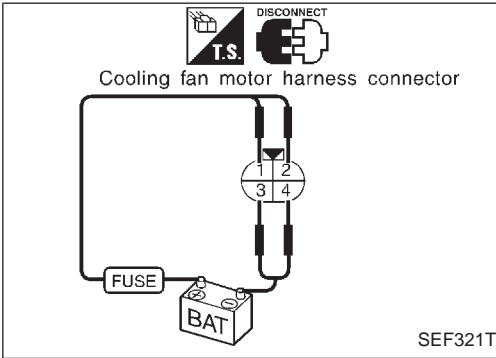
Overheat (Cont'd) COMPONENT INSPECTION

Cooling fan relays-1 and -2, -3

Check continuity between terminals ③ and ⑤ , ⑥ and ⑦ .



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



Cooling fan motor

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation as shown in the figure.

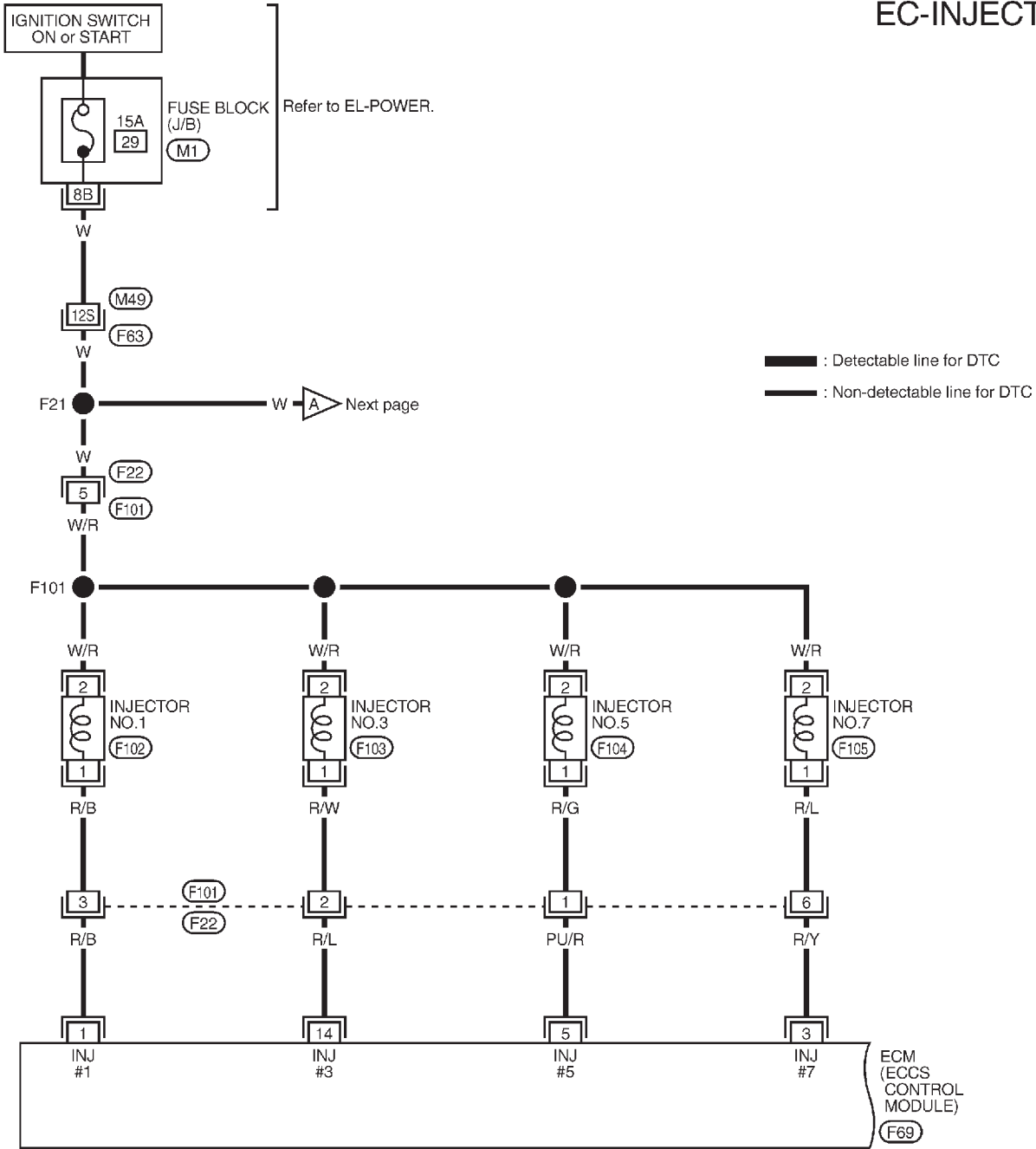
Conditions	Cooling fan motor
12V direct current supply between terminal ① , ② and ③ , ④ (Ground)	Cooling fan operates at high speed

If NG, replace cooling fan motor.

Injector

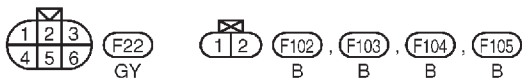
LEFT BANK

EC-INJECT-01

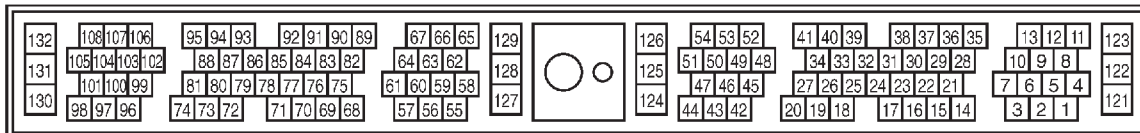
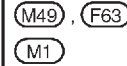


— : Detectable line for DTC
 — : Non-detectable line for DTC

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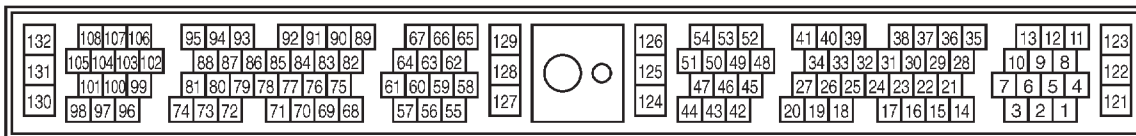
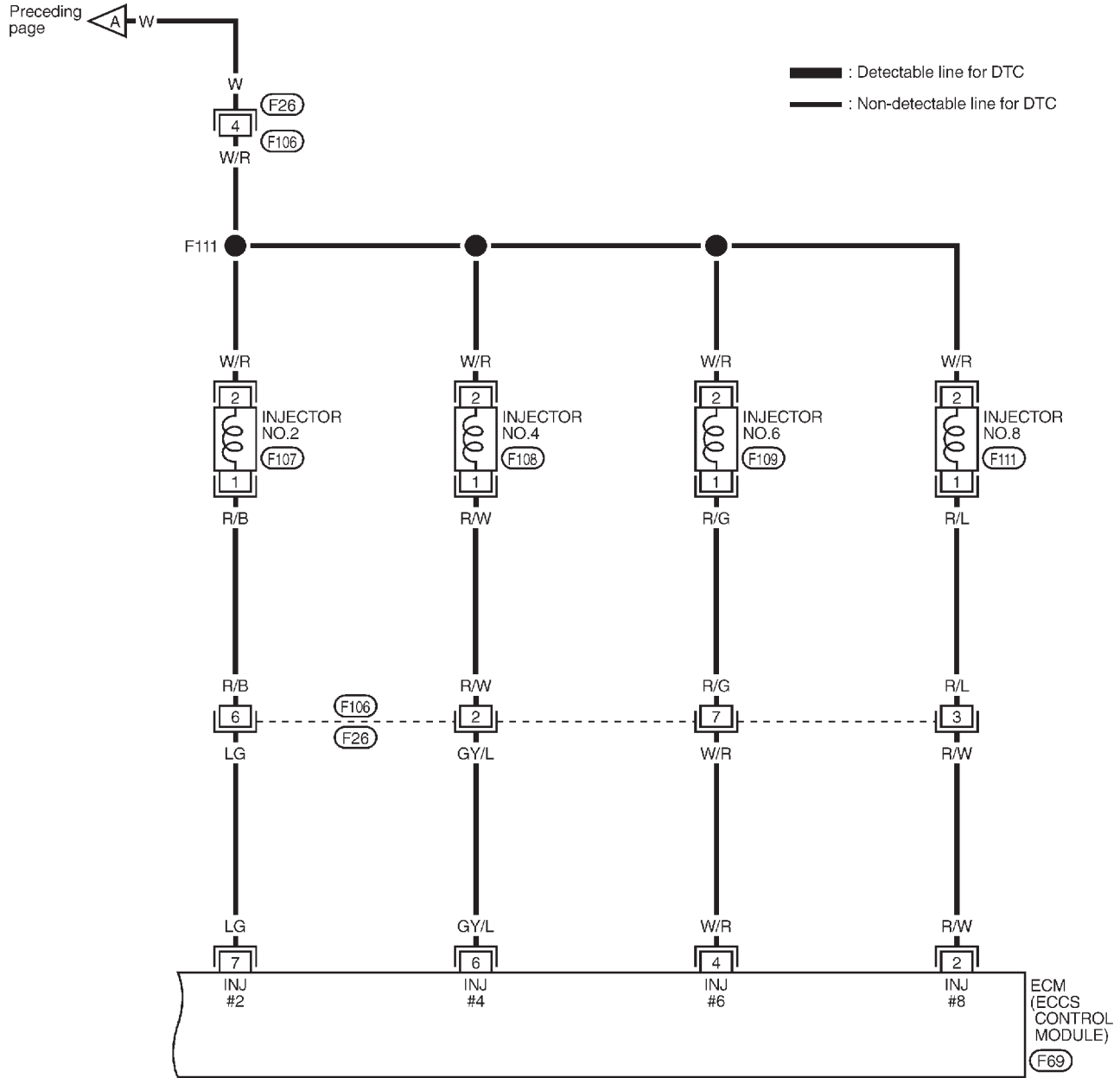


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)

RIGHT BANK

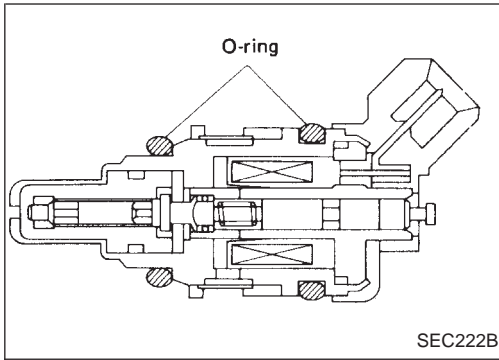
EC-INJECT-02



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)

COMPONENT DESCRIPTION



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.

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1	R/B	Injector No. 1	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) Idle speed	BATTERY VOLTAGE (11 - 14V)
2	R/W	Injector No. 8		
3	R/Y	Injector No. 7		
14	R/L	Injector No. 3		
4	W/R	Injector No. 6	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
5	PU/R	Injector No. 5		
6	GY/L	Injector No. 4		
7	L/G	Injector No. 2		

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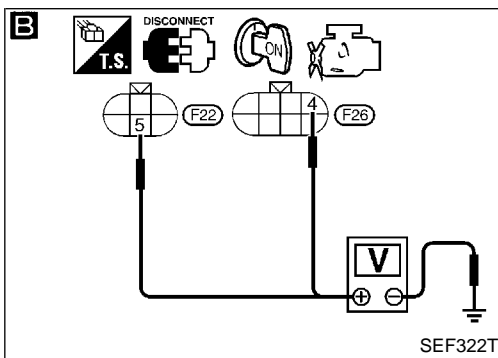
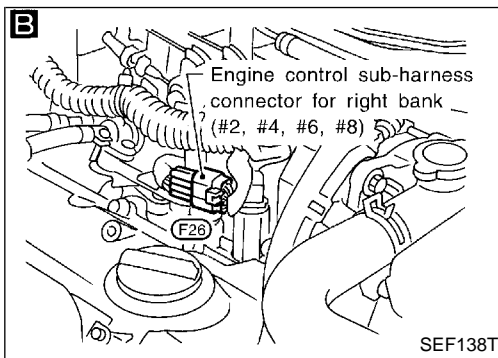
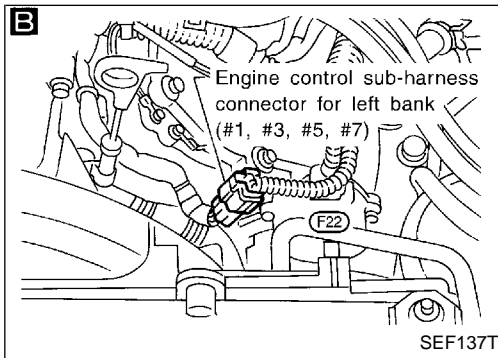
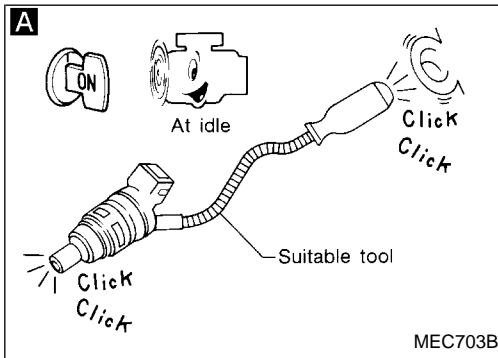
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd) DIAGNOSTIC PROCEDURE

A

ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS-RPM(POS)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX step

SEF793X



INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

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

OK → INSPECTION END

B

CHECK POWER SUPPLY.

1. Stop engine.
2. Disconnect right bank injector sub-harness connectors (F22) and sub-harness connector (F26) (on the right bank).
3. Turn ignition switch "ON".
4. Check voltage between terminal ④ (right bank), ⑤ (left bank) and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG →

Check the following.

- Harness connectors (F63), (M49)
- 15A fuse
- Check harness for open or short between harness connector (F22), (F26) and ignition switch.

If NG, repair harness or connectors.

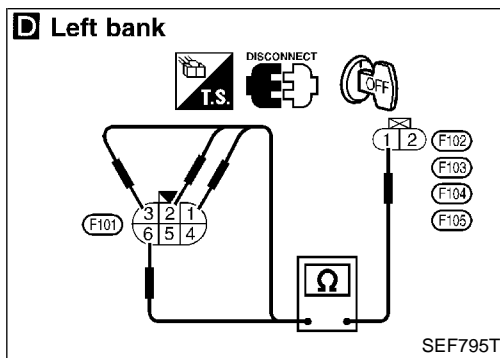
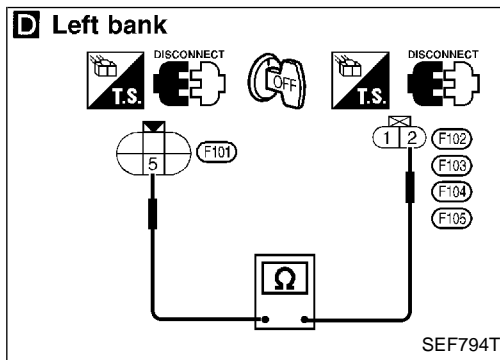
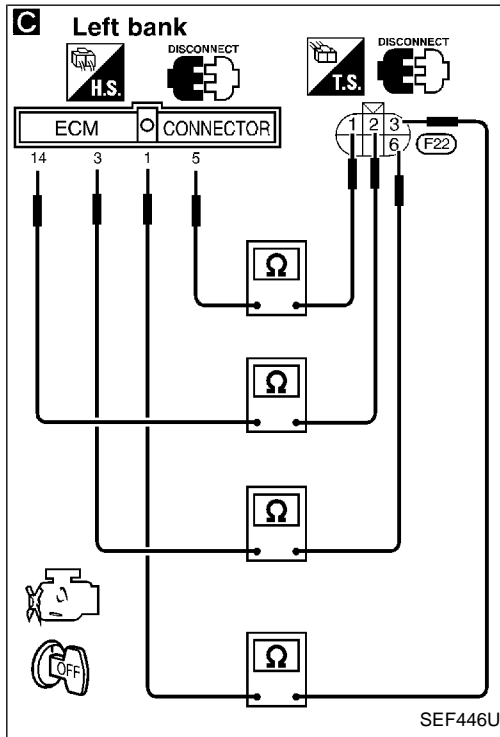
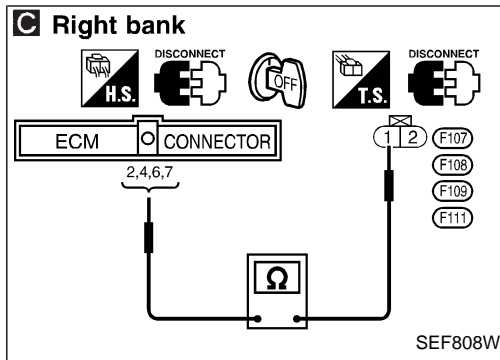
OK

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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)



C CHECK OUTPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals and ECM terminals.

Right bank:
 ① and ②, ④, ⑥, ⑦

Left bank:
 ③ and ①,
 ② and ⑭,
 ① and ⑤,
 ⑥ and ③

Continuity should exist.
 If OK, check harness for short to ground and short to power.

NG → Check the following (Right bank).
 • Harness or connectors
 (F26), (F106)
 If NG, repair open circuit or short to ground or short to power in harness or connectors.

D CHECK POWER SUPPLY CIRCUIT AND OUTPUT SIGNAL CIRCUIT (FOR LEFT BANK).

1. Remove intake manifold collector. (Refer to "TIMING CHAIN" in EM section.)
2. Disconnect injector sub-harness connector (F101).
3. Check harness continuity between terminal ⑤ and injector terminal ②. **Continuity should exist.** If OK, check harness for short to ground and short to power.
4. Check harness continuity between injector terminal ① and terminals ③, ②, ①, ⑥. **Continuity should exist.** If OK, check harness for short to ground and short to power.

NG → Repair harness or connectors.

CHECK COMPONENT (Injector).
 Refer to "COMPONENT INSPECTION" on next page.

NG → Replace injector.

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-117.

INSPECTION END

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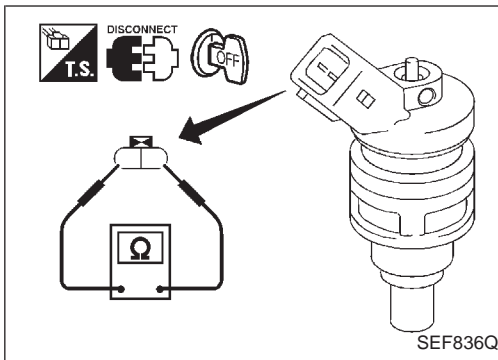
Injector (Cont'd) COMPONENT INSPECTION

Injector

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

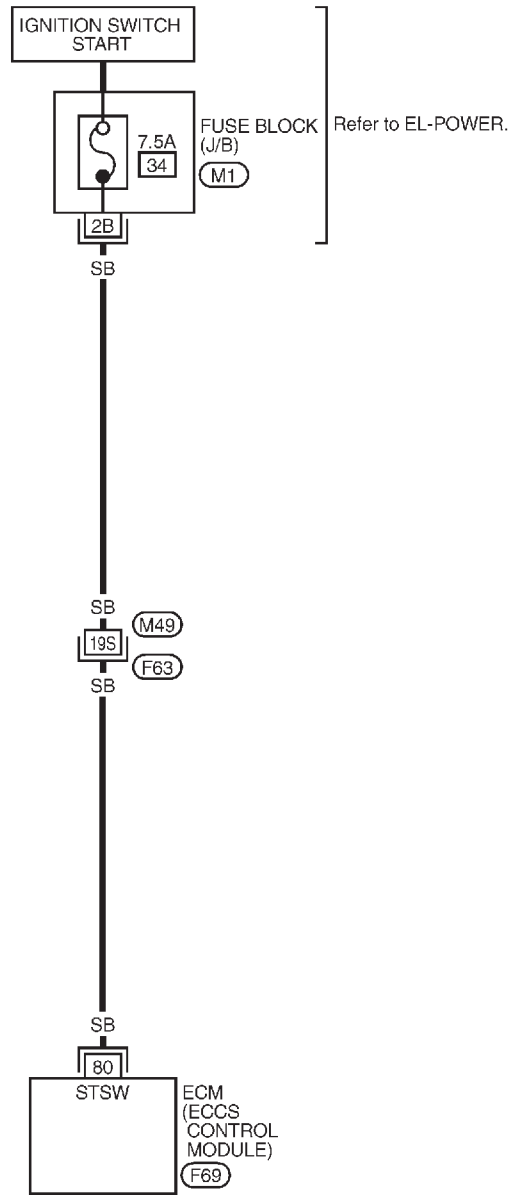
Resistance: 10 - 14 Ω at 25°C (77°F)

If NG, replace injector.



Start Signal

EC-S/SIG-01



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Refer to last page (Foldout page).

M49, F63

M1

132	108	107	106	95	94	93	92	91	90	89	67	66	65	129	126	54	53	52	41	40	39	38	37	36	35	13	12	11	123		
131	105	104	103	102	88	87	86	85	84	83	82	64	63	62	128	125	51	50	49	48	34	33	32	31	30	29	28	10	9	8	122
130	101	100	99	81	80	79	78	77	76	75	61	60	59	58	127	124	47	46	45	27	26	25	24	23	22	21	7	6	5	4	121
	98	97	96	74	73	72	71	70	69	68	57	56	55			44	43	42	20	19	18	17	16	15	14	3	2	1			

F69
W



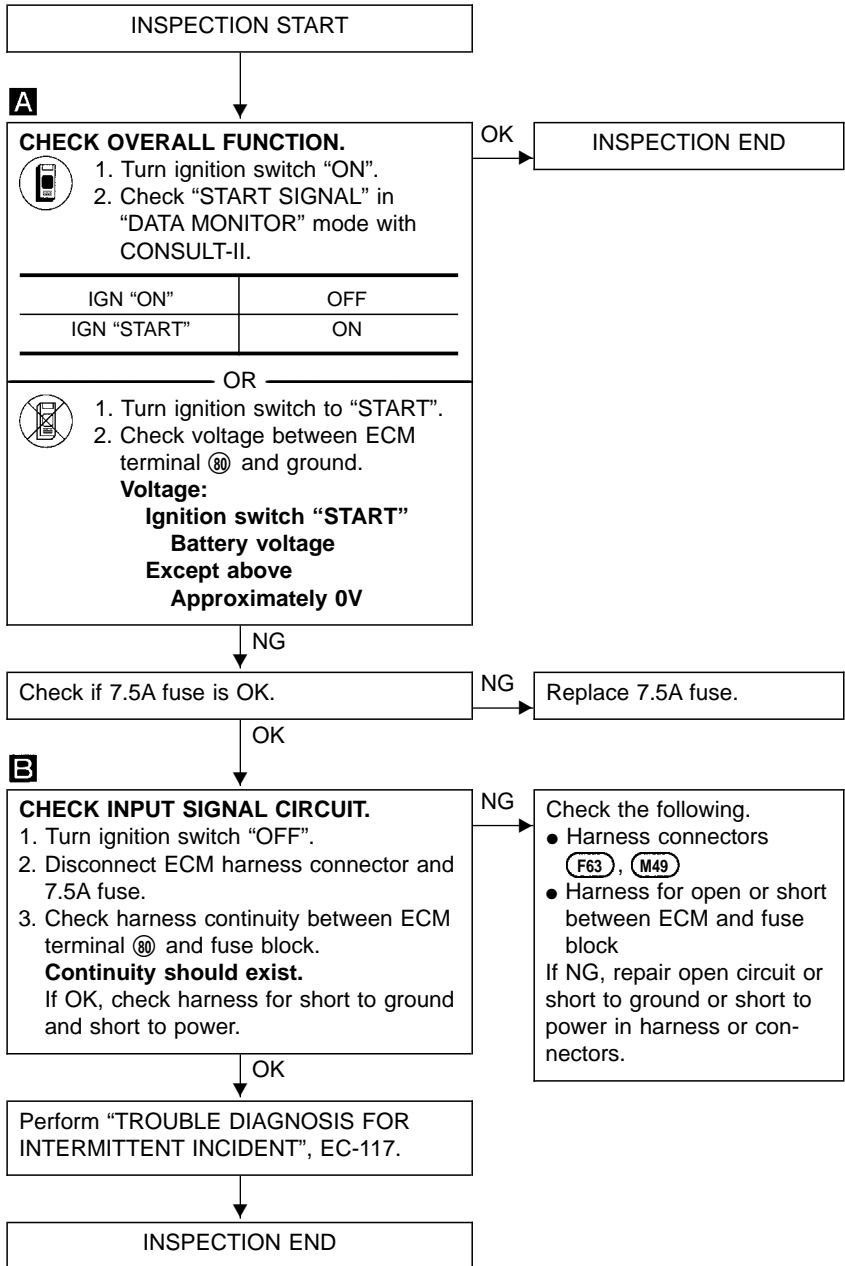
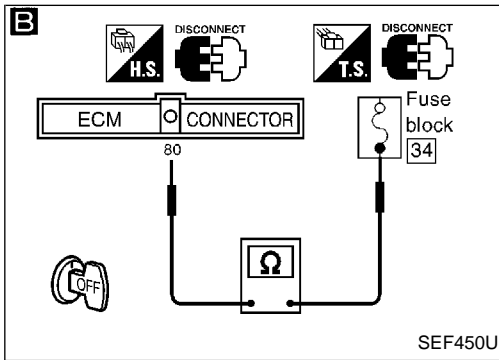
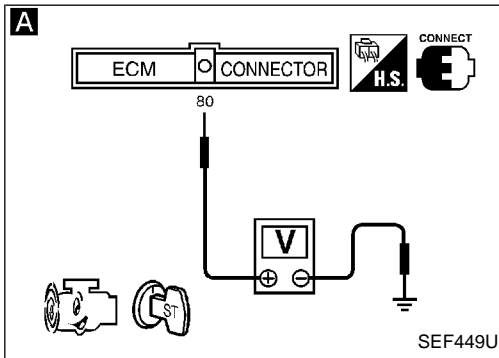
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Start Signal (Cont'd) DIAGNOSTIC PROCEDURE

A

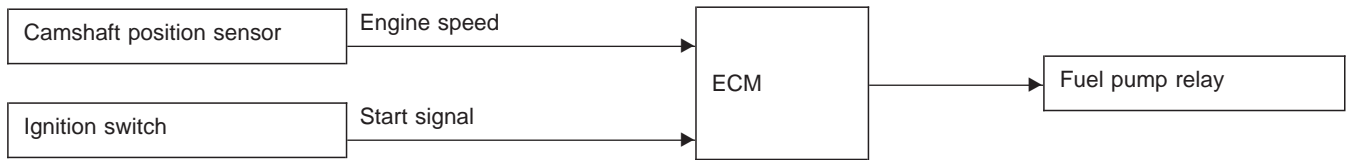
DATA MONITOR	
MONITORING	NO DTC
START SIGNAL	OFF
CLSD THL/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

SEF756X



Fuel Pump Control

SYSTEM DESCRIPTION



Fuel pump ON-OFF control

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start-up. If the ECM receives a 1° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to activate. If the 1° signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents the battery from 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 is running and cranking	Operates
When engine is stopped	Stops for 1.5 seconds
Except as shown above	Stops

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON (Operates for 1 second) Engine running and cranking 	ON
	Except as shown above	OFF

ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
11	PU	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0 - 1V
			Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

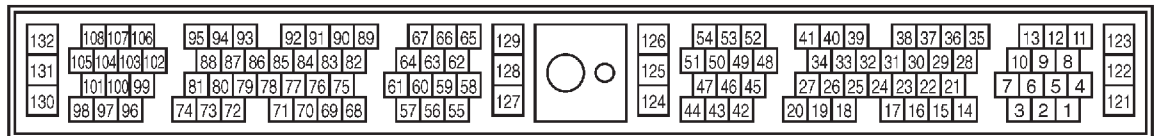
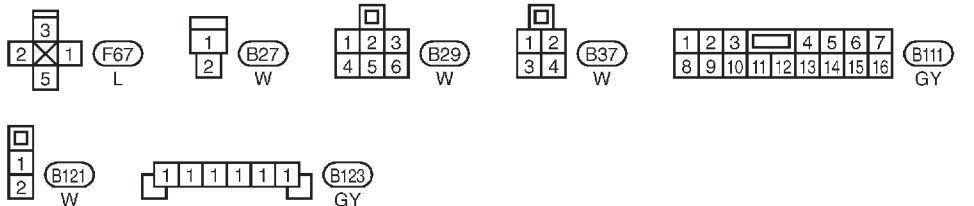
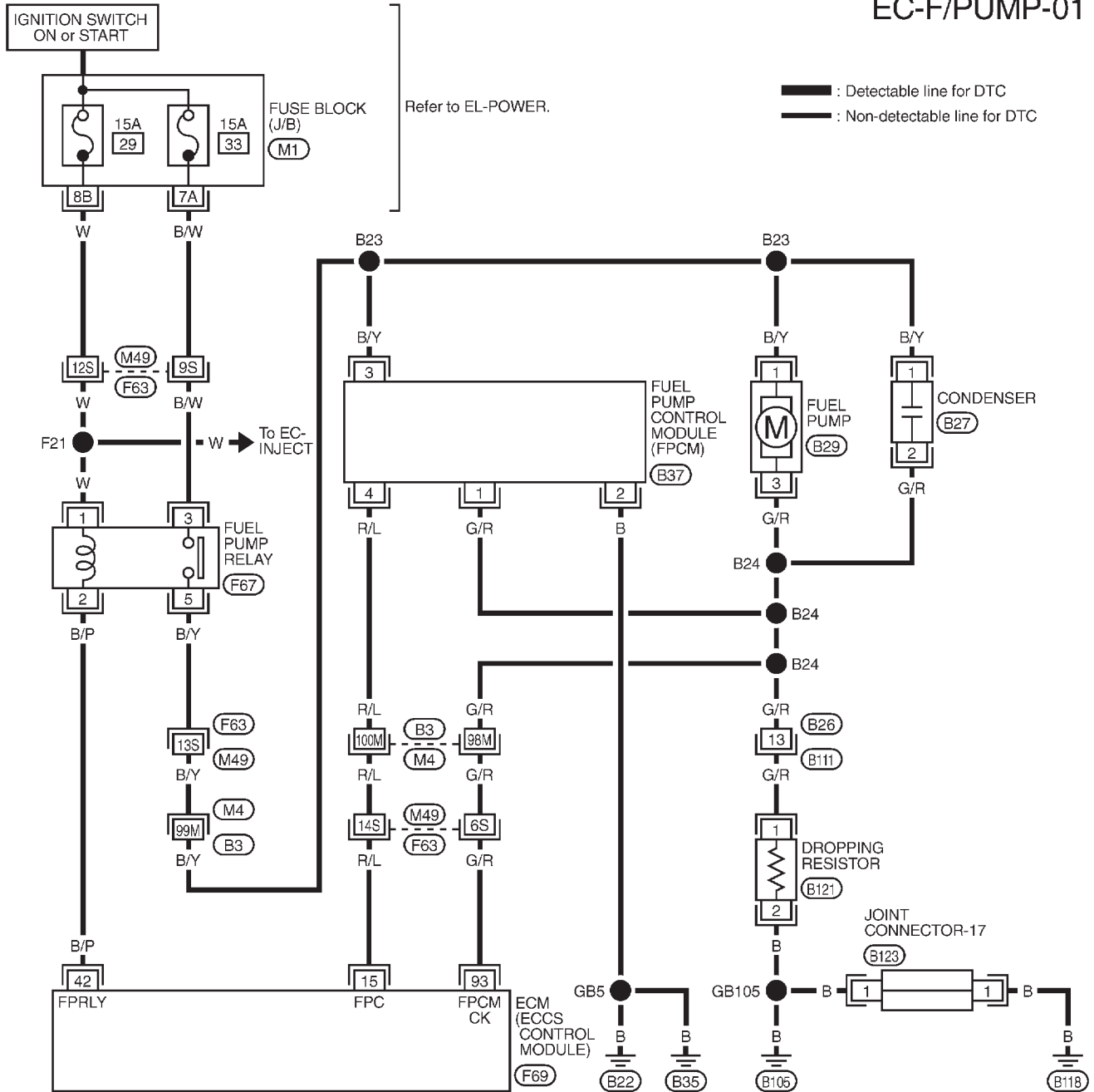
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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

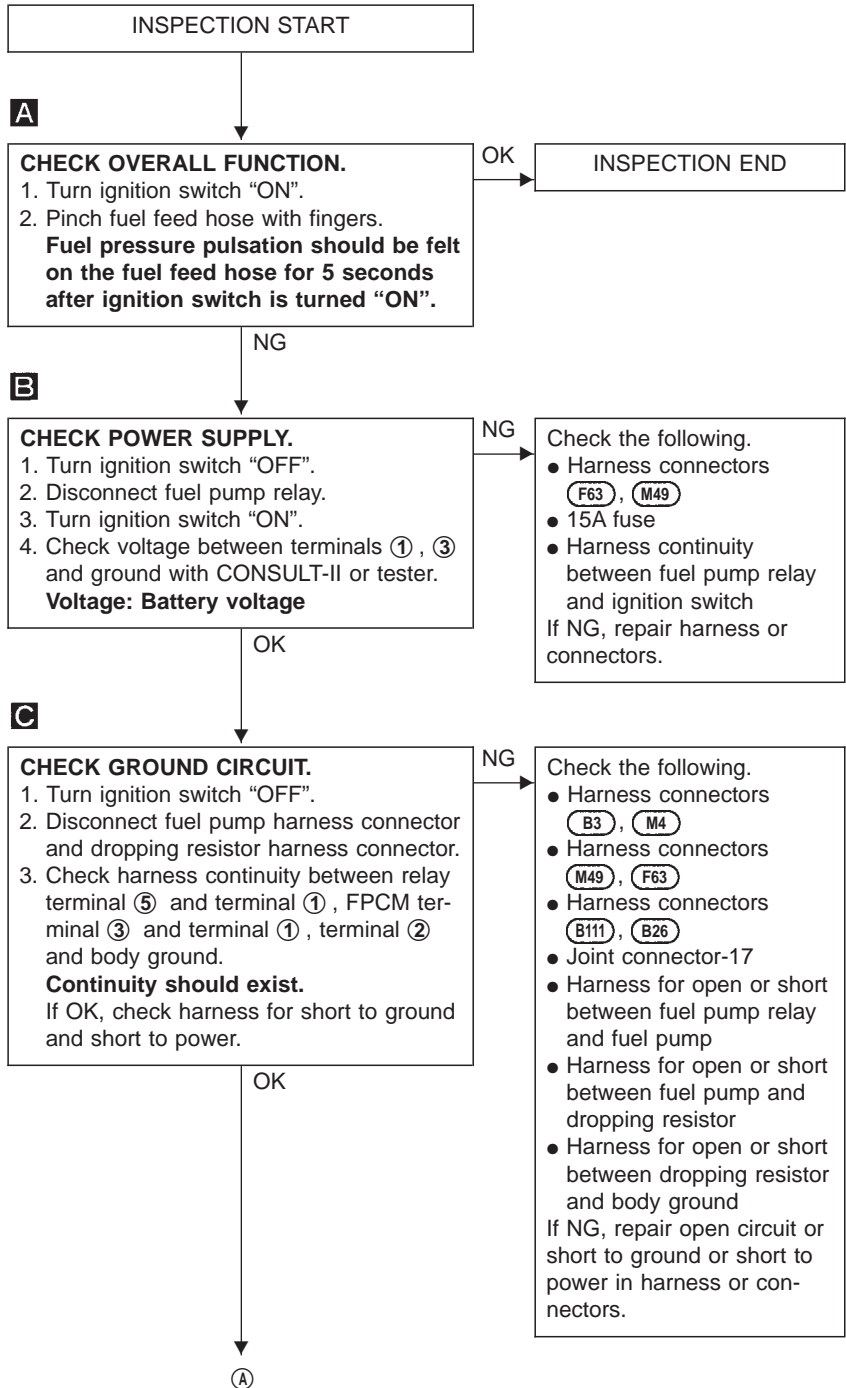
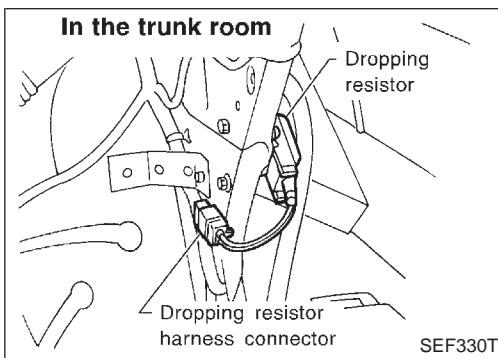
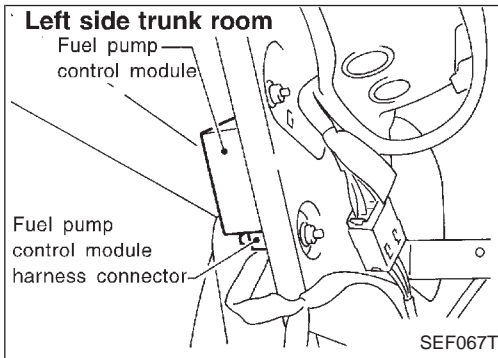
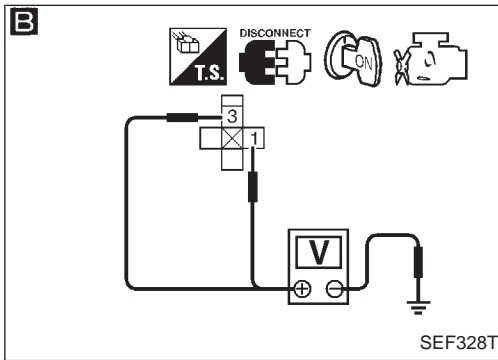
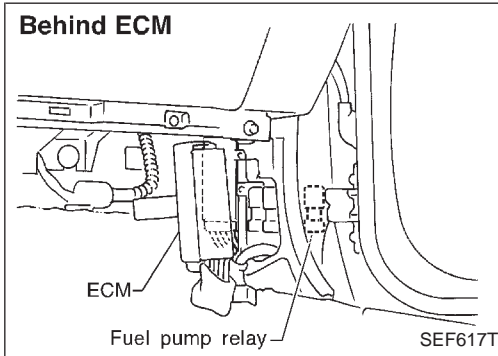
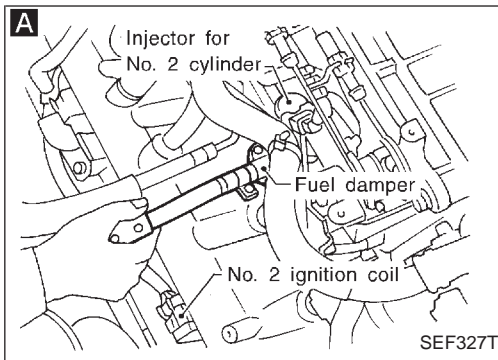
Fuel Pump Control (Cont'd)

EC-F/PUMP-01



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

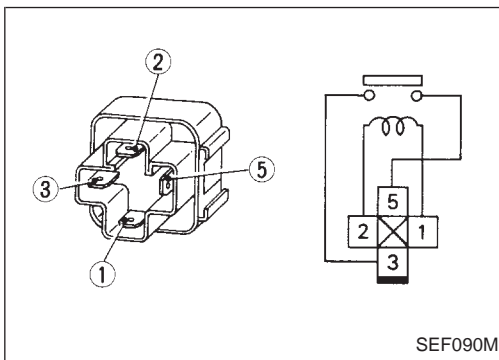
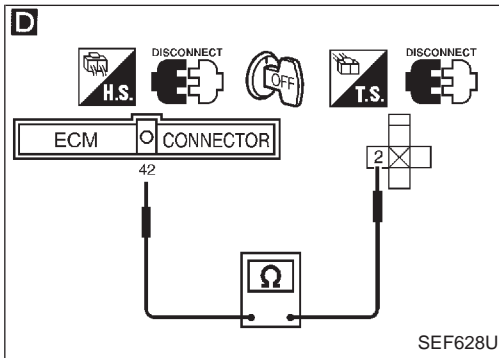
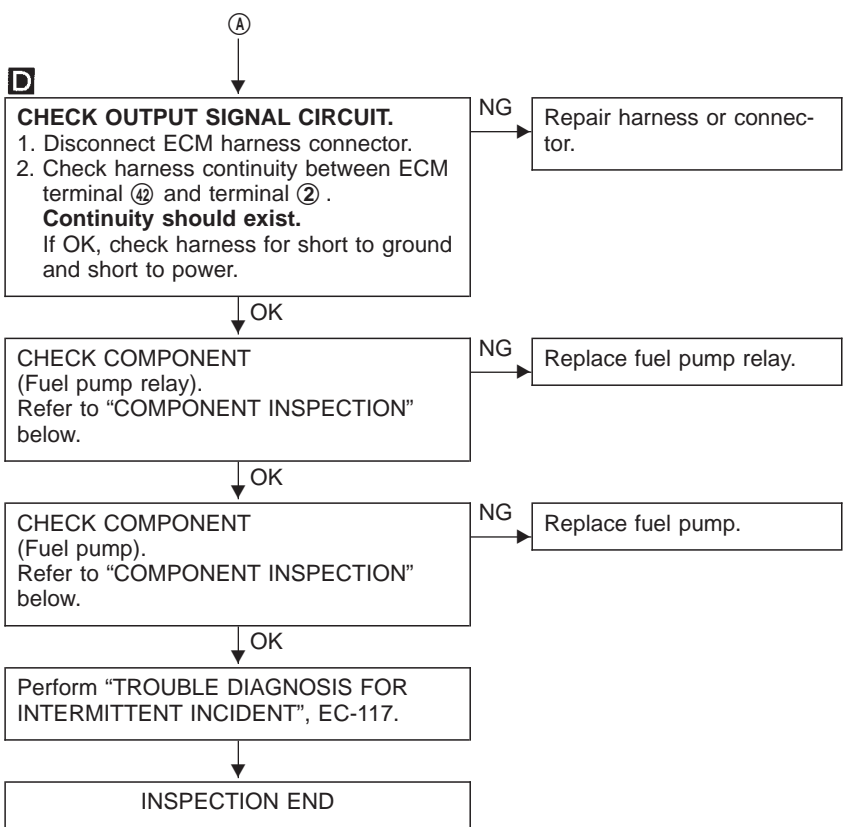
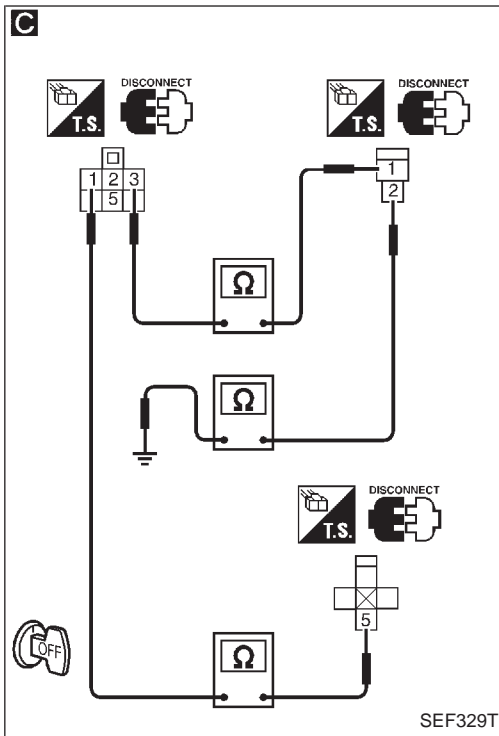
Fuel Pump Control (Cont'd) DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump Control (Cont'd)



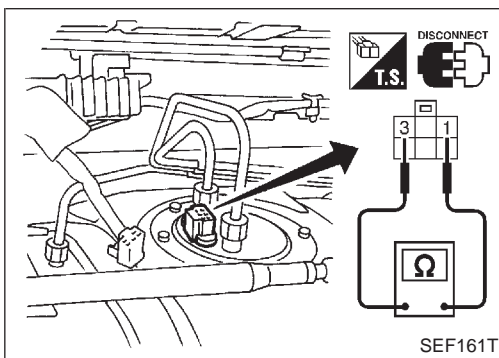
COMPONENT INSPECTION

Fuel pump relay

Check continuity between terminals ③ and ⑤ .

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

If NG, replace relay.

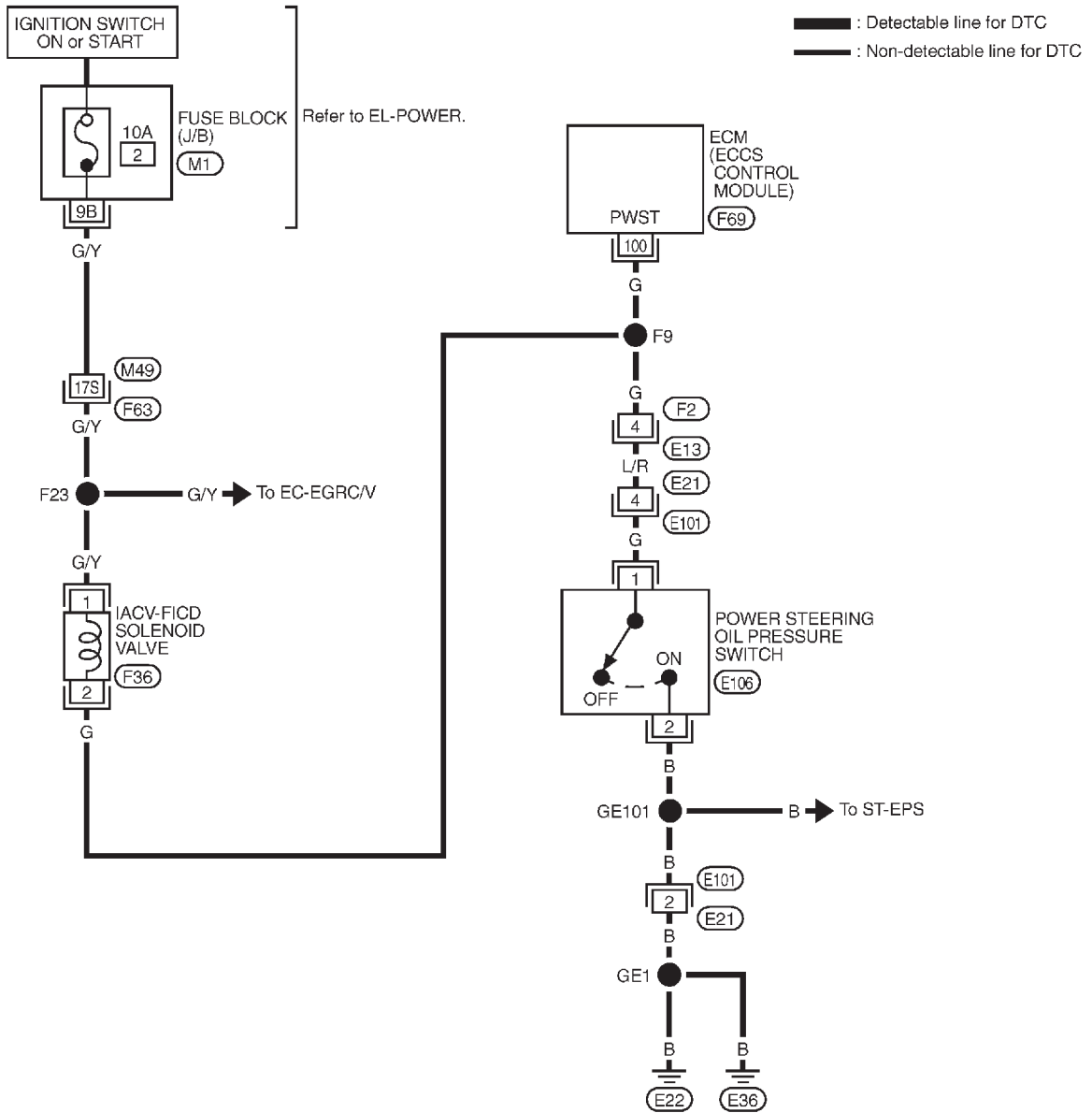


Fuel pump

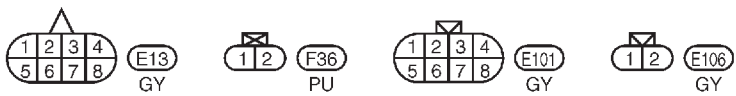
1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ③ .
Resistance: 0.2 - 5.0Ω at 25°C (77°F)
 If NG, replace fuel pump.

Power Steering Oil Pressure Switch

EC-PST/SW-01

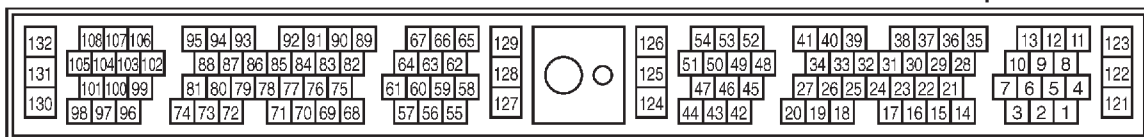


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(M49), (F63)
(M1)

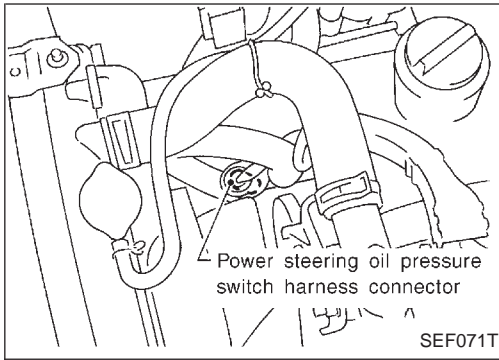


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)

COMPONENT DESCRIPTION

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-FICD solenoid valve to increase the idle speed and adjust for the increased load.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

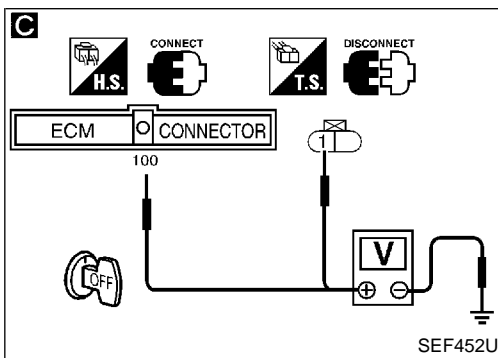
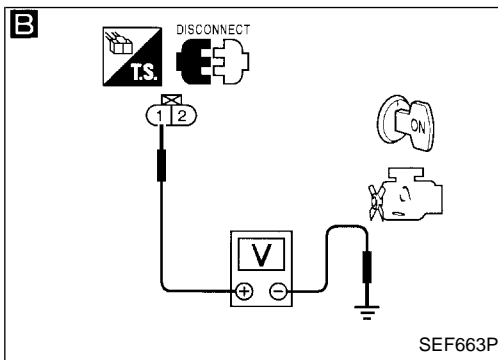
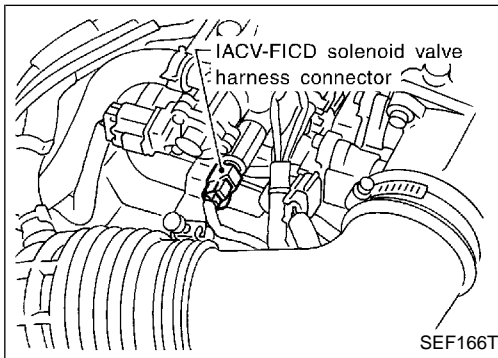
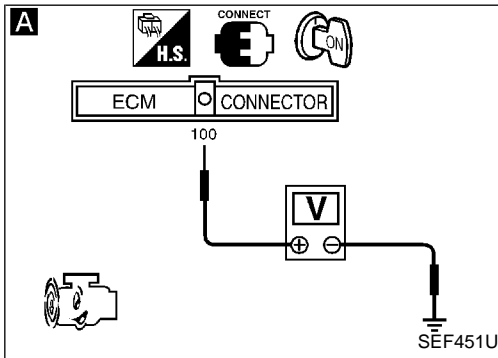
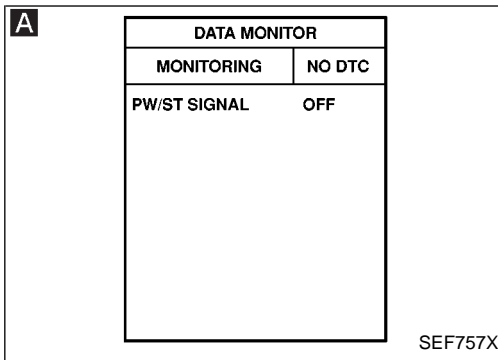
ECM TERMINALS AND REFERENCE VALUE

Specification data are reference values, and are measured between each terminal and (128) (ECM ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
100	G	Power steering oil pressure switch	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Steering wheel is being turned. 	0 - 1.5V
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Steering wheel is not being turned. 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK OVERALL FUNCTION.

- Start engine.
- Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.

Steering is neutral position: OFF
Steering is turned: ON

OR

- Start engine.
- Check voltage between ECM terminal (100) and ground under the following conditions.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above Battery voltage

OK → INSPECTION END

B

CHECK POWER SUPPLY-I.

- Stop engine.
- Disconnect IACV-FICD solenoid valve harness connector.
- Turn ignition switch "ON".
- Check voltage between terminal ① and ground with CONSULT-II or tester.

Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F63, M49)
- 10A fuse
- Harness for open or short between IACV-FICD solenoid valve and fuse

C

CHECK POWER SUPPLY-II.

- Turn ignition switch "OFF".
- Disconnect power steering oil pressure switch harness connector.
- Check voltage terminal ① (or ECM terminal (100) and ground.

Voltage: Battery voltage

NG → Repair harness or connectors.

OK

OK

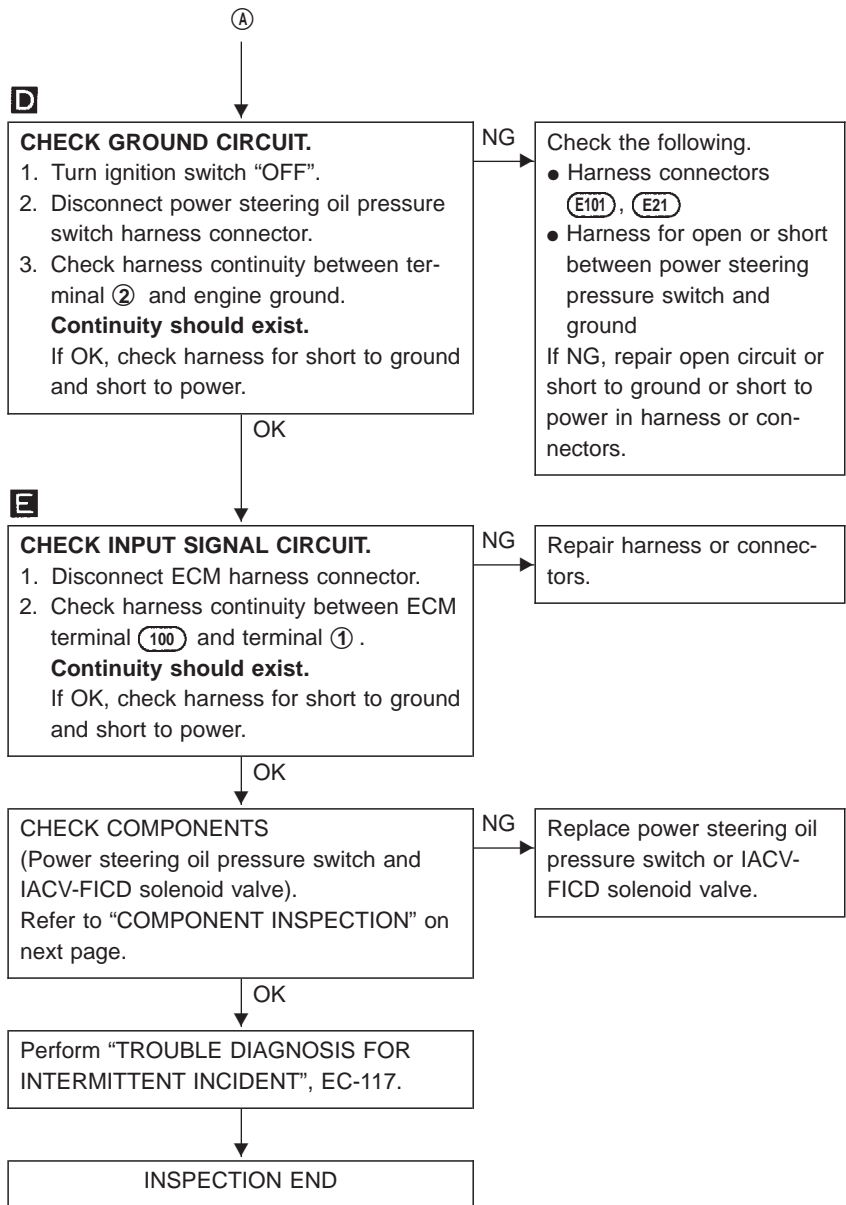
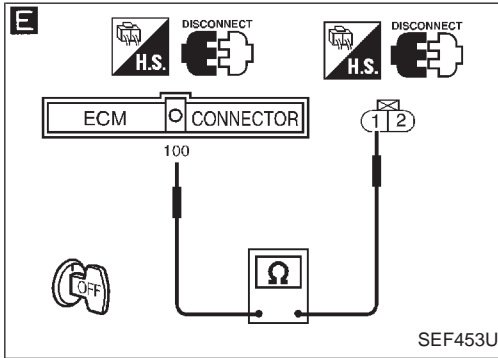
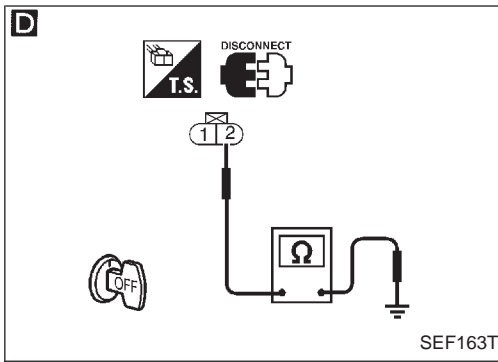
OK

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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)

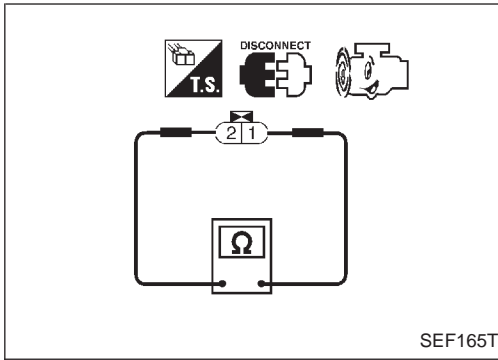


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd) COMPONENT INSPECTION

Power steering oil pressure switch

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 turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

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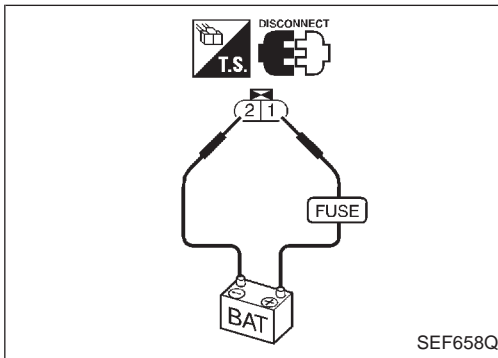
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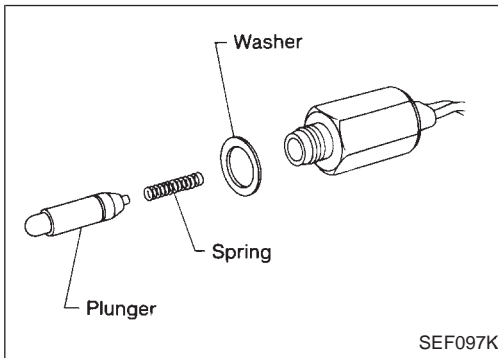
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IACV-FICD solenoid valve

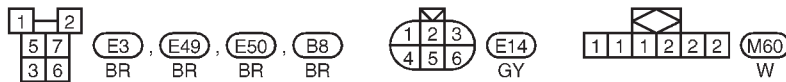
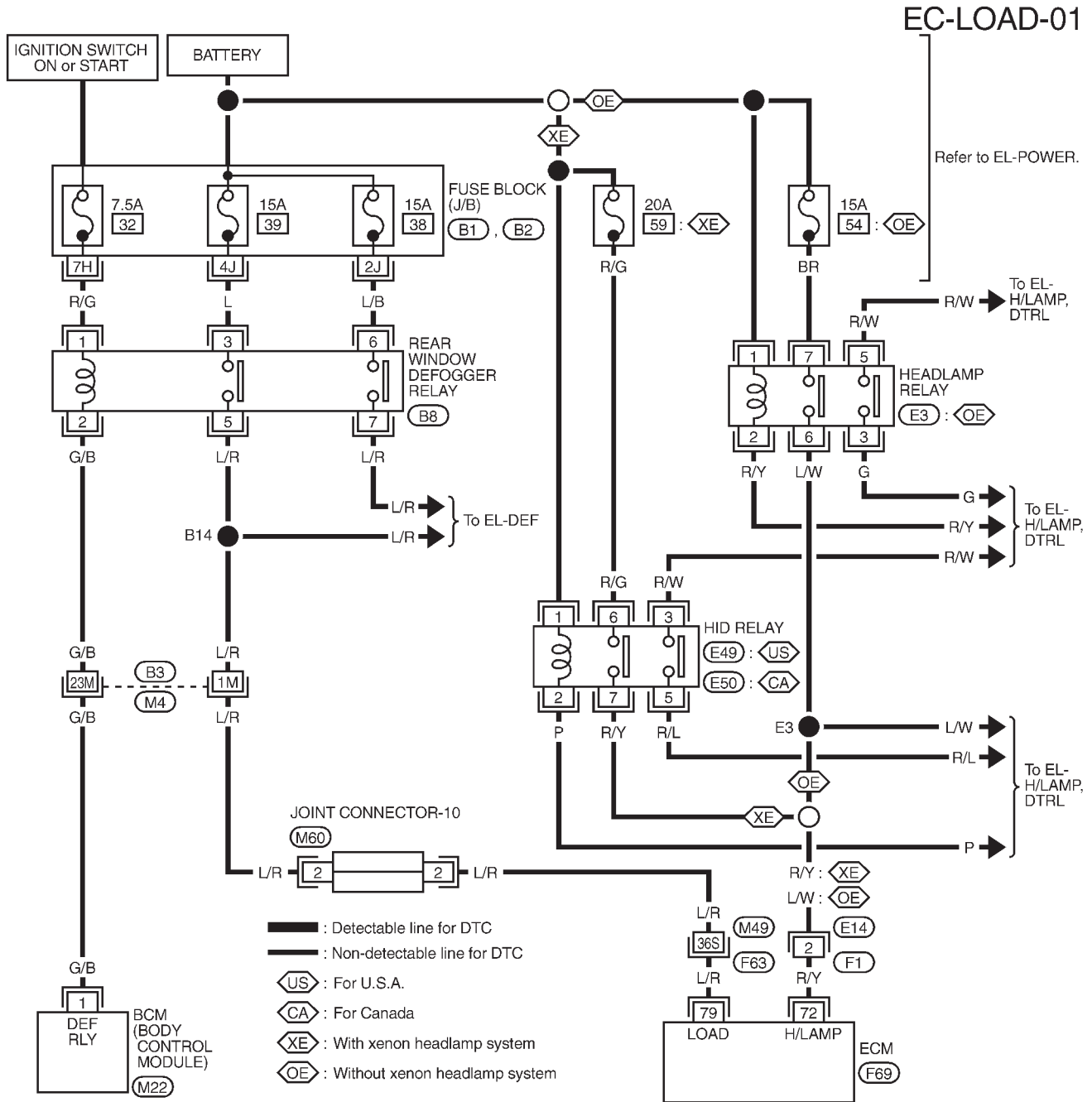
Disconnect IACV-FICD solenoid valve harness connector.

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

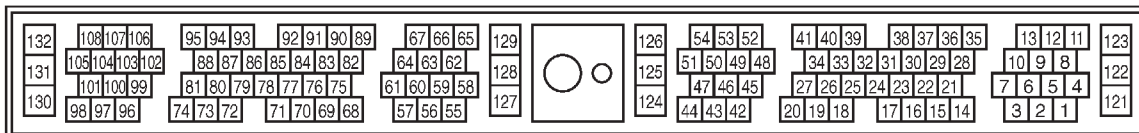
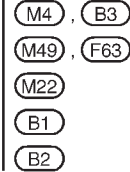


- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Load Signal

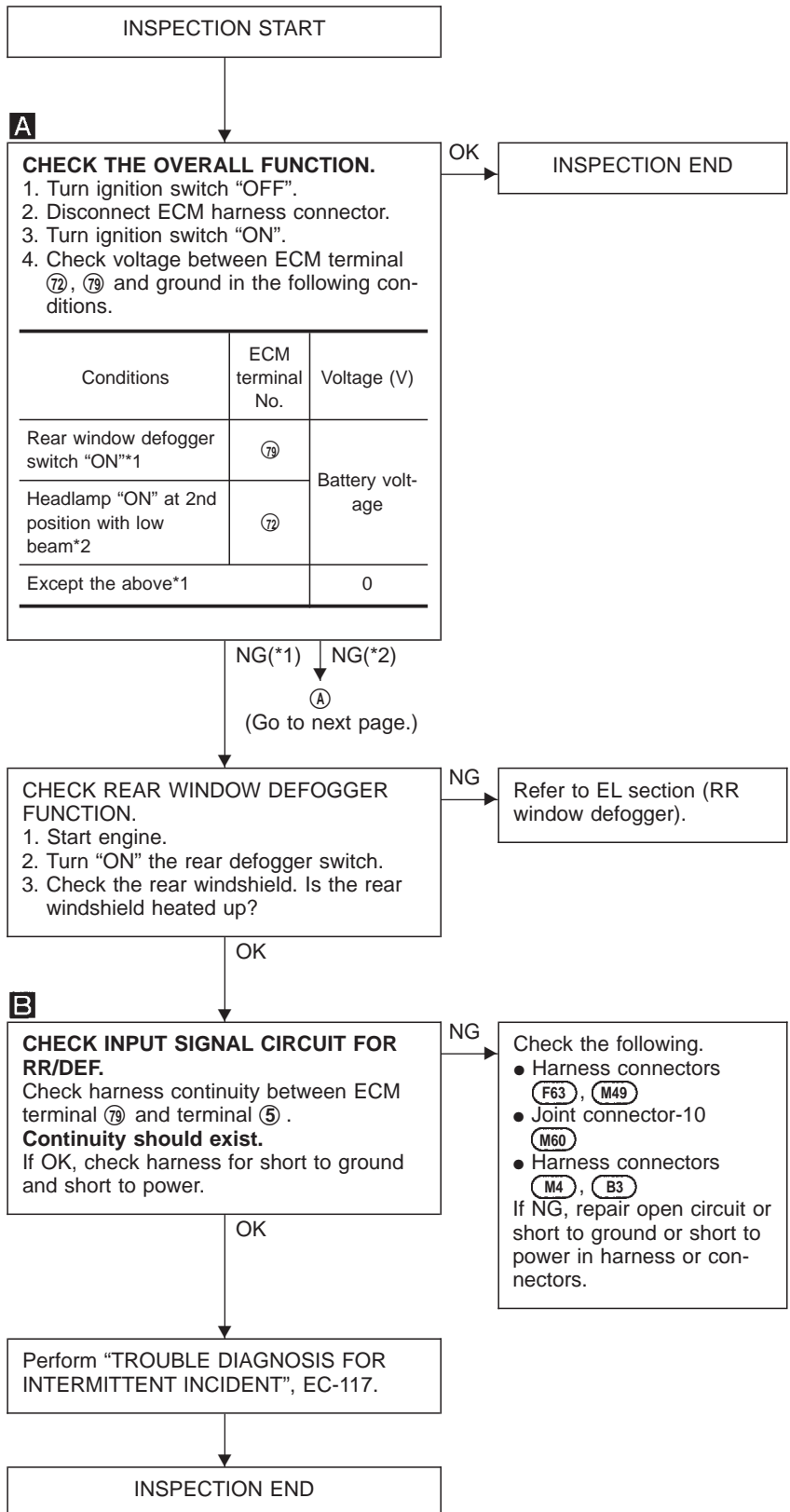
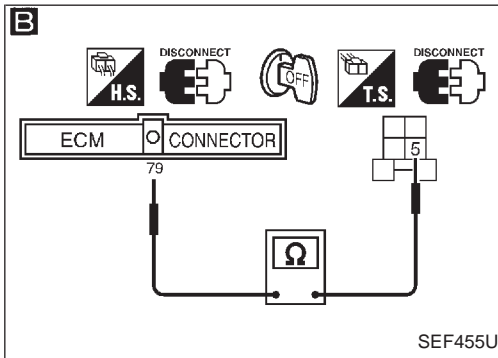
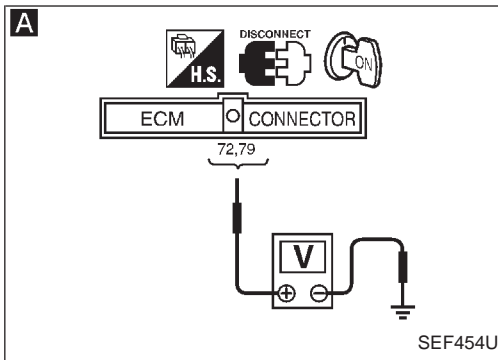


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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

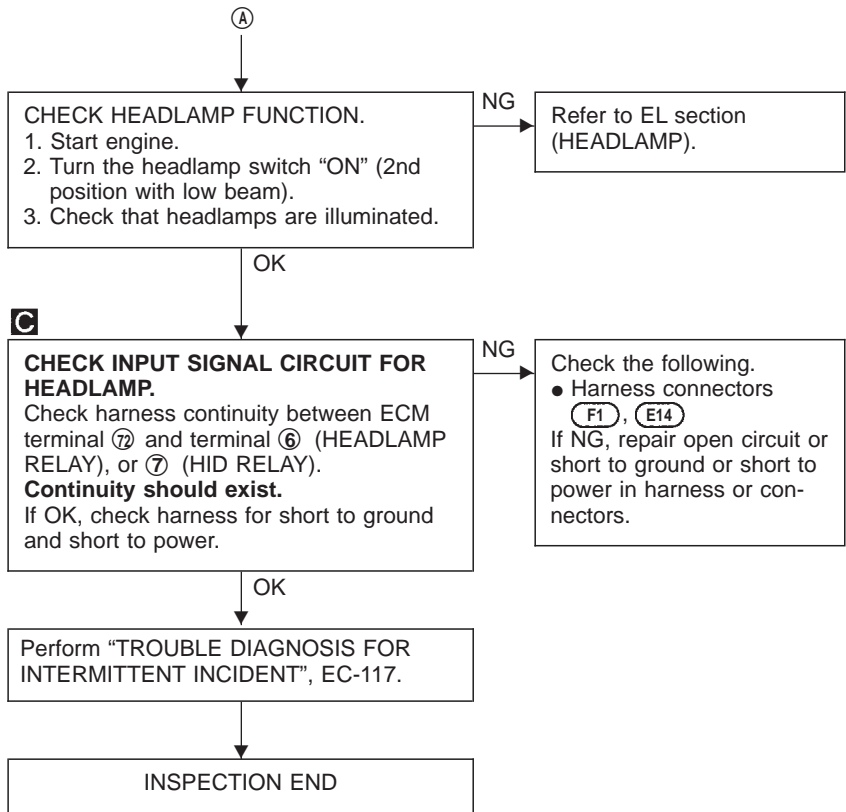
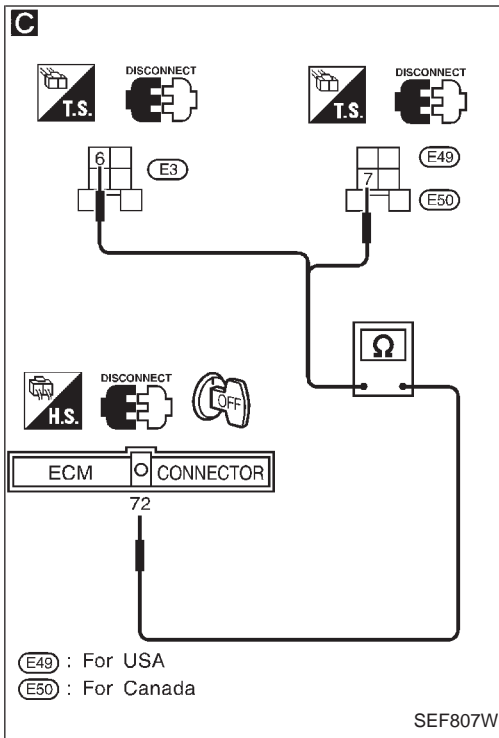
Electrical Load Signal (Cont'd) DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

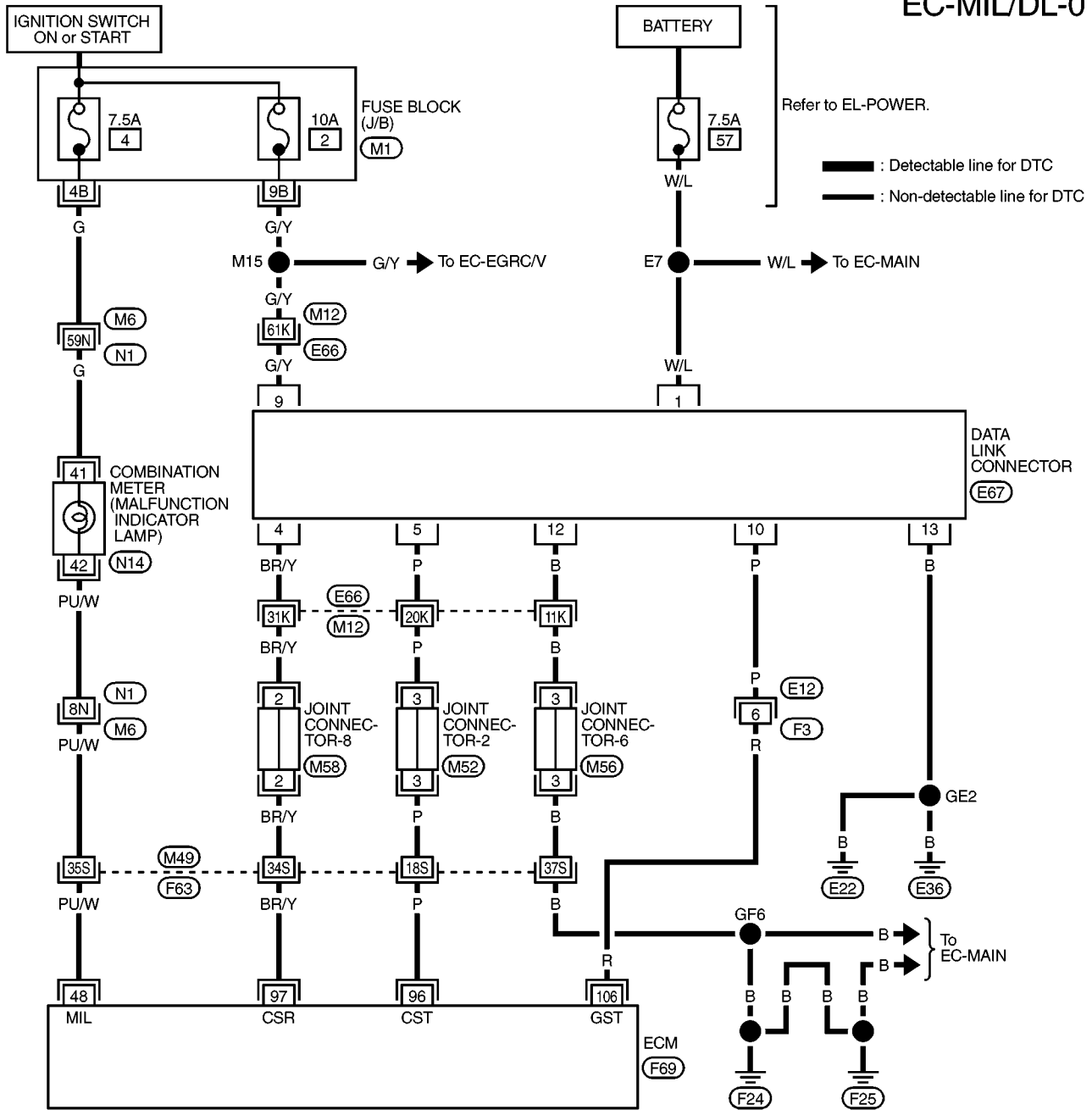
Electrical Load Signal (Cont'd)



MIL & Data Link Connectors

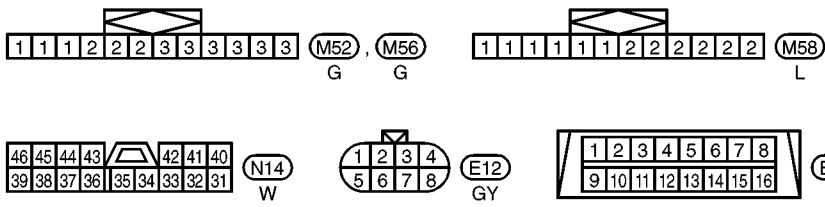
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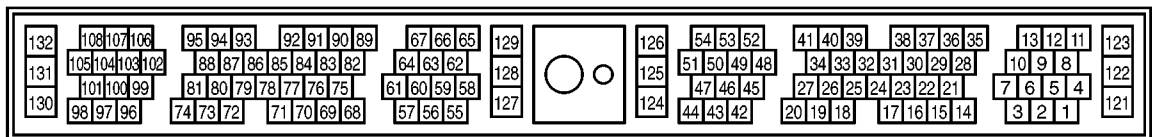


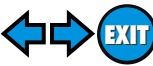
Refer to EL-POWER.

— : Detectable line for DTC
— : Non-detectable line for DTC



Refer to last page (Foldout page).
M6, N1
M12, E66
M49, F63
M1





General Specifications

PRESSURE REGULATOR

Fuel pressure	kPa (kg/cm ² , psi)	
At idle		Approximately 235 (2.4, 34)
A few seconds after ignition switch is turned OFF to ON		Approximately 294 (3.0, 43)

Inspection and Adjustment

Target idle speed*1	rpm	650±50 (in "P" or "N" position)
No-load*3		
Base idle speed*2	rpm	600±50 (in "P" or "N" position)
No-load*3		
Air conditioner: ON (in "N" position)		More than 700 rpm
Ignition timing		15°±2° BTDC

*1: TPS harness connector connected.

*2: Using CONSULT-II "WORK SUPPORT" or TPS harness connector disconnected.

*3: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	1.0 - 1.7 at idle* Approximately 2.1 at 2,500
Mass air flow (Using CONSULT-II or GST)	g·m/sec	3.0 - 6.0 at idle* 12.9 - 25.3 at 2,500 rpm*

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

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.61	0.68 - 1.11
50 (122)	2.53	0.09 - 0.12
100 (212)	0.87	0.017 - 0.024

FRONT HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	2.3 - 4.3
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REAR HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	2.3 - 4.3
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FUEL PUMP

Resistance [at 25°C (77°F)]	Ω	0.2 - 5.0
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IACV-AAC VALVE (Step motor type)

Resistance [at 25°C (77°F)]	Ω	Approximately 30
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INJECTOR

Resistance [at 25°C (77°F)]	Ω	10 - 14
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THROTTLE POSITION SENSOR

Accelerator pedal conditions	Voltage*
Completely released (a)	0.15 - 0.85
Partially released	Between (a) and (b)
Completely depressed (b)	3.5 - 4.7

*: Measured with vacuum applied to the throttle opener using a vacuum pump.

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT-II or GST)
At idle	13.0 - 32
At 2,500 rpm	13.0 - 25.5

INTAKE AIR TEMPERATURE SENSOR

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment (Cont'd)

DROPPING RESISTOR

Resistance [at 25°C (77°F)]	Ω	Approximately 0.8
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CRANKSHAFT POSITION SENSOR (OBD)

Resistance	Ω	166.5 - 203.5 [at 25°C (77°F)]
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EVAP CANISTER PURGE VOLUME CONTROL VALVE

Resistance [at 25°C (77°F)]	Ω	35 - 43
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INTAKE VALVE TIMING CONTROL POSITION SENSOR

Resistance [at 25°C (77°F)]	Ω	600 - 740
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